FACTOR MARKETS

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Performance Indicators in Agricultural Financial Markets

ABSTRACT

This study attempts to develop performance indicators for the financial markets based on the findings in an earlier Factor Markets Working Paper (No. 33, "Agricultural credit market institutions: A comparison of selected European countries") and on FADN (Farm Accountancy Data Network) data. Two indicators were developed. One measured the long-term economic sustainability of agricultural firms since the financial characteristics of the firms were perceived as important factors when rejecting a loan applicant. If the indicator works, it should show that a low value in this indicator is related to the performance in the financial markets. The second indicator was the loan-to-value (LTV), or debt-to-asset ratio, the reasoning behind this indicator is that low values can point to credit constraints, and in WP 33 we saw that the interviewed experts expected LTVs to be much higher than what is actually the case. We find that the first indicator can't be used to measure the performance of the financial institutions, since we can't show any relationship between the indicator and activities in the financial markets. However, the indicator is valuable for its measurement of the long-term financial sustainability of the agricultural sector, or of the firms. The loan-to-value indicator does imply that most countries would have room to increase the credit.

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Performance Indicators in Agricultural Financial Markets

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1. Introduction

In this Working Paper some of the findings of Jansson et al (2013) (WP 33 of the Factor Markets project, *Agricultural credit market institutions: A comparison of selected European countries*, hereinafter WP 33) have been the starting point to develop economic and financial performance indicators.

In WP33 we found agricultural specific involvement of government in financial markets which might indicate that the governments assume that agriculture has problems in receiving credit. Different levels of involvement were found: agriculture specific regulations (FYROM, Italy and France), different kinds of government support (Finland, Netherlands, Greece, Germany, Italy, France and Belgium) and the existence of government credit institutions (all case study countries except Ireland, UK, Slovakia and Sweden). At least the various types of government support have been shown to be inefficient (Swinnen & Gow, 1999). Another indication of inefficiencies in the agriculture financial markets is the low values of LTV. In Curtiss (2012) this is mentioned as a sign of credit constrains.

Our first indicator draws on WP 33 where we found that economic factors, such as farm business income, credit history and access to collateral were important factors in credit rejections. Furthermore, if a firm shall be long-term sustainable (in economic terms) there needs to be enough room for household consumption and taxes so the farmer can make a living off the firm. In the current WP we develop an indicator to measure the economic sustainability (ES) of the farm. We assume that farms with low values in ES are likely to have difficulties in receiving loans.

The second indicator is loan to value (LTV), or debt-to-asset ratio. In WP 33 we found that the experts who were interviewed for the questionnaire consistently expected the level of LTV to be higher than what the calculations of LTV implied. The LTV also provides a measure of how much collateral is available, although most countries were shown to lean towards cash-flow-based lending rather than asset-based lending. To further investigate this, in the current WP we use FADN data to calculate the LTV's for the case study countries and compare them to the expected levels that were reported in WP 33.

The questions we seek to answer are:

1) Can ES be used as a performance indicator of the financial markets? In other words, is there a connection between ES and the situation on the financial markets for the agricultural firms?

2) Is LTV lower that what the experts expected in WP 33? Does this imply that the credit levels could be higher in agriculture?

Differences in economic performance and LTV might be explained by differences in farm structure and production. We use FADN and FSS (Farm structure statistics) data from Eurostat to describe the farm and production structures of the case study countries to see if it is possible to explain differences in the performance indicators.

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For the indicator development, FADN data (online version) was used. This clearly reduced the possibilities to do detailed indicators since the online version is aggregated at national level. A drawback with using FADN data in this working paper is also that FYROM is not included in the data set and we thus lose one of the case study countries.

2. Performance indicators

2.1 Room for consumption – economic sustainability

In Working Paper No. 33 we saw that an important factor in the risk assessment of banks is the economic situation of the firm (see Table 8, p. 11 in WP No. 33). Examples of important factors for rejecting a loan applicant are: "Insufficient farm business income", "Poor credit history of the applicant" and "Lack of collateral". When it comes to weights assigned to different characteristics in risk assessment (see Table 10, p.13 in WP No. 33) high weight is given to cash flow. All of these are related to the economic and financial situation of the farms and we thus conclude that an indicator to measure the economic sustainability of a firm could give an insight into the likelihood for firms to get credit in the long run. Furthermore, household income also influences the credit constraints: a higher household income reduces the risk of experiencing credit constraints, either through the demand for credit being lower in a higher-income household or through the creditor perceiving the investment to be more secure (Nuryartono et al., 2005). Similar results are also found in Rahji & Adeoti (2010).

In Lagerkvist, 2001, a model is presented to analyse the economic performance of firms, based on financial statement data like the data in FADN. Based on that model we build an indicator of economic sustainability based on what the farmer has left for private consumption and taxes after all costs have been covered. We thereafter relate that room for consumption to the GDP per capita (euro) to enable comparison between countries. Economic sustainability (ES) is calculated as

$$ES=I-(\Delta F+\Delta D)$$

Where (I) is net cash income, (ΔF) is change in funds used between years, and (ΔD) is change in debt use between years.

Greece is the only country in this case study that shows positive values for all years (see 0). France has one negative year out of 20, and Belgium has two negative years. On the other extreme we find Ireland, Netherlands, Poland, Finland, Slovakia, Sweden and the UK who all have negative results on this indicator in a majority of the years. Germany and Italy both have 5 negative years out of the 20. Since the data is aggregated on national levels, the individual farms in a country with many negative years might still be better off than the numbers here imply. There does not seem to be any particular year that is bad for all countries, we may thus assume that local determinants are important for the outcome in this indicator.

Table 1. Data description

Item	Calculation	Data description
Farm income	Total Output (SE131) + Total Subsidies – excluding on investments (SE605)-Total Input (SE270)	SE131 = Total of output of crops and crop products, livestock and livestock products and of other output. Sales and use of (crop and livestock) products and livestock + change in stocks of products (crop and livestock) + change in valuation of livestock - purchases of livestock + various non-exceptional products. (incl. Leased land ready for sowing, receipts from occasional letting of fodder areas, agistment, forestry products, contract work for others, hiring out of equipment, interest on liquid assets necessary for running the holding, receipts of tourism, receipts relating to previous accounting years, other products and receipts) SE605 = Subsidies on current operations linked to production (not investments). Payments for cessation of farming activities are therefore not included. Entry in the accounts is generally on the basis of entitlement and not receipt of payment, with a view to obtain coherent results (production/costs/subsidies) for a given accounting year. SE270 = Specific costs + Overheads + Depreciation + External factors. Costs linked to the agricultural activity of the holder and related to the output of the accounting year. Included are amounts relating to inputs produced on the holding (farm use) = seeds and seedlings and feed for grazing stock and granivores, but not manure. When calculating FADN standard results, farm taxes and other dues are not included in the total for costs but are taken into account in the balance Subsidies and taxes (subsidies - taxes) on current and non-current operations. The personal taxes of the holder are not to be recorded in the FADN accounts (including remuneration of inputs (work, land and capital) which are not the property of the holder. = wages, rent and interest paid.)
Current farm assets	Total current assets (SE465) Calculated as a change (=year n- year (n-1))	SE465 = Non-breeding livestock + Circulating capital (Stocks of agricultural products + Other circulating capital).
Long term farm assets	Total fixed assets (SE441) Calculated as a change (=year n- year (n-1))	SE441 = agricultural land and farm buildings and forest capital + buildings + Machinery and equipment + Breeding livestock.
Funds available for withdrawals and taxes	Calculate(Income-Change in assets)	
Actual change in debt use	Long-term (SE490) + Short term (SE495) debt. Calculated as a change (=year n-year (n-1))	SE490 = Loans contracted for a period of more than one year. SE495 = Loans contracted for less than one year and outstanding cash payments.
Room for consumption	Calculate (Income-(change in asset + change in debt use))	

Table 2. Economic sustainability in the case study countries (subsidies included).

	BE	DE	GR	FR	IE	IT	NL	PL	FI	SE	SK	UK
1990	18707	19408	7769	13712	10022	4417	26159					29780
1991	30797	1423	9568	24249	10761	357	13642					30546
1992	-13123	-11596	5944	2902	5280	6940	-24035					78725
1993	18748	11138	8813	28339	18143	23987	-45068					23054
1994	1814	-4707	7822	8087	-3029	-77634	-28909					-21211
1995	24124	-256725	8327	13517	-1046	20039	-2730		-178910	-404059		18579
1996	33987	35773	4976	11832	-9418	-12348	28184		19046	-14048		-3790
1997	42759	47312	7190	23387	-13373	4580	1220		17795	21870		-143670
1998	31151	643	11872	20053	-5682	-34263	-54226		-37762	-11047		26749
1999	6459	-69571	7655	2594	-27802	6337	-159434		-16920	-19962		-32332
2000	44632	33274	10744	18510	-52697	19744	-213373		10716	-71418		-19895
2001	46578	12602	6296	32563	-9682	16363	-242144		14164	17479		-105147
2002	19717	3802	10742	6188	-60949	-84195	-43611		21718	-78131		37964
2003	13017	9516	8394	24465	39556	117446	17404		5189	-11872		103233
2004	10154	5095	6582	-957	-39804	41509	-63494		-1891	-31765		-3917
2005	33432	26105	10198	27795	-165730	-23657	-92407	2354	-18254	-106015	-58291	-108496
2006	5891	-11006	8524	11803	-168057	12096	-12987	2252	-10543	-67650	319461	-76206
2007	-14884	34658	11992	26212	-68751	22625	-107613	-2087	-6815	30712	-257981	-146285
2008	1230	10840	12090	4112	75215	46200	-95711	-4925	-4286	934	412954	155911
2009	40325	15849	7081	27251	101161	27621	-175376	-25130	9859	69398	-1283712	-7959
STDEV	18361	64205	2093	10252	65303	42848	80414	11392	17132	48172	678218	78581

Source: Own calculations based on FADN. Calculations for individual countries can be found in Appendix 1, Stepwise calculations for all countries.

When investigating further what the determining factors are in the ES indicator it is helpful to look at the stepwise calculations of the indicator (Appendix 1). A year with a mediocre income could turn out to give a high value in ES if the change in assets is negative (selling or depreciation) and the change in debts is positive (increasing the debts from one year to another). And this is also what we can see in the stepwise calculations. The negative years for most countries are mainly caused by a strong positive change in assets, in the case of Belgium 2007 was extreme, for Germany 1995 was extreme and for France 2004 was extreme.

