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Does the Single Farm Payment associate with different types of farm income?

- a study on how the SFP affect various incomes from farming

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Abstract

This paper investigates the impacts the Single Farm Payment has on farming household incomes, business income and service income. The aim of the study is to see whether the Single farm payment has any correlation with the various incomes. The data used is a panel data set with county level data from 2001-2013 in Sweden, the method used for the analysis is a fixed effects model for the estimations. Results of the analysis show that the Single Farm Payment variable has an estimated positive association with the various incomes. The main conclusion that can be drawn is that the Single Farm Payment has a small positive impact on various incomes from agriculture.

Abbreviations

CAP- Common Agricultural Policy

EU- European Union

SBA- Swedish Board of Agricultural

SFP- Single Farm Payment

SPS- Single Payment Scheme

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1. Introduction

This chapter introduces the background for the thesis, problem description and the research question are also presented in this chapter. The aim, delimitations and contribution will be discussed together with the disposition of the thesis in the end of this chapter.

1.1 Problem background

A competitive and environmentally sustainable food chain are not only a priority at the European Union level but is also pointed out in the Swedish government food strategy (Larsson et al., 2018). In the common agricultural policy (CAP) some of the aims is to support farmers and improve agricultural productivity and to ensure that farmers in the European Union (EU) can make a reasonable living. Therefore, it is of importance to analyse the Single Farm Payments possibility to contribute to this goal, which is the aim of this thesis. The amount of Single Farm Payments to farmers is independent of crop yield and therefore also the development of the market for crop products. This gives the farmers a stable revenue, but does that automatically contribute to higher living standard for the farmers?

Even though the agricultural sector is of such importance, farmers earn about 40% less than other sectors. The SFP to farmers in the EU is the CAP's main instrument to support farmers income. In 2003 there was a major reform of the Common Agricultural Policy (CAP). In this reform the introduction of the Single Payment Scheme (SPS) was made. This led to that the majority of the coupled direct payments transformed into the single payment scheme with decoupled direct support (European Commission, 2019).

Households income or farming income is often used as a measurement for living standards. This study will use three different types of income, farming household's income, which is the sum of the different incomes and transfers a farming household get in a year. Business income is also used and consists of incomes and costs due to a business. Agricultural stands for 72% of the business income and other business income stands for 28%. The high share of business income from other sector show that farmers have the opportunity and ability to compensate decreasing income with an increasing income from elsewhere (Brady et al., 2007). Service income is the third income used and by service means employment, mission or other income generating activity that are temporally or under long time (Lund, u.å). Service income can maintain both of employment in agricultural business and from other work.

The Single Farm Payment is expected to have a positive association with the different types of income. This is expected due to the results of Larsson et al. (2018) that concludes that the SFP has an impact on income in the short run, also the SBA (2007a) states that the service income is the biggest part of household's income and that business income is a smaller part. Therefore, this thesis expects that the SFP has a bigger association with households' income than it will have with business and service income. This because farming household's income consists of both service and business income, so the SFP association will therefore be bigger for the household's income. The SFP is expected to have a positive association to service income due to the SFP has had a positive impact on the employment rate in the agricultural sector in Sweden, the SFP has made it possible for farmers to afford more employees (Hasund et al., 2014). The SFP association to business income is expected to be lower due to a higher share of income from other sectors. Agricultural only stands for 78% of business income and business from other sectors stands for 21% of business income (Brady et al., 2007).

Keeny (2000) uses farming income when analysing how the direct support affect low income farm households in Ireland. Severini and Tantari (2013) also uses farm income when investigating how the direct support affect the concentration of farm income in Italy. Garvey et al. (2004) likewise uses farm income when analysing the Agenda 2000 impacts on farm income in Ireland in contrast to the impacts the Luxembourg Agreement will have on income.

1.2 Aim and research question

The objective of this study is to investigate if the Single Farm Payment associate with different types of income differently. A panel data set at the county level consisting of factors that impacts farming income in Sweden during 2001-2013 have been analysed using a fixed effects regression model to obtain the results. The research question for this thesis are:

“Does the Single Farm Payment associate with various farming income in different ways in Sweden?”

Hopefully, this thesis can answer this question and give an increased knowledge of how the decoupled direct support affect the different types of income; Households income, business income and service income.