Greece, the only country with positive results for all years, has a stable income and small fluctuations in assets. Furthermore, in Greece the change in debts is often negative which adds to the positive results for the indicator. Ireland has two extremely bad years recently: 2005 and 2006. In these years the assets increased with almost €185,000 each year, normal income levels could not cover these extreme changes. In Italy there are great variations in the ES levels: a good year is often followed by a bad year – again the changes in assets are determining the ES levels. Netherlands show the same pattern for the most part, except for 2009 when the income was much lower than normal. In Poland the asset domination is emphasized further in 2009 when a negative change in debt occurs at the same time as the assets increase. For Finland somewhat lower income in combination with increase in assets and decrease in debts determines the worst year (1998), for the rest Finland shows the same pattern as the rest of the countries. Sweden has big variation in income; with the exception of Slovakia, it is the only country with negative income (1998). The worst year in Sweden (2005) there was an extreme increase in assets – the best year (2009) there was an extreme decrease in assets. Income in the UK varies, and in the years 2005-07, there were strong increases in assets, 2008 on the other hand was a good year for UK with a good income in addition to a negative change in assets.

For most countries the increase in assets is mirrored by an increase in debt (see Graphs in appendix 1) with the exceptions of Greece, Italy, Ireland, Poland and Slovakia.

In general the room for consumption and taxes has decreased between 1995 and 2009; in most countries it is lower than the GDP/capita (see Table 3). Slovakia seems to have farmers who are economically much better off compared to national GDP/capita some years, and some years the farmers are much worse off than the national income. The FADN sample from Slovakia consists of extremely large farms; maybe this is an explanation for the extreme numbers.

Table 3. Room for consumption in relation to GDP/capita

	BE	DE	GR	FR	IE	IT	NL	PL	FI	SE	SK	UK
1995	0,67	-11,67	0,63	-0,14	-0,54	1,15	-0,26					-0,44
1996	1,08	0,76	0,24	-0,31	-1,11	-0,89	1,20		-0,47	-1,08		-1,90
1997	1,52	1,31	0,42	0,29	-1,17	0,07	-0,07		-0,48	0,19		-8,38
1998	0,98	-0,69	0,66	0,10	-0,71	-1,96	-2,47		-2,89	-1,11		-0,12
1999	-0,32	-3,75	0,31	-0,72	-1,53	0,11	-6,63		-1,98	-1,39		-2,67
2000	1,37	0,48	0,53	-0,05	-2,25	0,74	-8,24		-0,96	-3,07		-1,90
2001	1,26	-0,40	0,18	0,45	-0,67	0,54	-8,90		-0,86	-0,19		-5,09
2002	0,18	-0,84	0,44	-0,69	-2,23	-3,94	-1,74		-0,65	-3,55		-0,08
2003	-0,10	-0,64	0,29	-0,03	0,74	4,82	0,26		-1,25	-1,25		2,34
2004	-0,20	-0,93	0,14	-1,03	-1,50	1,51	-2,42		-1,50	-1,89		-1,56
2005	0,56	-0,15	0,33	0,04	-4,65	-1,20	-3,37	0,02	-2,09	-4,17	-20,87	-5,04
2006	-0,51	-1,63	0,14	-0,59	-4,48	0,23	-0,89	-0,20	-1,70	-2,93	26,77	-3,88
2007	-1,22	0,02	0,31	-0,04	-2,04	0,65	-3,56	-0,72	-1,58	-0,14	-39,07	-5,76
2008	-0,73	-0,79	0,28	-0,79	1,35	1,54	-3,11	-1,05	-1,51	-1,01	22,18	3,82
2009	0,50	-0,69	0,04	-0,02	2,26	0,86	-5,56	-3,73	-1,22	1,12	-126,19	-2,11

Source: Own calculations based on FADN.

2.2 Loan to value

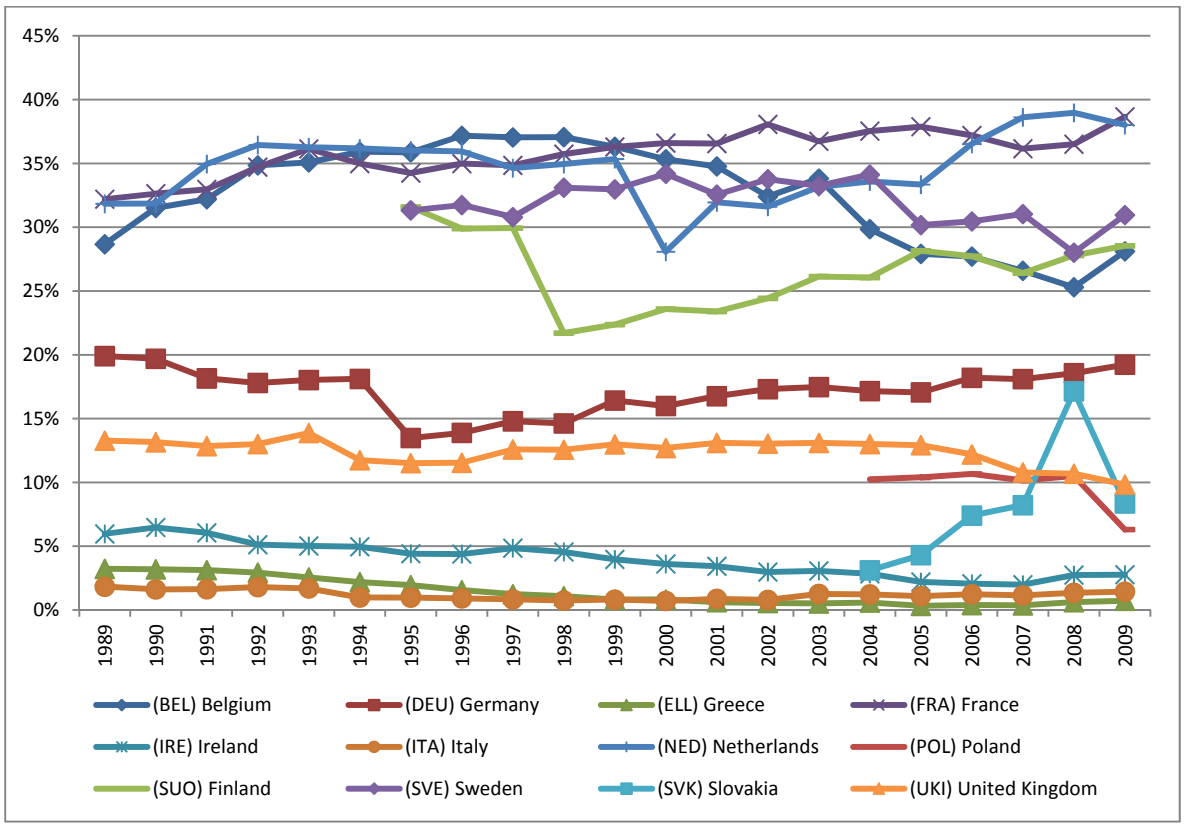
The questionnaire gave somewhat contradicting results regarding the loan to value (LTV) of the agricultural sector. The experts generally estimated the LTV to be 50-90%, but when calculated the LTV was much lower at 2-50%. Here we follow up with a LTV calculation based on FADN data. A low LTV might indicate some degree of credit rationing – however, it might very well be that the farmers have borrowed as much capital as they need. But a low value still indicates that there is room for more borrowing, should the firm want to.

Loan to value has been calculated as:

Total liabilities/Total assets

This is also called debt-to-asset ratio and it shows the financial risk of a company by measuring how much of the assets that have been financed through debt.

Figure 1. Loan to value (LTV)



Source: Own calculations based on FADN.

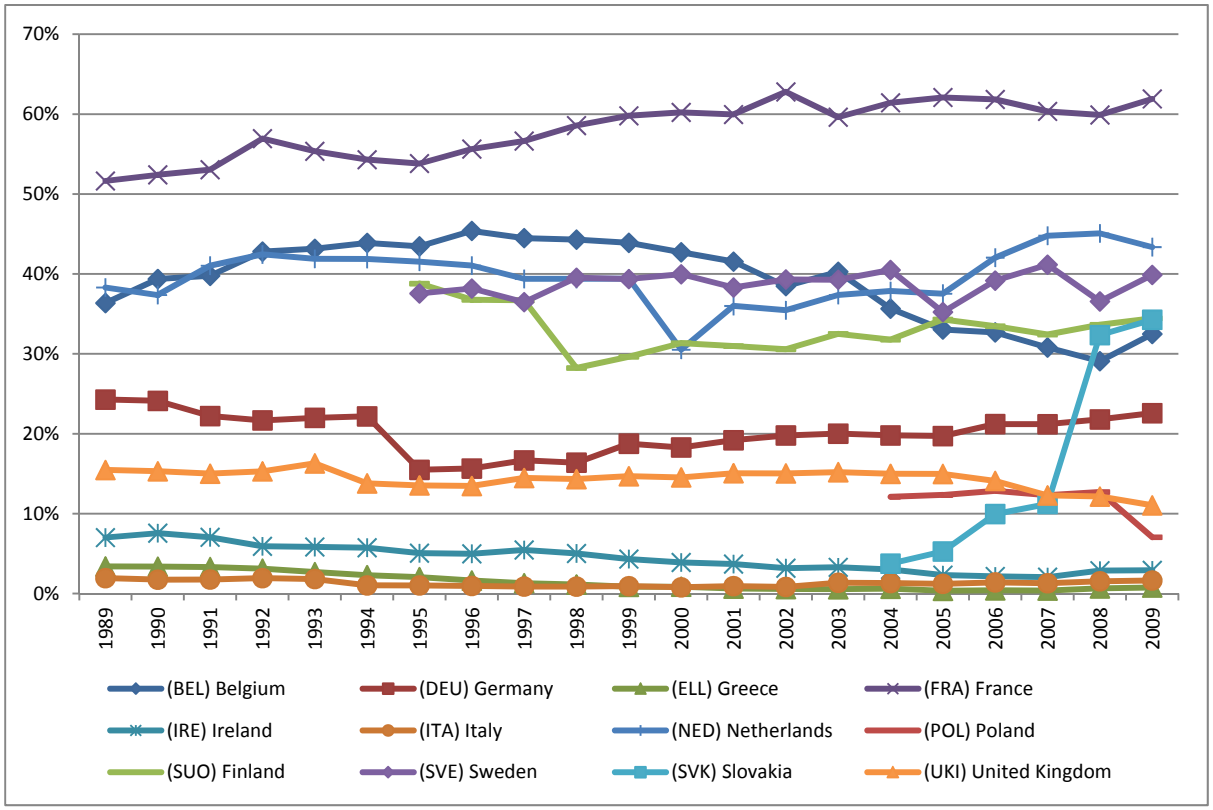
The results show that LTV is lower than what the experts expected in the WP 33 (p. 18-19). Some countries – Greece, Italy, Ireland, Slovakia, and Poland have LTV of 10% or less. In these countries the expected LTV as described in WP 33 were, depending on the asset: 70-90% (Greece), 30-70% (Slovakia) and 80-100% (Poland), there were no response on this question for Italy and Ireland. UK and Germany have LTVs of 10-20%. In WP 33 the experts expected the LTV to be 70-100% for the UK; there was no answer from Germany on this question. The rest of the countries all have LTV above 20%, with the highest value for Netherlands and France at about 40%. In WP 33 there were answers from Sweden (40-75%), Finland (60-100%) and the Netherlands (100%). This either indicates that there is room for more credit or means that the definitions of LTV that the experts used is not the total liabilities divided by the total assets. The discrepancy between what is calculated and what the experts expected could be caused by the experts assuming LTV for one future investment, rather than the debt-to-asset ratio.

These low LTV's, or low debt-to-asset ratios are also pointed out in Curtiss, 2012. This could be explained by differences in accounting standards in agriculture and in non-agriculture, but also by the characteristics of the assets making them harder to liquidize. Thus, it can be difficult for the farmer to use assets as collateral for several reasons: in proprietary farms there is a lack of differentiation between business assets and private assets and the farmer's machinery is not always possible to liquidize on a second-hand market. In other words: not all assets in a farm would be possible to use as collateral. In Weber & Musshoff (2012), they show that the risk of credit rationing is somewhat higher in agriculture than in other sectors, measured as the "probability of receiving a loan". Although once they receive loans, they are not volume-rationed.

Another aspect of LTV is that it can show the availability of collateral. Collateral can be used to reduce the risk since the creditor can sell the collateral should the borrower default on the loan. However, as stated above, the use of collateral in agriculture is not without difficulties

and the LTV for different asset categories are likely to differ: it is more likely to find high LTVs on land and buildings than on machinery. In mortgage loans collateral is real property, but only Sweden has mortgage institutes as an important creditor in WP 33. Most countries have commercial banks as the most important loan provider. In the Netherlands and Poland farmers' cooperative banks are most important. Nevertheless, also these creditors might prefer fixed assets as collateral rather than cash.[1] So an additional LTV for only fixed capital was calculated to see if a different picture emerges from that, and to see if there still seem to be room for more credit. The results are displayed in Figure 2. It is a similar pattern, though as might be expected the LTVs are higher: Ireland, Italy Greece and Poland are still below 10% in LTV, Slovakia increases to above 30%. UK and Germany remains between 10-20%. Belgium, Sweden, Finland, and the Netherlands remain between 30 and 40%, whereas France leaps to over 60% in LTV when only the fixed assets are used. This might indicate that there is room to use fixed assets as collateral to a larger extent.

Figure 2. LTV of fixed capital



According to WP 33 one of the most important factors for rejecting a loan is the lack of collateral. The LTV indicators show that there is room for higher credits, if only the availability of fixed assets for collateral is considered. The weights assigned to different characteristics in WP 33 show that both the expected cash-flow of the investment and the availability of collateral are important, when looking at the importance of just those two – asset-based lending versus cash-flow based lending – cash flow is more important than assets in most countries (the exception being Poland).

Different types of asset will have different levels of LTV and important in determining the asset value and thus also the LTV is the land prices and the development of land prices. In

[1] Curtiss (2012) also mentions how small firms, which are common in agriculture, usually already have used their own capital before turning to financial institutions for credit; thus cash as collateral would be unusual.

Ciaian et al. (2012), the development of land prices in EU member states is described for the period 1996-2009. Among the case study countries of the current WP, Germany and Greece saw decreasing land prices, and France and Italy saw stable land prices. Increasing land prices were experienced in the Netherlands, Belgium, Ireland, Finland, Sweden, UK, Slovakia and Poland.

Table 4. Development of land prices in the case study countries

Development	Country
Decreasing land prices	Germany, Greece
Stable land prices	France, Italy
Increasing land prices	Netherlands, Ireland, Finland, Sweden, Belgium, UK, Slovakia & Poland

Source: Ciaian et al (2012). Time periods are 1996-2009 for old member states and 2004 to 2009 for new member states.

The price levels differ a lot between as well as inside the countries (Ciaian et al., 2012) (see Table 5). A farmer in an expensive region who wishes to expand is faced with high costs, but also holds an attractive asset that the creditor can use as collateral because of strong demand from alternative uses. The total asset value of the firm is also higher. In a country with low price levels, one problem might be that the farmer's main asset is not valued high enough to be used as collateral and he will then have to rely more on cash flow to receive capital for investments.

Table 5. National average prices of agricultural land in some of the case study countries

Country	National average €/ha
Germany	8500 (2007)
Italy	18000 (2010)
Netherlands	47433 (2010)
Sweden	7000 (2009)
UK	17733 (2008)

Source: Ciaian et al. (2012).

In Greece the prices vary between €4,500 and €18,000 per hectare. In France, the quality label wine regions have very high prices (€95,200/ha), whereas pastures cost about €5,000/ha. In Belgium the average prices for arable land in Flanders are considerably higher at over €15,000/ha than in Wallonia at €6,500/ha (Ciaian et al., 2012).

3. Farm structure in the case study countries and connection to the indicators

The differences in the indicators might be related to the farm structure and the production in the individual countries. We use data from the farm structure survey (FSS) and FADN to build a typology based on the structure of the agriculture in our case study countries.

3.1.1 Farm structure typology

The average size of the farms in our case study countries varies between very small, 4.7 hectares in Greece, and rather big, 70.8 hectares in the UK (see Table 6). Also the number of livestock per farm varies largely, with small numbers in the south and high numbers in central European countries. The average UAA per holding of the FADN samples in the case study countries is much larger than for the FSS data.

Table 6. Farm structures in the case study countries (2007)

Country	Average UAA per holding	LSU*/holding	Average UAA per holding (FADN Sample)
Belgium	28.6	78.9	43.85
Germany	45.7	48.5	84.35
Ireland	32.3	46.2	45.06
Greece	4.7	3.1	7.04
France	52.1	42.7	77.34
Italy	7.6	5.9	16.81
Netherlands	24.9	83.6	32.64
Poland	6.5	4.6	17.28
Slovakia	28.1	10.8	582.28
Finland	33.6	16.9	51.94
Sweden	42.9	24.6	97.62
United Kingdom	70.8	61.2	158.46
EU-27	12.7	10.0	101.2

* LSU = Livestock units.

Source: Eurostat, 2013, FADN and own calculations.

If we look at to what extent livestock dominates production in the countries (Table 7), we see that livestock production dominates the output in most countries; the big exceptions are Greece, Italy and Slovakia, with values of about 30%. In most countries, the domination of livestock is (to a varying degree) decreasing in the period, with one interesting exception: Greece. The strongest decrease occurred in Sweden, Finland and the Netherlands.

Table 7. Livestock domination, share of livestock output in total output

	BE	DE	GR	FR	IE	IT	NL	PL	SF	SE	SK	UK
2009	56%	52%	28%	43%	79%	28%	39%	48%	54%	46%	31%	51%
2008	59%	51%	26%	41%	80%	27%	42%	47%	55%	46%	30%	50%
2007	56%	50%	22%	39%	86%	29%	40%	43%	48%	42%	31%	49%
2006	56%	50%	26%	42%	87%	32%	40%	46%	53%	50%	39%	50%
2005	58%	52%	21%	43%	87%	32%	44%	50%	57%	50%	34%	51%
2004	59%	52%	21%	43%	86%	31%	45%	49%	57%	50%	35%	52%
2003	55%	51%	21%	42%	85%	33%	40%		59%	54%		50%
2002	60%	52%	20%	42%	85%	33%	42%		57%	58%		52%
2001	64%	53%	22%	43%	86%	33%	43%		61%	60%		55%
2000	65%	57%	21%	43%	86%	32%	52%		59%	60%		52%
1999	63%	53%	22%	41%	85%	31%	51%		58%	61%		51%
1998	61%	51%	20%	42%	87%	32%	49%		58%	62%		50%
1997	64%	54%	19%	44%	90%	32%	54%		55%	63%		55%
1996	66%	54%	17%	43%	88%	32%	55%		56%	61%		57%
1995	65%	55%	18%	45%	87%	33%	51%		68%	65%		54%
1994	65%	57%	20%	47%	87%	34%	52%					55%
1993	65%	57%	20%	47%	89%	33%	54%					59%
1992	65%	56%	19%	43%	86%	31%	54%					56%
1991	67%	58%	18%	42%	84%	29%	53%					54%
1990	67%	57%	21%	43%	85%	33%	53%					52%
1989	69%	59%	20%	44%	86%	34%	56%					54%

Source: Own calculations (FADN).

Based on the above factors we build our typology based on farm size, where the average for EU-27 is the limit between small and big farms and on livestock domination, where 50% and above means the country is dominated by livestock (Table 8).

Table 8. Farm structure typology

	Small average farm size	**Large average farm size**
Crop domination	Greece Italy	Netherlands Slovakia France Sweden
Livestock domination	Poland	Belgium Ireland Finland Germany UK

The production structure contains more information: the dominating crop in total crop output in Greece is olive oil and olives and in Italy it is wine and grapes. The crops in Netherlands are mainly vegetables and flowers. In Slovakia, France and Sweden, the dominating crop is cereals. For livestock production the dominating produce in the output of livestock products are pigmeat in Poland and Belgium, beef and veal in Ireland and in Finland, Germany and the UK, cows' milk and milk products are dominating the output.