1.3 Contributions and delimitations

The number of studies that have been made with the aim of analyse how the SFP affects different farm income in Sweden or the EU are limited. However, a lot of studies have been done regarding how the SFP and decoupled direct payments affect farm survival, farm exit and income concentration throughout the EU. But there is very little work concerning determinant factors that affect the income. Therefore, this study contributes to existing literature with new knowledge on how the SFP and the decoupled direct payments affect different farming incomes in Sweden.

This study is limited to analyse the effects of the decoupled direct support on farming income in Sweden and includes the time period between 2001-2013. The determinants of income are limited to the factors which data has been available to find.

1.4 Structure of the report

The thesis is divided into six parts. Here, the structure of the study will be explained by giving the reader an overview of the various sections that are covered in this thesis.

In the first chapter the background of the problem is presented, followed by the aim and research question. The chapter is finished with contributions and delimitations of the work.

Chapter two build the theoretical framework and provides a literature review of previous research on the direct payments effect on farming income.

In chapter three the empirical framework is presented, where the method used to solve and answer the research question will be presented. Further, chapter three will give an explanation of the data and variables used in the thesis.

The result of the study is presented in chapter four. Thereafter the results are analysed and discussed in chapter five. Chapter six gives a conclusion of the work and will also give suggestions for future research.

2. Theoretical framework

The theoretical framework focus on the development of EU's agricultural support scheme, while the literature review study how the decoupled support payments affect farmers income.

2.1 Single Payment Scheme and Decoupled direct support

The Single Payment Scheme is an area-based income support which aims to promote agricultural business and food security (SBA, 2020a). It should contribute to increased competitiveness and to keep an open landscape. To be able to be eligible for the Single Farm Payment the farmer needs to have SFP entitlements. To be eligible to apply for payment entitlements the farmer needs at least four hectares of land, for each hectares of land that a farmer wants support for, one payment entitlement is needed (SBA, 2020b). To be able to get full support the farmer needs to follow the cross-compliance rules. Meaning that the farmer is obligated to keep the land in a cultivatable condition and also comply with the laws that exists within the environment, animal protection and food area (SBA, 2020a). The value of the payment entitlements determines how much support each farmer can get for their agricultural land. Three different models were implemented to determine the value of the payment entitlements.

This thesis has used Falkendal (2019) to describe the three different models, Falkendal (2019) describes the three different models used to calculate the value of the entitlements in EU. The historical, regional and hybrid model is the three models used.

In her thesis Falkendal describes the models as following, in the historical model, the total amount that a farmer could receive in payments were equal to the average payments in the reference period between 2000-2002. These payments were divided by the average number of hectares farmed in the reference period. The total value of all SFP entitlements thus equalled accordingly the historical average payments and the number of entitlements equalled the total amount of farmed hectares in the reference period. In the regional model, all payment entitlements in a region have the same value. The value was calculated by dividing the sum of payments that a region received between 2000-2002 with the hectares farmed in the first year of implementation in the region. The hybrid model consists of both the historical model and the regional model. Therefore, consists the value of each entitlement of one regional part that is the same for all entitlements and one historical part that is dependent on the value of each

farm's historical payments. Therefore, the variance of the value of SFP entitlements in the hybrid model is higher than in the regional model but lower than in the historical model.

The SPS was introduced in Sweden as a hybrid model, in 2015 a process was started to equalize the payment entitlements between the different regions in Sweden. Meaning that all payment entitlements will be worth same amount of money.

2.2 The Single Farm Payments association with different incomes

Studies have been conducted with the aim of examining the effects of the income support on employment in Sweden. The SFP is the biggest part of the income support and decoupled direct payments and therefore it is of essence to investigate what impacts the support has on farming income indicating the socio-economic benefit of the support.

The total farming business income in Sweden was 6.3 billion, counted as an average between the years 2009-2011. Within the same period the total amount of SFP was 6.2 billion. Without the SFP there would be no money left, because business income is what is left to pay wages for own work and interest on equity (Hasund et al., 2014). The SFP has also resulted in a higher employment rate in Sweden. Where a majority of the higher employment rate is in the agricultural sector (Hasund et al., 2014). Blomquist and Nordin (2014) explains in their study about the effect that the CAP has had on employment in Sweden. They find that the wealth effect of the CAP lead to an increase in labour in Sweden. In the cross-compliance requirement, farmers need to keep the land in good agricultural and environmental condition, this is costly in terms of labour. This implies that the SFP helps to increase labour supply, when farmers receive increased subsidies that can be used to labour supply.

Larsson et al. (2018) write that the SFP helps to maintain the incomes in the existing farms in Sweden in a short time perspective, but in the long run the SFP is not expected to increase or stabilise income. According to the SBA (2007) comes a major part of the household's income from service income, 78% stands service income for and business income stands only for 21% of farming households income. Agricultural stands for 72% of the business income and other business income stands for 28%. The high share of business income from other sectors shows that farmers have the opportunity and ability to compensate decreasing income with an increasing income from elsewhere (Larsson et al., 2018). Höjgård and Nordin (2017) conclude in their study looking at the development of farmers' incomes and earnings the

same thing, that business income consist of a bigger share of work outside the agricultural business. They also conclude that the increase in service income and households income also depends on that the partner of the farmer have their own career which also increase the households income, Höjgård and Nordin state that this is most likely the biggest impact on increasing service and household's income than increased incomes from agriculture.

Therefore, the conclusion of this is that the SFP is expected to have a positive impact on the different types of income. However, the positive impact the SFP has had on employment rate may therefore also have had a positive impact on service income. The SFP is likely to have a positive association with business income also because the majority of business income still comes from agricultural services.

2.3 Literature review

Uthes et al. (2010) work is interesting for this study because they analyse the impacts on structural change and the environment if a policy change that eliminate the direct payments would happen. The authors have analysed the impacts of this policy change on farm structure and land use intensities in four European regions, Germany, Denmark, Poland and Italy. Based on the four examples results, it can be concluded that regions with poorer conditions for agriculture, insufficient marketing, processing and sales structure, and have a high dependence on direct payments (Germany) will be hit the most of an abolishment of direct payments. Regions that will be less hit by such a policy change are regions with moderate dependence on direct payments. Either through a relatively competitive agricultural sector (Denmark) or a much more diversified sector with good marketing and sales structures, and with an agro- tourism sector (Italy). Poorer regions in the transition economies of the youngest member states in the EU (Poland) have had very little time to get used to the direct payments. An abolishment of the direct payments would push these regions toward a restructuring of the farming sector. Replace old technology that otherwise would not have happened with a continuation of direct payments. In their work the authors mention that Sweden is pro an abolishment of the direct payments, this work is interesting because it shows that the direct payments can associate different with different regions. This is interesting for Sweden because there is very different prerequisite of agricultural across the country. As a conclusion of this study an abolishment of the direct payments would hit very different across Sweden and have different impacts on the farm incomes.

Investigating living standards, income is often used as a measurement for that. But Howley et al. (2012) work comes with another very interesting perspective on what farmers may benefit of besides income. The results of this study are interesting in the perspective of why people enjoy being farmers even though the incomes are lower than other sectors. The study investigates if decoupled payments affect farmers behaviour, using Ireland as a case study. From their results they conclude that the decoupled payments still seem to encourage production levels that are higher than the optimal level is from a market perspective. In effect of this many farmers are using the decoupled payments to partly subsidise what would be unprofitable farm activity otherwise. However, it could be for many that maximising income may not be most important, some farmers may benefit more from such things as social interaction with other farmers or the enjoyment of farming is also important considerations.

Keeny (2000) analyses the impact on farm income distribution of the MacSherry CAP reform for the years 1992 and 1996, using Ireland as a case study. The paper show that the importance of direct payments in farm incomes has consequences for how the total family farm income is spread across farm households. The results show how the direct payments have been relatively more collected to less well-off compared to market-based income and the increasing share of direct payments was the largest factor answerable for the improvement in allocation of Irish farm incomes between 1992-1996. This study contributes with knowledge to this thesis about what affect the direct payments can have on farm incomes and farming household income.

Severini & Tantari (2013) investigate the role the direct payments have on concentration of farm income by applying different scenarios of regional implementations of the direct payment policy. The result of the paper suggests that if the objective is to reduce the concentration of the direct payments and farm income is to be obtained, the national flat-rate model is to be preferred. One consequence of this model is the likelihood of implementing it. Regions that will get a lower direct payment than before are expected to strongly oppose this model by blocking the proposal of it. So, in the end, supporting the regional flat-rate model which maintain the baseline amount of direct payments within each region. This study gives knowledge about how the direct payments impact on farm income can change depending on which model that is used. Today Sweden uses the regional flat-rate model, but in 2020 Sweden is changing to the national flat-rate model.