3.2 Farm structure and performance indicators

3.2.1 Room for consumption – economic sustainability

We would expect small farms to typically have small numbers in economic terms and they would probably have incomes below the national average, implying a need for off-farm income. A large farm would on the other hand have large numbers, and they might have an income closer to the national average. Based on our typology we would expect Greece, Italy and Poland, to have small numbers and incomes below the national average. In Table 9, we see that this expectation does not hold. Greece does have small, but positive numbers, Italy on the other hand, has in the worst year (2001) an income almost 9 times lower than the national average, and the best year (2003) close to 5 times higher than the national average. Also in Poland the numbers varies.

Greece, France and Belgium had good results for the ES indicator; Greece has positive results for all years, and France and Belgium had only a few negative years. Looking at the typology we can see no similarities between these three countries.

Italy and Germany also have a few negative years (5 out of 20); they also have no similarities in the farm structure typology. The countries with a majority of negative years: Ireland, Netherlands, Sweden, Finland, Poland and Slovakia also show little similarities; Netherlands, Sweden and Slovakia have big farms and are dominated by crop production. In addition the crop output in Netherlands is to a large extent (about 70%) dominated by vegetables and flowers. Sweden and Slovakia is mainly producing cereals. Poland has small average farm sizes and is dominated by livestock, and Finland has big average farm size and is dominated by livestock.

If we instead look at the fluctuations (standard deviation) that the different countries experience the lack of pattern continues. Greece and Italy (small farms, domination of crop production) differ largely in standard deviation even though they have a similar structure. The group of countries that have big farms and are dominated by crop production are also spread: the Netherlands and Slovakia have big variations in the indicator, France has relatively low and Sweden somewhere in the middle. The "small farm, dominated by livestock"-group only consists of Poland. The group of countries that have big farms, and are dominated by livestock are also not showing any particular patterns.

Table 9. Fluctuations in room for consumption, ordered from smallest to largest

	STDEV
Greece	2093
France	10252
Poland	11392
Finland	17132
Belgium	18361
Italy	42848
Sweden	48172
Germany	64205
Ireland	65303
UK	78581
Netherlands	80414
Slovakia	678218

3.2.2 Loan to value – debt to asset ratio

In general we would expect the highest investments to be in countries where livestock is dominating output – mainly this would be the case in countries dominated by Cow milk and milk products in the output. This would mean that Poland, Belgium, Ireland, Finland, Germany and the UK would have high assets, and possibly high debts, in particular this would be expected in Finland, Germany and the UK due to the cow milk production. We would furthermore expect that small farms (Greece, Italy and Poland), might have bigger difficulties in receiving loans and thus have low LTV's. It might also be that large farms, regardless of production structure, would have high LTV's since they would have less difficulty than small farms to receive loans.

Again, the expected pattern does not emerge from the material we have (see Tables 10 and 11). The only expectations being fulfilled are the small farm size countries (Italy, Greece, Poland) also having low levels of LTV. Regarding the production type, Greece and Italy follow the expected pattern and show low levels of LTV.

Table 10. LTV and production type

	Expected	**Observed**
High	Finland, Germany and the UK	France and Netherlands,
Medium-high:	Poland, Belgium, Ireland,	Sweden, Finland, Belgium
Medium-low:		Germany, UK, Slovakia and Poland
Low:	Greece, Italy, France, Netherlands, Sweden, Slovakia,	Ireland, Greece, and Italy

Table 11. LTV and farm structure – average farm size

	Expected	**Observed**
High	Netherlands, Slovakia, France, Sweden, Belgium, Ireland, Finland, Germany, UK	France and Netherlands,
Medium-high:		Sweden, Finland, Belgium
Medium-low:		Germany, UK, Slovakia and Poland
Low:	Italy, Greece, Poland	Ireland, Greece, and Italy

4. Performance indicators and government support

A high involvement of government in the credit market might indicate that they perceive the credit market for agriculture to be inefficient. In WP 33 (Tables 2 and 3) we saw differences in the involvement of governments between the case study countries with no involvement in four of the case study countries and varying involvement in the rest of the countries (see Table 12). Even though most of the countries do not have specific regulations for the agricultural credit markets, a majority get involved on a practical level.

Table 12. Government involvement in the agricultural credit markets

Type	Countries
No involvement	Sweden*, UK, Slovakia, Ireland
Subsidized interest rates	Finland, Greece, Germany, Poland, France and Belgium
Payback guarantees	Netherlands, Greece, Poland, Italy, Belgium
Investment allowances	Finland, Netherlands, Greece, Germany, Poland, Italy, Belgium
Government credit institutes (various types)	Finland, Netherlands, Greece, FYROM, Germany, Poland, Italy, France, Belgium

* In Sweden the government is one of the shareholders in a large bank.

Source: Adaptation of Tables 2 and 3 of WP 33.

Another indication that the governments find there are difficulties for agriculture to receive credit is if the investment support of the second pillar is high. The graph in Figure 3 shows the share of investment support in total support. In the beginning of the displayed period the highest levels were in the Netherlands (about 15% in 1999 and about 11% in 2000). After that Italy has the highest percentage in 2001. Between 2002 and 2005 no country really stands out as having very high levels. In 2008 Ireland increases its share and in 2009 the highest level is in Ireland at above 20%. On the other extreme we find Sweden (zero or extremely low levels), Germany and Finland, these three countries have below average in all years. In later years also Greece and the Netherlands have had low values and UK had low levels for the most of the period.

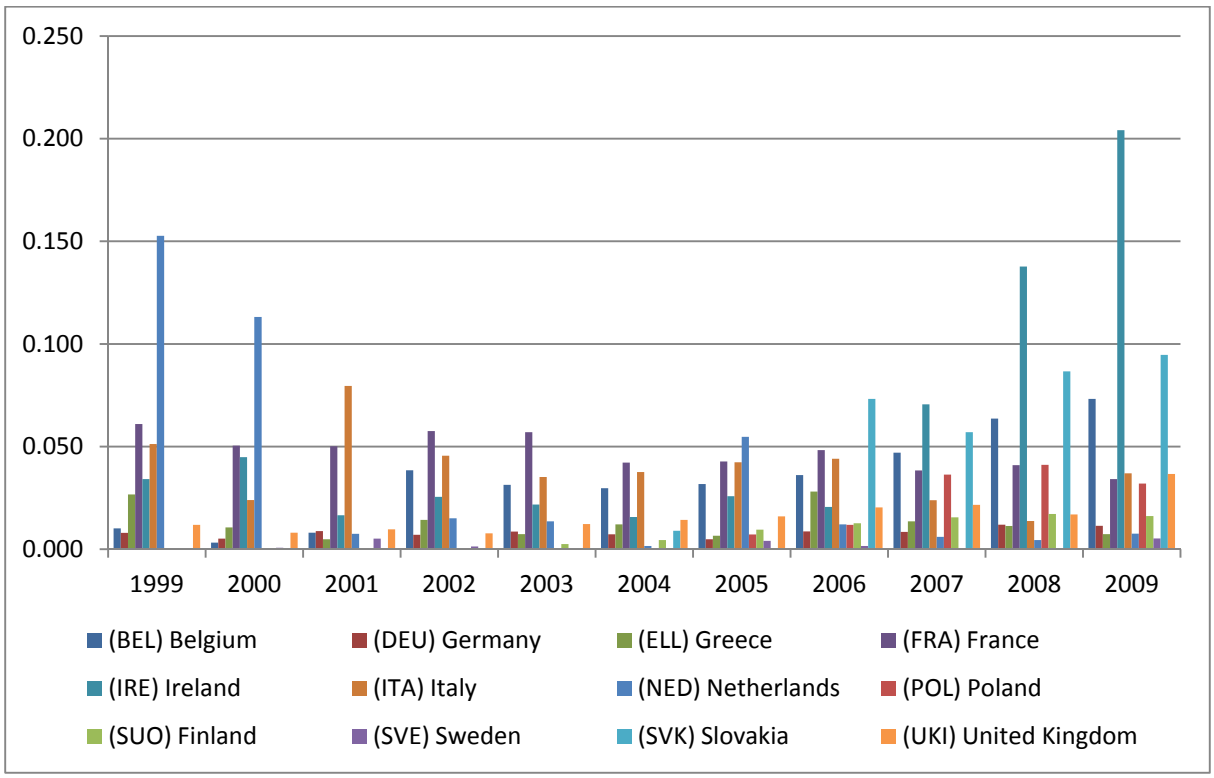
One can discuss the efficiencies of investment support; the risks for crowding out effects are well-known, but we can still see how the agricultural or rural ministries have perceived the situation in the agricultural credit markets as being less than efficient in some countries. If not, they should not have emphasised this support over other measures.

It is particularly interesting that in Ireland, where we find no involvement from the government in the questionnaire in WP 33, the investment support for agriculture has been a big part of the support in the last couple of years. Maybe it is a way to remedy some of the effects of the financial crisis that started in 2007 and the following decrease in property values. Also Slovakia, that had no involvement according to WP33, has close to 10% in investment support levels in 2009.

In a country where credit is subsidized through investment support we can expect the LTV to be higher since the cost of loans is reduced. We would thus expect Ireland, Slovakia and maybe Belgium to have high, or at least increasing, levels of LTV in 2008 and 2009. However, of those three countries, only Belgium has a high LTV value in 2009 at 28%. Slovakia has a LTV of less than 10% and Ireland of less than 5% in 2009.

On the other hand we could expect countries with low levels of investment support to have low levels of LTV. The expectations are partly wrong: Greece and UK do have low levels of LTV, but Sweden and Finland has about 30%, Germany about 20% and the Netherlands about 35%.

Figure 3. Investment support/ total support



Source: FADN.

5. Conclusions

The questions to which we seek to answer are:

1) Can economic sustainability (ES) be used as a performance indicator of the financial markets? In other words, is there a connection between ES and the situation on the financial markets for the agricultural firms?

2) Is loan-to-value (LTV) lower than what the experts expected in WP 33? Does this imply that the credit levels could be higher in agriculture? Can LTV be used to measure performance of the financial markets?

To be able to answer the first question, we need to have an idea of what the financial performance is in the individual markets. Looking at the results of WP 33 there are two indications of the financial markets for agriculture being inefficient: 1) some governments are actively involved in the credit market through support measures and in some instances there are even examples of governmental credit institutes, and 2) there are very low levels in LTV ratios.

Greece, France and Belgium are the countries with the best results for the ES indicator. If our indicator would work as performance indicator we could expect that these countries have high LTV, assuming that LTV is an indicator of credit rationing. Greece, however, has very low levels of LTV, whereas France and Belgium have rather high levels of LTV. All three countries have specific government support to the agricultural credit market, and some level of investment support (Greece has very low levels).

Ireland, the Netherlands, Poland, Finland, Slovakia, Sweden and the UK all have negative results on the ES indicator in a majority of the years. Again, if the indicator would work, we might expect the countries to have low LTV – being credit rationed. But that is only partly true: Ireland, Poland, Slovakia and the UK all have rather low LTVs, whereas the Netherlands, Finland and Sweden have rather high. In this group we also find all countries

with no or low levels of support to the agricultural credit market: Ireland, Sweden, Slovakia and the UK.

It is unfortunately not possible to draw any conclusions on the relation between the economic sustainability indicator and the performance of the financial institutions. The ES indicator is interesting only as a description of the economic situation of farms. The economic situation of the firm certainly plays an important role when applying for credit as we saw in WP33, but the correlation between the ES indicator and the performance of the financial institutions is not possible to determine in this study.

Regarding the second question, or set of questions, it is clear that the LTVs calculated in this WP are lower than the levels the experts expected in WP 33. This does imply that credit levels could be higher, and Curtiss (2012) sees this as an indication of credit constraints. So, if that is the case, LTV might be used as an indicator of how the financial markets perform. Regarding this indicator it is important to note that depending on who is performing the analysis, the interpretation might differ: for a commercial investor, low values are positive since the financial risk of a firm is lower if the debt-to-asset ratio is low, whereas others might see this as a sign of the firm being credit-rationed and hampered in economic and/or technical development.

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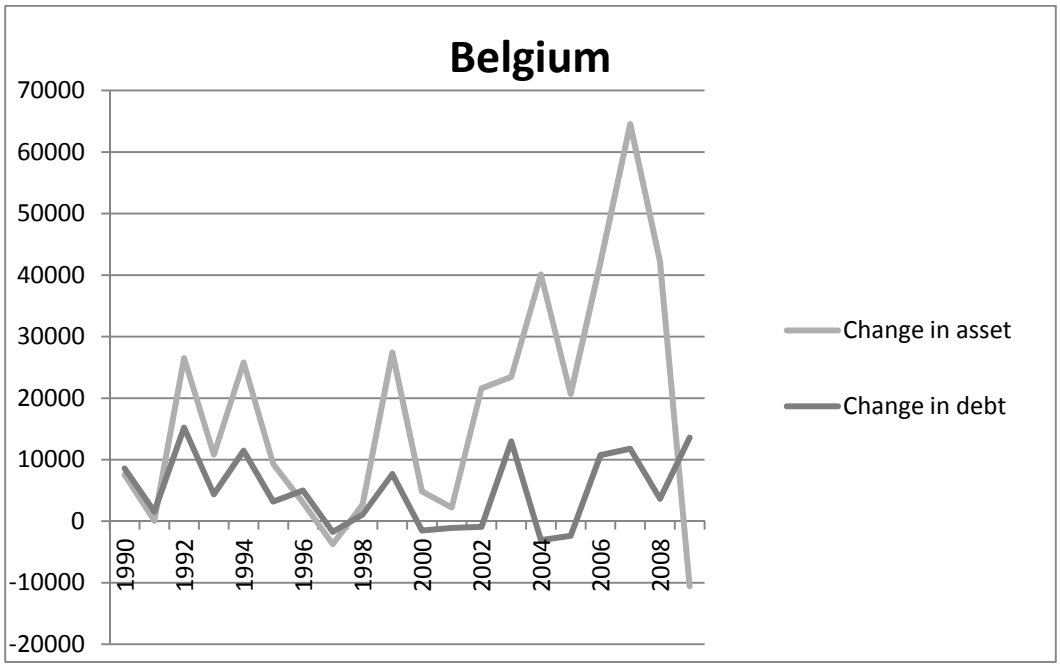
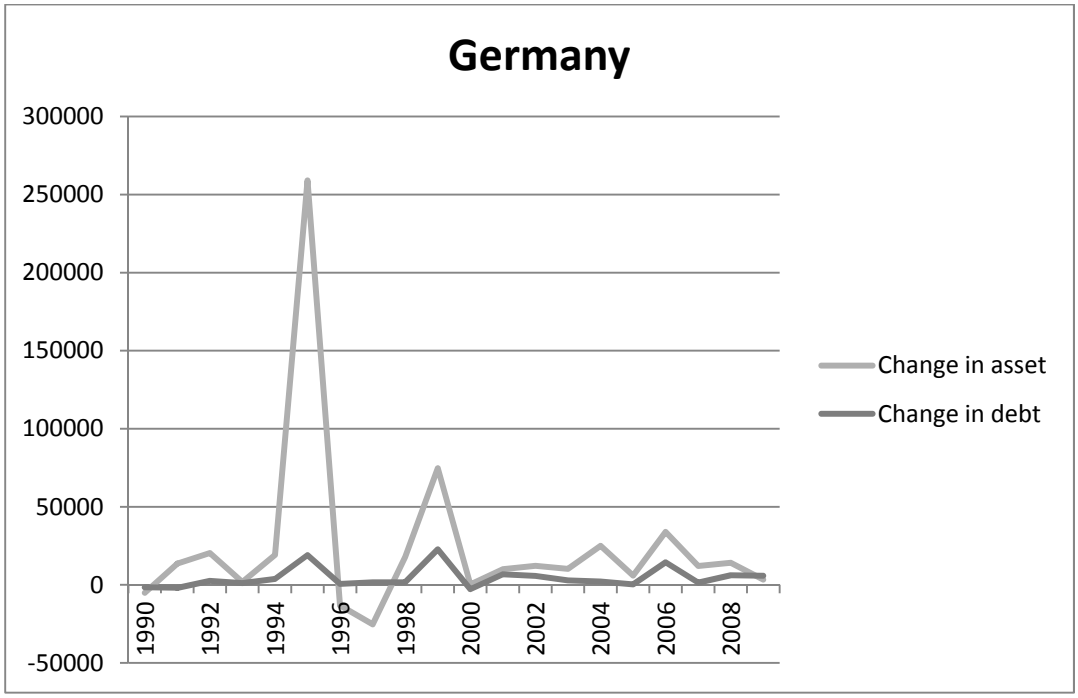
Appendix 1. Stepwise calculations for all countries

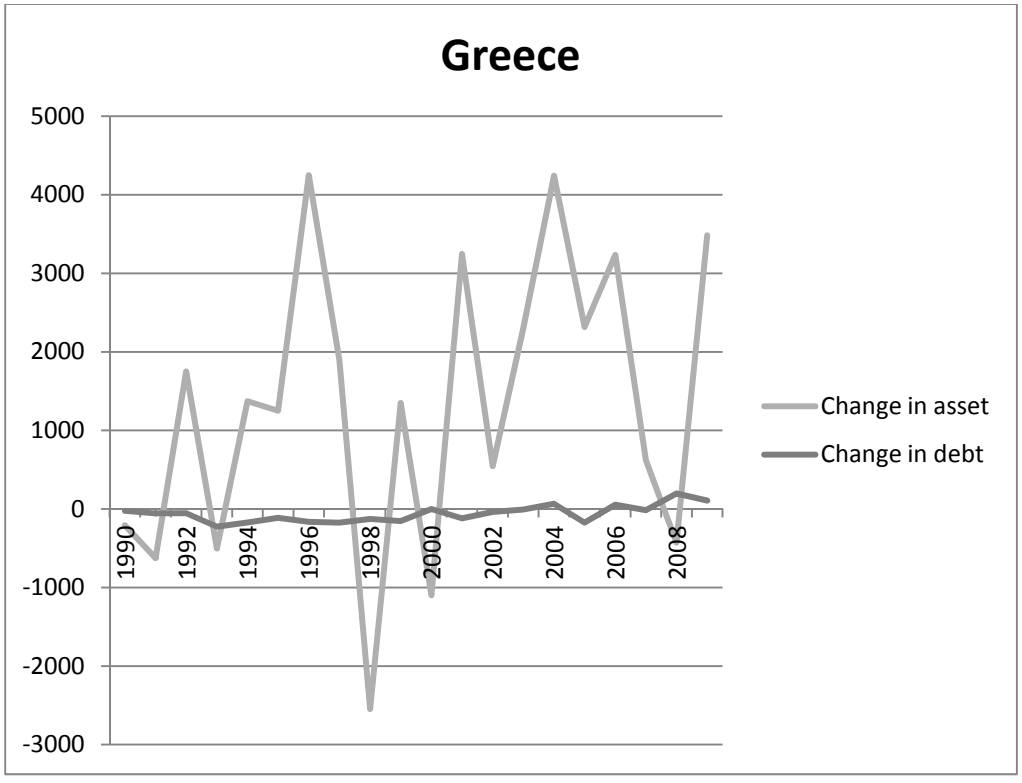
(BEL) Belgium	Income (incl. total subsidies)	Change in assets	Change in debt	ES
1990	34825	7544	8574	18707
1991	32504	127	1580	30797
1992	28593	26502	15214	-13123
1993	33950	10827	4375	18748
1994	39082	25789	11479	1814
1995	36604	9295	3185	24124
1996	41990	3020	4983	33987
1997	37289	-3716	-1754	42759
1998	34906	2698	1057	31151
1999	41551	27408	7684	6459
2000	47966	4832	-1498	44632
2001	47717	2223	-1084	46578
2002	40399	21596	-914	19717
2003	49453	23466	12970	13017
2004	47196	40109	-3067	10154
2005	51743	20670	-2359	33432
2006	58697	42067	10739	5891
2007	61456	64564	11776	-14884
2008	47088	42211	3647	1230
2009	43344	-10551	13570	40325