A study that contributes with knowledge about how the 2003 CAP reform will impact on farm income is Garvey et al. (2004). The study analysis the CAP reform on agricultural in Irelands NUTS 3 regions. The authors make assumptions about how the Luxembourg Agreement will be implemented in the MS and the effects of this policy in contrast to at the time, current policy Agenda 2000. The study uses 2009 as projection year for their estimations. The results from this study show that an increase in Irish agricultural income if a full decoupling of agricultural payments is done, compared to what the effects would be without a change in policy. Some regions will do better than others with this policy change, but overall is income projected to increase in all regions at Ireland. This work contributes with information about what effect that can be expected of the 2003 CAP reform on farm income.

3. Method and Data

In this chapter is the econometric methods for solving the research questions described and composed. Data for the dependent variable, income for farming households in Sweden, is presented. The regressors for the regression will also be presented and the background for how they affect the dependent variable.

3.1 Data

The study uses compiled data on agriculture in Sweden from The Swedish Board of Agricultural. The majority of the data used in the study is aggregated to county level, part of the data is the same across the country because there is no available data on county level. These variables only exhibit temporal variation. The study has data from Sweden's 21 county's over the time period 2001-2013, so the data set used for this study are structured as a panel data set. The motive of using a more aggregated approach in this thesis is because farm level data is not publicly available and data on municipality level where not either to be found for all the variables. Therefore, based on previous studies such as Garvey et al. (2004) using NUTS3 data and due to lack of data on farm level and municipality level, county level data is used for this study. The data for this thesis is collected from the Swedish Board of Agricultural statistical database. Chapter 3.2 defines the variables, the sources and explanations for each variable included in the estimation.

3.2 Variables

The dependent variables this study will use is farming household's income, business income and service income. Farming household's income measures the sum of the different incomes and transfers a household get in a year from agricultural activities; the variable used for this study is before tax. Business income consists of incomes and costs due to an agricultural business. By business is meant with acquisition activities that are conducted professionally, permanently, independently and for profit. Service income, by service means employment, mission or other income generating activity that are temporarily or under long time (Lund, u.å). The data for the different types of incomes is collected from the Swedish Board of Agricultural from their yearbooks, where they present statistics from the agriculture in Sweden. The different types of income are measured at county level and presented as the yearly mean for the different types of income for each county in Sweden. The SBA has

probably collected the income data from the Swedish tax agency and their data on personal income tax and corporate tax. However, it is not clear if the SBA has collected the data from the Swedish tax agency, but it is most likely that they have.

A limit of the data chosen and used in this study is that it is not sure that the different types of incomes only is based on income from agriculture. The different types of income can include non-farm income also, but this has not been able to find out. There is very little information about it on the SBAs website where the data is collected from. Therefore, it is a big chance that the data used in this study consists of both farm income and non-farm income. Which can be seen as a limit and source of error for this study.

Overall the SFP is expected to have a positive association with farm income, after conducting the literature review. Keeny (2000) concludes that the SFP was the single largest influencer affecting the increase in farm income on Ireland. Garvey et al. (2013) also concludes that the 2003 reform is expected to have a higher positive impact on farm income than the Agenda 2000. The SFP is expected to have a positive association with the different incomes due to the conclusions that the SFP has an impact on income in the short run (Larsson et al., 2018). Service income is also the biggest part of household's income, thereafter business income (SBA, 2007). Therefore, this thesis expects that the SFP has a bigger association with service income than business income. Also, because the SFP has had a positive impact on the employment rate in the agricultural sector in Sweden, the SFP has made it possible for farmers to afford more employees (Hasund et al., 2014).

Income can be defined in a variety of ways; this paper will refer to income as the term used in a business accounting sense, the revenue from farm sales after the costs of the business have been paid. These costs and expenditures consist of purchases from other firms, wages and interest, rents, depreciation charges and so on. The income is the net profit owned by the farmer (Hill, 2000). To limit the variables this study will be using the total cost function for a company used in economics, to limit the variables. The expression for total cost function is:

$$TC = C * R + L * W$$

Where C is capital, R is rent, L is labour, and W is wage.

For total labour this study has chosen to limit it to entrepreneurs and family members permanently and temporarily employed in agricultural (*Total labour business and family*) together with non-family members permanently employed in agricultural (*Total labour outside*). For total cost this study has chosen the variable *Total farming cost*, which consists of the average total cost a farm has including costs for consumption of fixed capital, goods and services, maintenance, interest costs, fuel, wages, fertilization, seed, leasing fees and electricity.

The data is from the Swedish Board of Agricultural, the SFP variable is measured as the total amount every county gets per year. The variable for total farming cost observations are measured on a national level instead of county level and the variable for total labour is observed at county level. There are some missing observations for some years which lead to the need of imputing values in STATA.

The years of the financial crisis will be included in the regression as dummy variables, to see if the 2008 financial crisis had any impact on the different incomes. In 2008 the crisis got really deep and continued into 2009. The economy started to recover and increase again in 2010 (SCB, u.å).

Tangermann (2011) writes that recent dramatic economic development such as the financial crisis in 2008, agricultural tend to be less impacted than other sectors of the economy. This because the demand for food is not as dependent on income changes as demand for other goods. However, Tangermann writes further on that exchange rate variations tend to impact markets for agricultural commodities more intensively than for other more highly differentiated products. Variations in interest rates are also felt more strongly among farmers, who finance most of their capital-intensive investments with borrowed money.

Table 1: Variables and description

<i>Variables</i>	<i>Description</i>
Total SFP	The total amount of SFP to farmers in a county each year, measured in 1000-sek
Total labour business and family	Total labour for business and family in a county that work full time in agriculture
Total labour outside	Total labour for people who are full time employees, not a business owner or a family member
Total farming cost	The total cost of farming, includes all the costs a farming business have, measured in million
dYear8	Dummy for the year 2008
dYear9	Dummy for the year 2009
dYear10	Dummy for the year 2010

Table 2: Descriptive statistics

Variables	Observations	Mean	Std.dev	Min	Max
Total SFP	286				
Total labour business and family	286	6307.608	5341.653	2306	28437
Total labour outside	286	905.9545	677.8576	289	4638
Total farming costs	286	46357.46	7799.924	37487	65200
dYear8	286	0.0769231	0.2669364	0	1
dYear9	286	0.0769231	0.2669364	0	1
dYear10	286	0.0769231	0.2669364	0	1

3.3 Empirical model and structure of the data

Panel data

Panel data is a combination of cross-sectional and timeseries data. Panel data consists of observations that are measured on the same n entities at two or more time periods, T (Stock & Watson, 2015). The use of panel data gives more observations to the regression than cross-sectional data, the observations also show a development over time and the evolution over time can be observed between the county's (Dougherty, 2011, s.514-515). For this analysis, the data consists of $n=21$ observations (county), that have been observed over $T=12$ time periods. The data set used in this thesis have missing values for some time periods. If nothing is done about the missing values, STATA will exclude the variables with missing values

when they are put into the regression. Therefore, the variables have been imputed before running the regression. This is done replacing missing values with value of the nearby (latest) observation.

For this thesis a fixed effects regression model is used to answer the research question. The fixed effects regression uses OLS-regression technique to perform the regression. With a fixed effect regression, it is possible to control for omitted variables that vary between county's but are constant over time. If time fixed effects are included in a fixed effects regression, it is possible to also control for unobserved variables that are constant across county's but change over time (Stock and Watson, 2015). The fixed effects model is chosen after performing a Hausman-test, which show what model of random effects or fixed effects provides the best fit for the data. The fixed effects model can be specified as:

$$Y_{it} = \beta_1 X_{it} + \alpha_i + \lambda_t + u_{it}$$

Where α_i is the county fixed effects and λ_t is the time fixed effects, where X is a vector of explanatory variables and β is a vector of corresponding variables.

Measures of goodness of fit

To see how well the data fits the regression analysis and measure the OLS regression line, there are several factors that can be used to evaluate the fit. One is the coefficients of determination, which measures the fraction of the sample variance of the dependent variable, the variance of the dependent variable is explained by the explanatory variables. The value is between zero and one. Even if the value is close to one that does not mean that the chosen explanatory variables are the best to explain the variance in the dependent variable, data material, data-quality and the economic theory used also have impacts on the results (Stock & Watson, 2015).