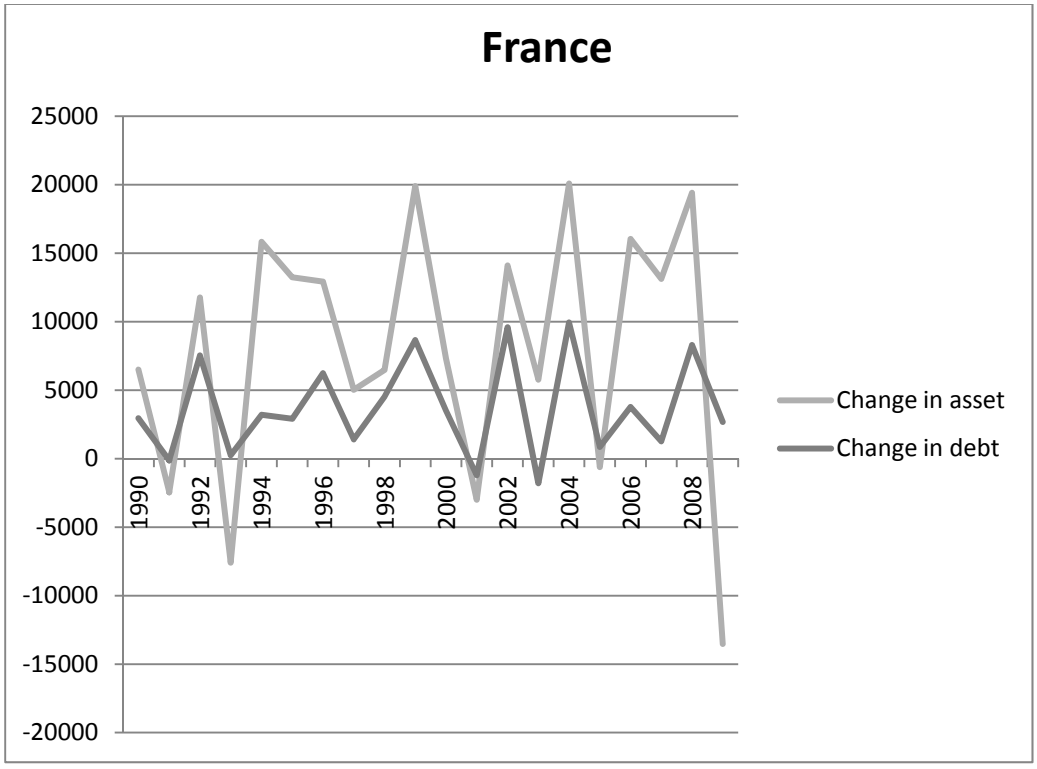
(DEU) Germany	Income (incl. total subsidies)	Change in assets	Change in debt	ES
1990	12710	-5082	-1616	19408
1991	13057	13576	-1942	1423
1992	11332	20377	2551	-11596
1993	14081	1863	1080	11138
1994	18187	19150	3744	-4707
1995	21408	259063	19070	-256725
1996	23143	-13221	591	35773
1997	23614	-25301	1603	47312
1998	20108	17819	1646	643
1999	27798	74675	22694	-69571
2000	30827	333	-2780	33274
2001	29359	10011	6746	12602
2002	21704	12131	5771	3802
2003	22576	10187	2873	9516
2004	32183	24973	2115	5095
2005	32255	5879	271	26105
2006	37308	33888	14426	-11006
2007	48144	12092	1394	34658
2008	31079	14095	6144	10840
2009	25082	3392	5841	15849



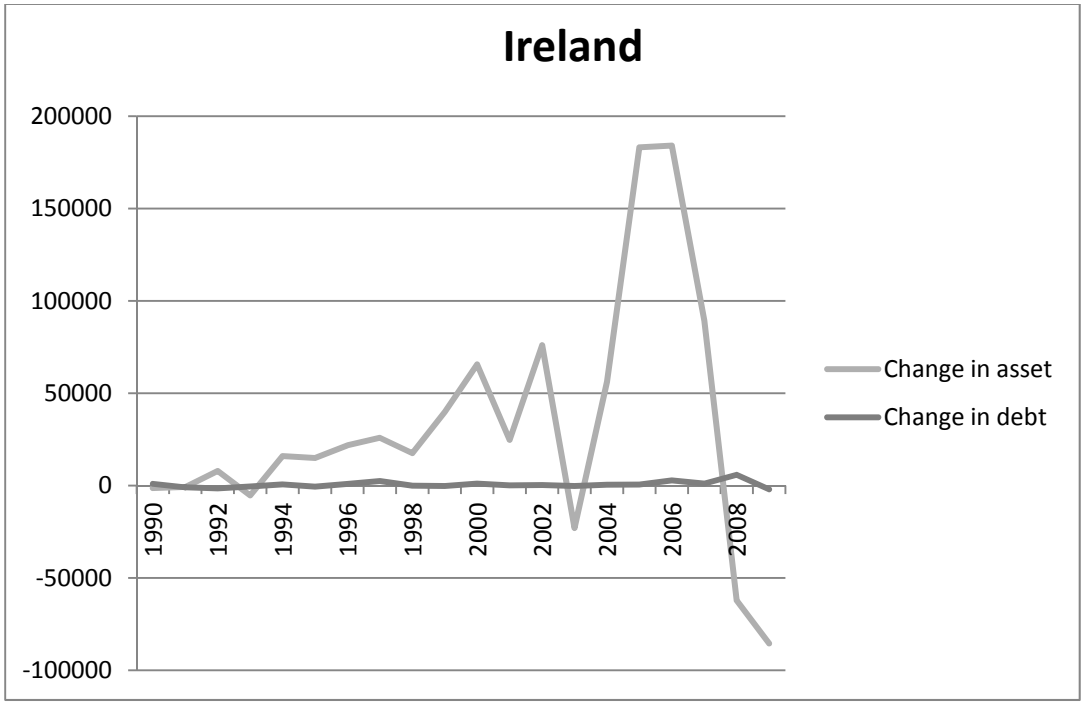
(ELL) Greece	Income (incl. total subsidies)	Change in assets	Change in debt	ES
1990	7536	-208	-25	7769
1991	8888	-624	-56	9568
1992	7643	1752	-53	5944
1993	8085	-504	-224	8813
1994	9022	1372	-172	7822
1995	9465	1250	-112	8327
1996	9061	4249	-164	4976
1997	8913	1896	-173	7190
1998	9196	-2548	-128	11872
1999	8852	1351	-154	7655
2000	9645	-1098	-1	10744
2001	9425	3247	-118	6296
2002	11249	545	-38	10742
2003	10687	2299	-6	8394
2004	10892	4243	67	6582
2005	12341	2317	-174	10198
2006	11814	3235	55	8524
2007	12599	621	-14	11992
2008	11858	-429	197	12090
2009	10673	3484	108	7081



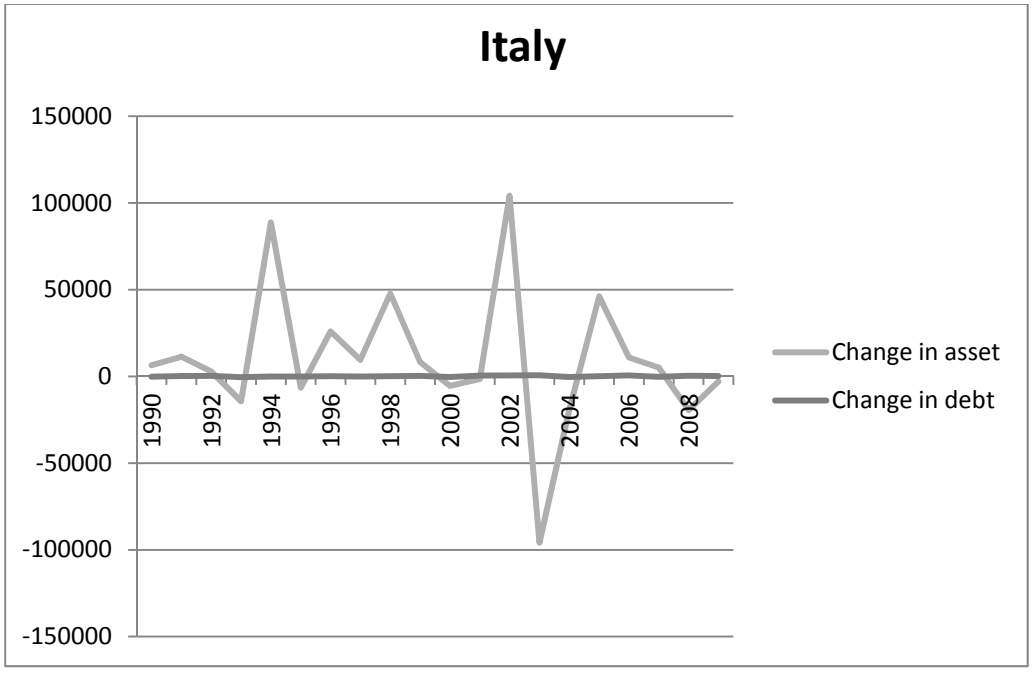
(FRA) France	Income (incl. total subsidies)	Change in assets	Change in debt	ES
1990	23176	6507	2957	13712
1991	21666	-2457	-126	24249
1992	22214	11766	7546	2902
1993	20995	-7594	250	28339
1994	27124	15831	3206	8087
1995	29678	13246	2915	13517
1996	30997	12925	6240	11832
1997	29822	5024	1411	23387
1998	31046	6477	4516	20053
1999	31166	19907	8665	2594
2000	29334	7313	3511	18510
2001	28354	-3000	-1209	32563
2002	29903	14113	9602	6188
2003	28437	5766	-1794	24465
2004	29086	20094	9949	-957
2005	28037	-618	860	27795
2006	31637	16051	3783	11803
2007	40602	13124	1266	26212
2008	31830	19414	8304	4112
2009	16408	-13527	2684	27251