To decide if the results are statistically significant the p-value is used. The p-value show whether the null hypothesis can be rejected or not. To reject the null hypothesis, a p-value of at least 0.05 is chosen as a decision rule, which corresponds to a significance level of 5%. Hence, if the p-value is lower than 0.05, the variable has a statistically significant influence on the dependent variable (Stock & Watson, 2015).

4. Results

In this chapter the findings of the study will be presented, with a focus on the SFP variable. The focus is on the SFP variable since it is of most interest to answer the research question.

As table 3 shows, the results for the SFP variable are statistically significant with a positive estimated correlation with business at 13%. These result means if the SFP increases with 1%, business income would increase with 13%. This result is in line with what Brady et al. (2007) who finds that without the SFP there would not be any money left for the farmer to pay wages and interest rates with. Most of business income comes from agricultural indicating that that the SFP is of significance for business income (Brady et al., 2007).

The results for business and family labour is not statistically significant but show a small positive estimated correlation with income from business indicating that labour from family and business owners has a positive impact on income from business.

Farming costs are not statistically significant in this regression but show a positive relation with business income indicating that farming costs has a positive impact on business income. Labour outside are also not significant, the estimated result for labour outside has negative estimated result indicating that labour outside family and business will decrease business income.

In this regression the time variable 2008 and 2009 is not statistically significant and show an estimated negative relation, indicating that 2008 and 2009 decreased the business income. However, 2010 show a statistically significance with a positive impact on business income indicating that 2010 increasing impact on business income (Tangermann, 2011).

The R^2 for the regression is 0,4126, which means that 41% of the variance in business income is explained by the independent variables, indicating that the model has a fairly good fit.

Table 3: Regression results from Business income

Variable	Fixed effect model	
LogSFP	0.1301**	(.0346297)
LogLabourBuisnessFamily	0.0141	(.039529)
LogLabourOutside	- 0.0099*	(.0092904)
LogFarmingCost	0.1434*	(.0215457)
dYear8	-0.0265	(.0168126)
dYear9	- 0.0280*	(.0155848)
dYear10	0.0456**	(.0128583)
Number of Observations	286	
Number of groups	21	
R ²	0.4126	

Heteroscedasticity Robust standard errors in the parenthesis

*** p <0.01, ** p <0.05, * p <0.1

As the results in table 4 shows, the SFP variable is statistically significant and have an estimated positive association to service income with 23.4%, this result is also in line with what theory and previous studies have argued and shown (Hasund et al., 2014; SBA, 2007).

Labour for business and family is not statistically significant but have a positive estimated impact on service income (SBA, 2007). Farming cost is of statistical significance but shows a positive connection with service income.

Labour outside is not of statistically significance but show a small estimated negative association on service income. The dummy variable for year 2008 shows statistical significance at 5% level and have an estimated negative association with service income. Neither one of the dummy variables for year 2009 or 2010 shows statistically significance but they have an estimated positive association with service income (SCB, u.å; Tangermann, 2011).

The R² for the regression is 0.54, which means that 54% of the variance in business income is explained by the independent variables.

Table 4: *Regression results from Service income*

Variable	Fixed effects model	
LogSFP	0.2343***	(.0314853)
LogLabourBuisnessFamily	0.0382	(.0500628)
LogLabourOutside	- 0.0086	(.0061661)
LogFarmingCost	0.1267***	(.0284744)
dYear8	-0.0491**	(.0151311)
dYear9	0.0116	(.0155894)
dYear10	0.0040	(.0134695)
Number of Observations	286	
Number of groups	21	
R ²	0.5408	

Heteroscedasticity Robust standard errors in the parenthesis

*** p <0.01, ** p <0.05, * p <0.1

The SFP variable show statistical significance as can be seen in table 5. The estimated result shows a positive association with the farming household income with 23%. This result is in line with what theory and what previous studies has concluded (Brady et al., 2007; SBA, 2007).

Labour for business and family members does not show any statistical significance but have a small positive estimated relation with farming household's income. This result is in line with previous studies has shown (SBA, 2007). Farming cost is significant at 5% level and show a positive estimated relation with income, indicating that farm costs has a positive influence on household's income. Labour outside is also of statistical significance and have a small estimated negative result at 1.8%. Indicating that labour outside family and business have a small negative influence on farming household's income.

The dummy variable for 2008 show statistical significance at 5% level and have an estimated negative association with farming household's income. The variables for 2009 and 2010 does not show statistical significance but have an estimated positive association with households income (SCB, u.å ; Tangermann, 2011).

The R² for the regression 0.5805, which means that 58% of the variance in farming household income is explained by the independent variables.

Table 5: *Regression results from Farming household income*

Variable	Fixed effect model	
LogSFP	0.2316***	(.024465)
LogLabourBuisnessFamily	0.0269	(.0400649)
LogLabourOutside	- 0.0184**	(.0075445)
LogFarmingCost	0.0643**	(.028012)
dYear8	- 0.0592**	(.0172216)
dYear9	- 0.0216	(.0146144)
dYear10	0.0034	(.0134811)
Number of Observations	286	
Number of groups	21	
R ²	0.5808	

Heteroscedasticity Robust standard errors in the parenthesis

*** p <0.01, ** p <0.05, * p <0.1

5. Discussion

The results in previous chapter and the limitations of the study is discussed.

The results of the study show that the SFP variable are statistically significant in all the regressions for all three variables; farming household income, business income and service income. That the SFP would have a positive association with all three incomes was expected, due to the findings in the literature review as Keeny (2000) and Garvey et al. (2013) both concluded that the decoupled direct payments had a positive impact on farm income in their studies. The regression results for this study shows that for the farming households' income the SFP has a positive association with 23%. The SFP has a lower positive association with business income, the estimated result was 13%. However, service income has a higher estimated value with 23.4%. That service income and household income had a higher association with the SFP than business income can depend on that household's income consists of service income to 78% and business income only requires for 21% of the farming household's income (SBA 2007).

That service income had a higher association with SFP could also be the result of that the SFP has made it possible for farmers to hire labour from outside the family, making it possible for the partner to the farmer to have their own career outside the farm (Höjgård and Nordin, 2014). Which helps to increase the household's income. The lower association between business income and SFP could also depend on that business income is not only from agricultural activity, business income consisted also of 28% income from other activity than agricultural, but agricultural activity accounted for 72% of business income (Brady et al., 2007).

This discussion should be considered with caution, as this is based on the results from earlier studies that has been linked to the results of this study. To be able to say that this is the reasons for the different associations, further research has to be done. Analysing the underlying reasons for the SFP different associations with the different incomes.

Another factor that also affects the results is the choice of method, in this study county level data was chosen and merged together in the model. To get better results it might be better to compare different municipalities with each other, or different production areas. But due to

limitations of the study and lack of public data this study chose to merge county level data. Other things that also have impact on the different types of income from is the weather, good or bad crop year and if the farmer has other jobs outside the farm, increasing the income. This study does not take these sources into account and can be seen as a limit of this study or a source of error. Therefore, an extension of this work would be to compare counties with each other or production areas to better handle these other factors affecting the incomes.

The results for total labour business and family showed no statistical significance in either one of the regressions, but they had a small positive estimated association with the different types of income. Which is in line with what previous studies has concluded regarding the SFP effect on employment in Sweden (Hasund et al., 2014; Blomquist and Nordin, 2013). The results for total labour outside showed a negative association with the different incomes and was significant in two regressions. The hypothesis after reading existing literature was that labour outside would also have a positive association with the different types of income (Hasund et al., 2014; Blomquist and Nordin, 2013). But the labour outside showed a negative association and was statistically significant in two regressions. That the labour outside was not significant in all three regressions and that the results was different from the hypothesis can depend on the data material, the data that was chosen may have been selected incorrectly. However, that labour outside was significantly estimated to have a small negative association with business income and farming household's income is not so odd. If a business has more people employed, they get bigger costs for wages, which leads to higher business costs and reduces the business income in the end. Outside labour may impact farming household's income negative in the way that these people are not included in the statistics for farming household's income. So therefore, the data may have been selected incorrectly for this study.