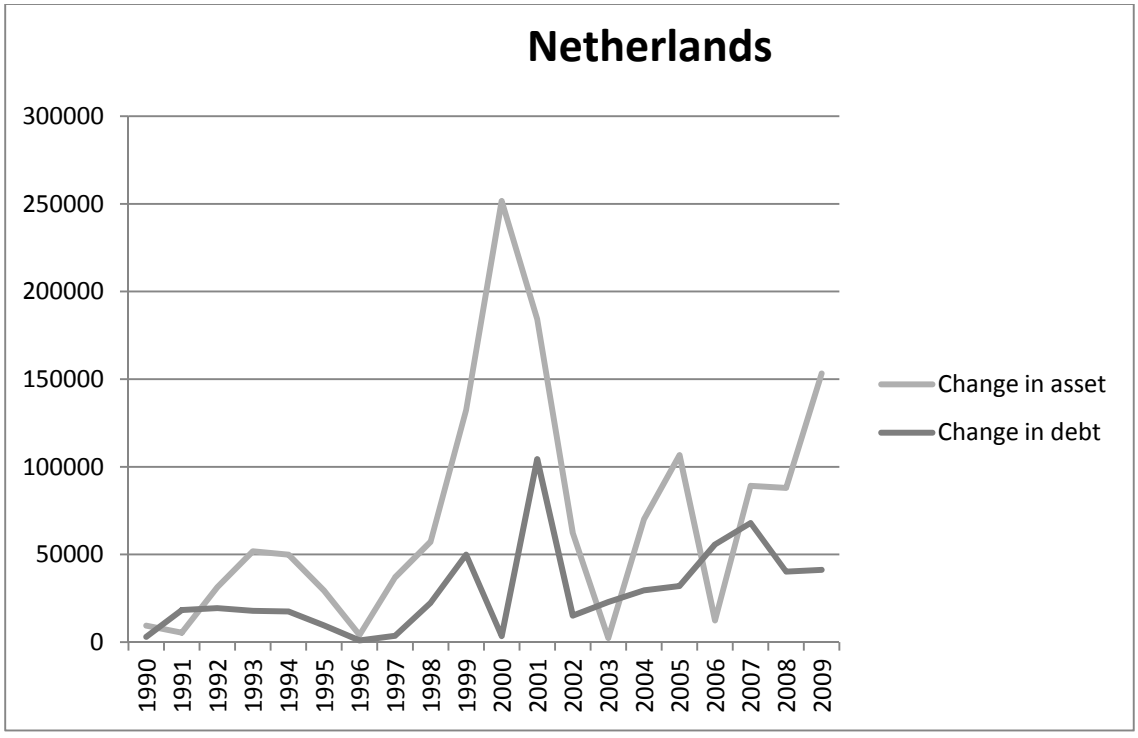
(IRE) Ireland	Income (incl. total subsidies)	Change in assets	Change in debt	ES
1990	9655	-1338	971	10022
1991	9063	-785	-913	10761
1992	11647	7897	-1530	5280
1993	12324	-5341	-478	18143
1994	13638	16008	659	-3029
1995	13312	14930	-572	-1046
1996	13325	21846	897	-9418
1997	14958	25874	2457	-13373
1998	11816	17548	-50	-5682
1999	11901	39900	-197	-27802
2000	14089	65665	1121	-52697
2001	15140	24721	101	-9682
2002	15417	76060	306	-60949
2003	16294	-23019	-243	39556
2004	16847	56189	462	-39804
2005	18028	183210	548	-165730
2006	18860	184093	2824	-168057
2007	21633	89330	1054	-68751
2008	18866	-62194	5845	75215
2009	13573	-85525	-2063	101161



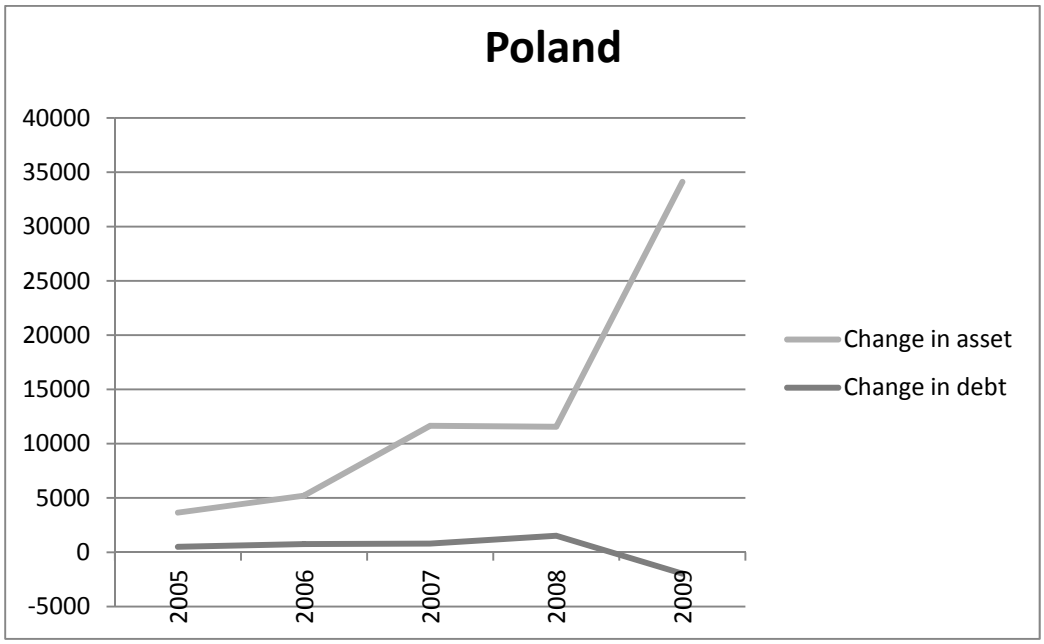
(ITA) Italy	Income (incl. total subsidies)	Change in assets	Change in debt	ES
1990	10737	6475	-155	4417
1991	11933	11369	207	357
1992	10136	2911	285	6940
1993	9195	-14399	-393	23987
1994	11112	88798	-52	-77634
1995	13401	-6554	-84	20039
1996	13717	25952	113	-12348
1997	14012	9534	-102	4580
1998	13716	47849	130	-34263
1999	14940	8323	280	6337
2000	13878	-5508	-358	19744
2001	15291	-1549	477	16363
2002	20625	104223	597	-84195
2003	22240	-95869	663	117446
2004	21804	-19350	-355	41509
2005	22631	46175	113	-23657
2006	23606	10879	631	12096
2007	27459	5081	-247	22625
2008	27227	-19408	435	46200
2009	24961	-2909	249	27621



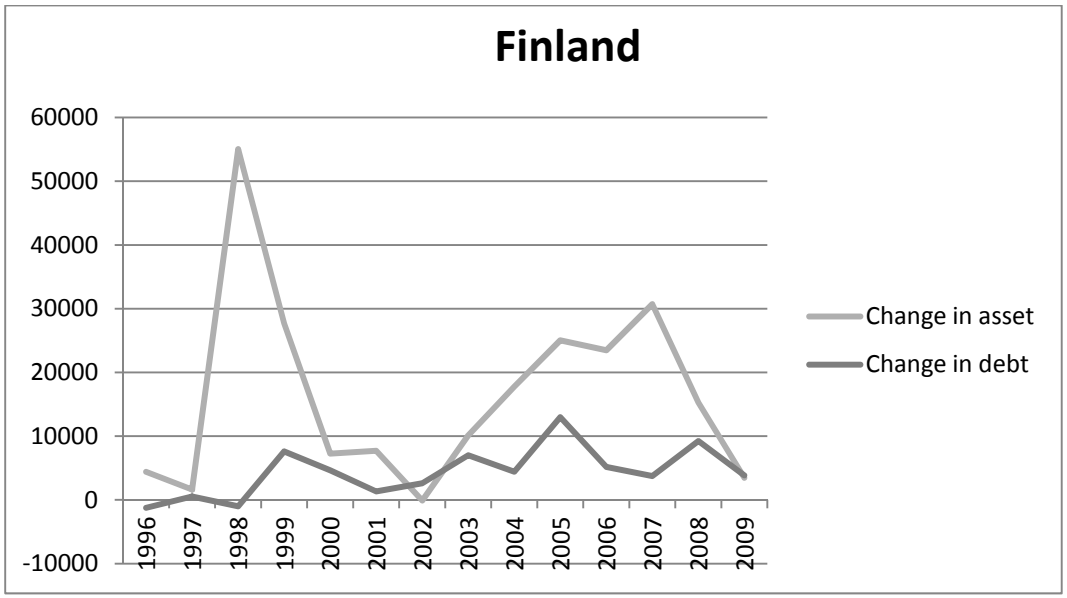
(NED) Netherlands	Income (incl. total subsidies)	Change in assets	Change in debt	ES
1990	38545	9350	3036	26159
1991	37324	5415	18267	13642
1992	26684	31343	19376	-24035
1993	24508	51784	17792	-45068
1994	38463	49901	17471	-28909
1995	36085	29316	9499	-2730
1996	33252	4089	979	28184
1997	41692	36877	3595	1220
1998	25511	57316	22421	-54226
1999	22869	132419	49884	-159434
2000	41655	251659	3369	-213373
2001	46517	184220	104441	-242144
2002	33840	62339	15112	-43611
2003	42617	2341	22872	17404
2004	36152	70084	29562	-63494
2005	46220	106679	31948	-92407
2006	55096	12369	55714	-12987
2007	49539	89156	67996	-107613
2008	32489	87958	40242	-95711
2009	19153	153291	41238	-175376