This study did not look into if the SFP have different impacts in the 21 counties on the various incomes, most of the previous studies have had a regional aspect when looking on how the SFP impact farming income. But these studies have also concluded that the SFP has a positive impact on incomes from farming on a national level. Though it can be good to analyse the SFP impact on county level, because most of the previous studies has concluded that the SFP has different impacts in different parts of the country they have looked at (Uthes et al., 2010; Severini & Tantari, 2013; Keeny, 2000; Garvey et al. 2013).

A limit of this study is that the statistics from the Swedish Board of Agricultural for the different incomes never showed if the incomes was only from farm income or if included also non-farm income also. Therefore, there is a risk that the incomes used in this study can include incomes from non-farm work. But it is hard to say because there was no clear information about what the different incomes consisted of. An initiative for further development of this thesis would be to look at how the SFP associate with non-farm income.

According to the results from the regressions the time specific variables did not always indicate statistically significant association with the depended variables for income. The results for total farming cost was significant in all three regressions but showed a positive association with the different income. This is in contrary to what the theory behind the choice of variables indicated. The reason why these variables does not show a statistically significant correlation or go against the hypothesis and theory with the different incomes is difficult to say, but one explanation could be that those variables does not affect the different types of incomes. This does not seem like the best explanation because it goes against the theory. Therefore, it is more likely that the insignificant results in the model depends on the data like incorrect selection of data for these variables. For a better result data on farm level would be preferred, but unfortunately farm-level data is not publicly available. Due to lack of data on municipality level for most of the variables, county level was elected to be able to conduct the study.

The results showing the R^2 estimations in table 4 and table 5 was quite high. For the regression in table 3 the R^2 was 54% and for the regression in table 5 the R^2 was 58%. This indicates that there is risk for multicollinearity between some of the explanatory variables. Some of the variables are likely to might influence each other. However, if the data would be on a more aggregated level such as farm-level or municipality level the risk of multicollinearity between the variables would probably be reduced.

Given these results, it is of importance to discuss if the CAP as it is formed now is the most effective way to increase and ensure incomes for farmers throughout the EU. This study got the result that the SFP had 13-23.4% association to the different types of income. It is quite low association, and therefore it is interesting to ask if today's formation of CAP can be defended? Around 70% of CAP's total budget goes to the SFP and of EUs total budget goes around 30% to CAP (European commission, 2019). Therefore, it is relevant to discuss if this is an effective way to use taxpayer's money? Most of the member states that are net donors to

EU think they pay too much given what they get back from the EU. Therefore, it is of high importance that the money is allocated in the most effective way.

6. Conclusions

The main conclusion of the results is presented and proposal for further research are made.

The aim of this study was to analyse if the Single Farm Payment associated with different types of farming income. The data used was a panel data set consisting of observations on county level from 2001-2013. In order to estimate the results, the method used was a fixed effects regression model. The research question was;

“Does the Single Farm Payment associate with various farming income in different ways in Sweden?”

The findings indicate in this study that the Single Farm Payment has a significant association with an estimated positive effect between 13-23.4% with the different types of incomes. These findings from the study is in line with what the results from the theory part and literature review showed. The literature review also made it clear that analysing the impact the Single Farm Payment has on different regions in a country is also of interest, because the prerequisites of farming often differ and especially in Sweden. Therefore, this could be an incentive for further research to analyse. It would also be interesting to see what impact the decoupled direct support has on different farm sizes.

The literature review focused on how the decoupled direct support affect farming income in different parts of the European Union member states. It was found that the SFP has overall a positive impact on farm income, but it can differ between the various parts of a country, depending on the prerequisite of agricultural. The results from the regression showed that the SFP variable was significant for farming households' income, business income and service income.

As a conclusion, Swedish farming household's income, business income and service income are positively associated by the Single Farm Payment in different ways. The results from this study has raised several interesting questions for further research. It would be interesting and useful to examine how the SFP influences the incomes for different farm sizes.

In the CAP some of the aims is to support farmers and improve agricultural productivity and to ensure that European Union farmers can make a reasonable living. The aim of this study

has been to fill the gap regarding how the SFP influences different Swedish farm incomes. Policy makers need to understand the implications off different policy decisions, to be able to reach the goal of CAP. To best know how to maintain a productive and sustainable countryside there is a need to be better to analyse the effects of different policies. Hopefully this thesis can help in some way to give relevant information or give incentives for more relevant studies in this field.

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