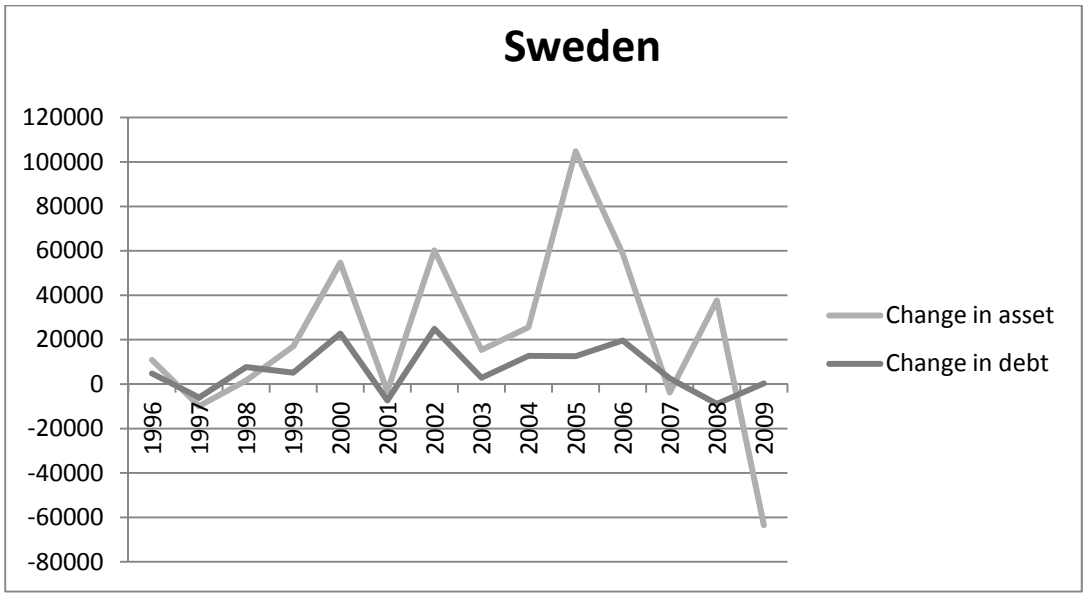
(POL) Poland	Income (incl. total subsidies)	Change in assets	Change in debt	ES
2005	6494	3649	491	2354
2006	8211	5213	746	2252
2007	10351	11644	794	-2087
2008	8155	11562	1518	-4925
2009	7005	34109	-1974	-25130



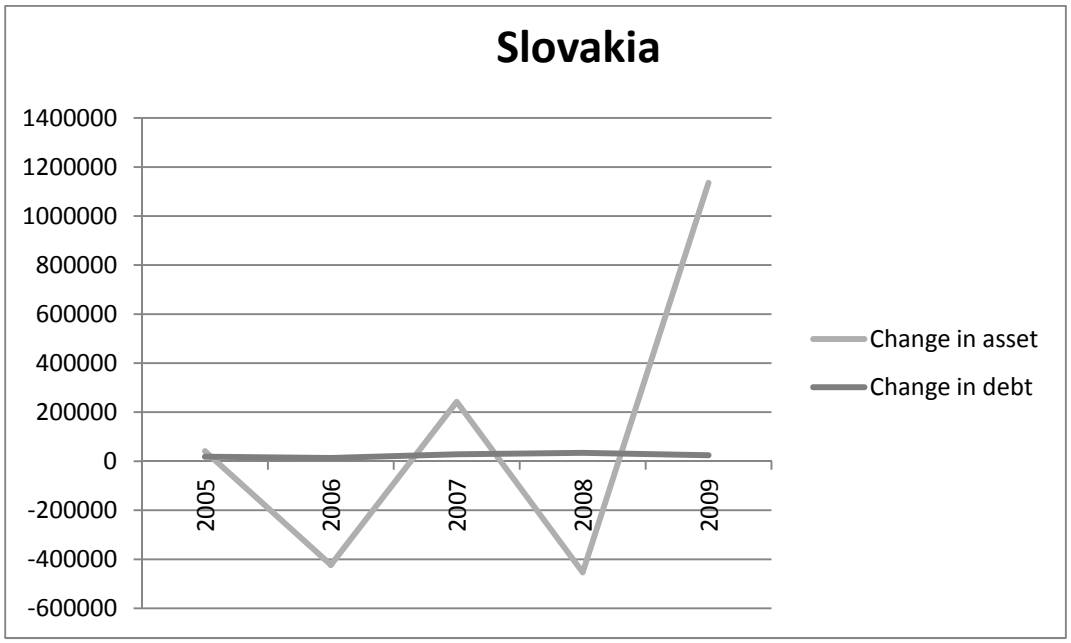
(SUO) Finland	Income (incl. total subsidies)	Change in assets	Change in debt	ES
1996	22207	4402	-1241	19046
1997	19958	1624	539	17795
1998	16278	55039	-999	-37762
1999	18379	27696	7603	-16920
2000	22625	7263	4646	10716
2001	23204	7708	1332	14164
2002	24228	-90	2600	21718
2003	22324	10125	7010	5189
2004	20306	17784	4413	-1891
2005	19764	25038	12980	-18254
2006	18114	23473	5184	-10543
2007	27651	30717	3749	-6815
2008	20247	15280	9253	-4286
2009	17174	3467	3848	9859



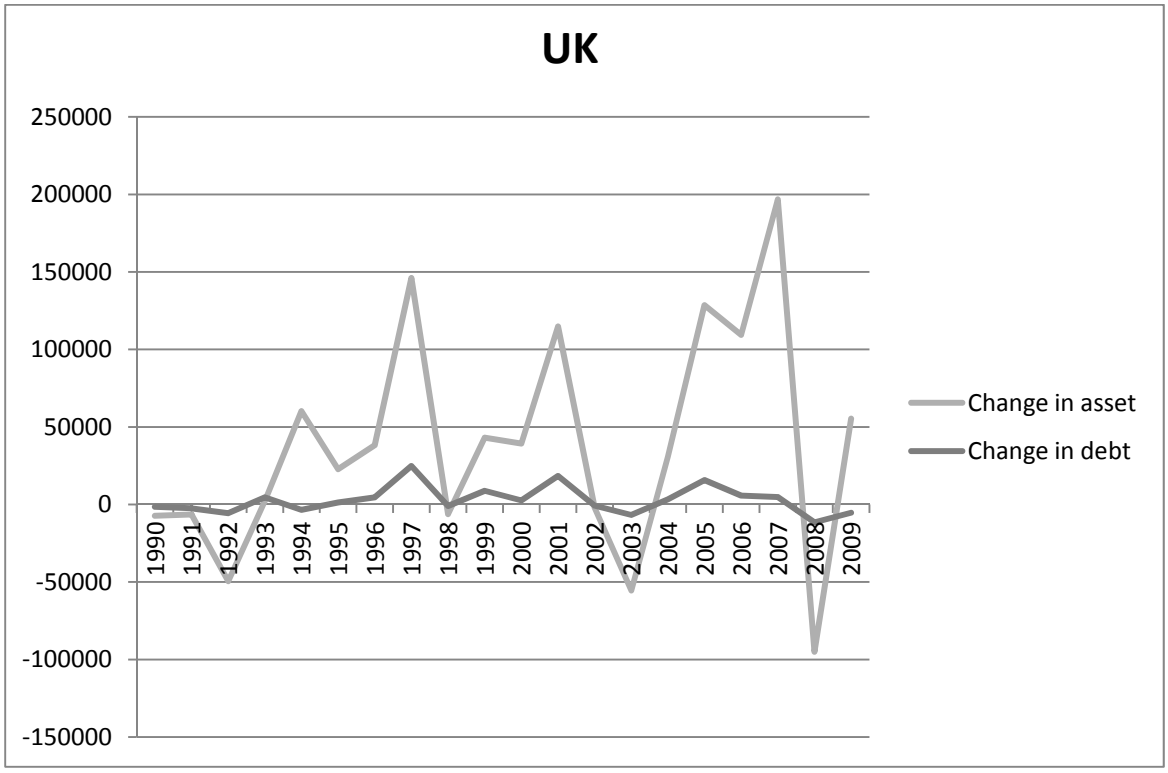
(SVE) Sweden	Income (incl. total subsidies)	Change in assets	Change in debt	ES
1996	1582	10898	4732	-14048
1997	5867	-9936	-6067	21870
1998	-1747	1618	7682	-11047
1999	2183	16965	5180	-19962
2000	5891	54616	22693	-71418
2001	7024	-3160	-7295	17479
2002	6995	60209	24917	-78131
2003	6335	15380	2827	-11872
2004	6574	25606	12733	-31765
2005	11331	104769	12577	-106015
2006	10708	58761	19597	-67650
2007	29479	-3779	2546	30712
2008	29684	37626	-8876	934
2009	6243	-63510	355	69398



(SVK) Slovakia	Income (incl. total subsidies)	Change in assets	Change in debt	ES
2005	1032	40897	18426	-58291
2006	-90062	-422703	13180	319461
2007	12288	242126	28143	-257981
2008	-6569	-453635	34112	412954
2009	-123377	1135724	24611	-1283712



(UKI) United Kingdom	Income (incl. total subsidies)	Change in assets	Change in debt	ES
1990	20882	-7308	-1590	29780
1991	21526	-6529	-2491	30546
1992	23602	-49509	-5614	78725
1993	30008	2370	4584	23054
1994	35667	60287	-3409	-21211
1995	42703	22801	1323	18579
1996	39118	38296	4612	-3790
1997	27232	146092	24810	-143670
1998	19553	-6234	-962	26749
1999	19564	43110	8786	-32332
2000	22098	39310	2683	-19895
2001	28068	114817	18398	-105147
2002	34881	-2268	-815	37964
2003	41015	-55461	-6757	103233
2004	30002	30707	3212	-3917
2005	35896	128615	15777	-108496
2006	38928	109402	5732	-76206
2007	55343	196818	4810	-146285
2008	49285	-95078	-11548	155911
2009	42050	55337	-5328	-7959



Comparative Analysis of Factor Markets for Agriculture across the Member States

245123-FP7-KBBE-2009-3

The Factor Markets project in a nutshell

Title	Comparative Analysis of Factor Markets for Agriculture across the Member States
Funding scheme	Collaborative Project (CP) / Small or medium scale focused research project
Coordinator	CEPS, Prof. Johan F.M. Swinnen
Duration	01/09/2010 – 31/08/2013 (36 months)
Short description	Well functioning factor markets are a crucial condition for the competitiveness and growth of agriculture and for rural development. At the same time, the functioning of the factor markets themselves are influenced by changes in agriculture and the rural economy, and in EU policies. Member state regulations and institutions affecting land, labour, and capital markets may cause important heterogeneity in the factor markets, which may have important effects on the functioning of the factor markets and on the interactions between factor markets and EU policies. The general objective of the FACTOR MARKETS project is to analyse the functioning of factor markets for agriculture in the EU-27, including the Candidate Countries. The FACTOR MARKETS project will compare the different markets, their institutional framework and their impact on agricultural development and structural change, as well as their impact on rural economies, for the Member States, Candidate Countries and the EU as a whole. The FACTOR MARKETS project will focus on capital, labour and land markets. The results of this study will contribute to a better understanding of the fundamental economic factors affecting EU agriculture, thus allowing better targeting of policies to improve the competitiveness of the sector.
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Partners	17 (13 countries)
EU funding	1,979,023 €
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