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Feeling of Relative Deprivation as a Driver for Higher Agricultural Subsidies*

Abstract. Because people tend to compare themselves with others from their own surroundings, even a person rich in absolute terms can feel poor in relative terms, if people from their reference group are richer. This phenomenon is called relative deprivation. Farmers in developed economies claim to be poor, because they compare themselves not with farmers from poor economies, but rather with other members of their own society who work outside of agriculture and whose incomes are usually higher. Feeling relatively deprived, farmers in developed economies demand stronger financial support and act intensively to convince policymakers to support them. The main aim of this paper is to analyze the relation between relative deprivation of farmers and support for farmers in countries with different development levels. Results of this study prove that levels of support for farmers are positively related with the average level of relative deprivation of farmers dependent on the size of farmer groups. Hence the idea of relative deprivation might provide additional political explanation of different levels of support for farmers in countries with different development levels.

Key words: agricultural policy, support for farmers, relative deprivation, political economy

Introduction

Under conditions of perfect competition prices are determined by demand and supply. However, agricultural markets in most countries are far from what we call perfect competition. The agricultural sector is subject to government intervention in most world economies and prices of agricultural products are influenced by a wide range of domestic and trade policies. However, the character of these actions takes different form in developed and developing countries. Rich economies usually support farmers, whereas poor economies typically or often tax them. As a result, world food prices are strongly distorted. Although lack of financial support in developing countries might be explained through fiscal reasons, it is much harder to understand why developed economies continue to support farmers. Moreover, farmers from developed economies, though rich in comparison to the farmers from developing economies, claim to be poor and demand financial support, which they ultimately receive. Hence the main research problem of this paper is to find some possible explanations of this situation, since such patterns of agricultural policies make little sense from a classic economic point of view.

In the literature there are several answers to this phenomenon provided by political economy theories [Swinnen 2010, Gawande and Hoekman 2010]. A set of arguments is related to the effectiveness of political organization and the power of farmer lobbying. Studies drawing on Olson's [1965] theory of collective actions argue that incentives to act collectively increase as interest groups get relatively smaller and gather more political power, because a group requires measures of organization, communication and

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coordination among its members and the transaction costs of organizing a lobby are lower – with higher potential gains per capita – in smaller groups. Baldwin and Robert-Nicoud [2007] explain that in expanding industry, with low barriers to entry, new entrants reduce potential political rents, however in declining industries this is not the case. The result is that members of declining industries invest more resources in lobbying activities. Other economists [Freund and Özden 2008, Tovar 2009] stress the importance of aversion to loss in determining political reactions; hence governments support groups or industries that would face significant short-term loss, as in many cases for the agricultural sector in developed countries. Another group of studies emphasized the importance of income and asset inequality in explaining why rich countries support farmers and poor countries tax them. Olper [2007] argues that inequality is negatively correlated with protection, which is contrary to Olson's line of argument. He refers mainly to land inequality and the ideology of the ruling party. He claims that democratic governments tend to reduce inequalities and are more willing to support farmers than dictatorships, which prefer to maintain assets in only a few hands[2]. On the other hand, La Ferrara [2002] proves that inequality causes collective problems, which is often the case in developing countries and results in lower levels of support.

However, there might be another explanation for why farmers in developed countries receive greater financial support. One can look at the problem of group size and the problem of inequality from another perspective. Farmers in developed economies demand support because they feel poor, even though in absolute terms their incomes are much higher than the incomes of farmers in developing countries. Prosperity looks different in relative terms. Farmers in rich economies compare themselves not with farmers in poor economies, but rather with other members of their own society who work outside of agriculture and who are usually richer[3]. Moreover, because in developed countries the number of people employed in agriculture is small, the percentage of those who are richer than farmers is significant. Seeing that most of society is better off, farmers in developed economies claim to be poor. This phenomenon is called relative deprivation and is used in theories of social movement to explain why people join social movements or advocate social change [Runciman 1966]. Feeling relatively deprived, farmers in developed economies demand stronger financial support and act intensively to convince policymakers to support them. In addition, farmers from rich countries are aware that their actions will not meet with social opposition and that the rest of society will not act against agricultural subsidies, due to the fact that increases in income reduce the relative cost of such support for consumers. As a result, the average level of support for farmers in developed countries is higher than in other parts of the world.

Hence the main aim of this paper is to assess the relative deprivation of farmers in countries with different development levels and to compare it with levels of support for farmers. The following research hypothesis is assumed: there exists a positive relation between the level of a country's average support for farmers and the level of a country's average relative deprivation of farmers, which is related to the percentage of society working outside of agriculture. The first part of this paper gives some methodological

[2] Issue of ideology, inequality and lobbing is also widely discussed by Dutt and Mitra [2010].

[3] Frank [2007] stresses the importance of reference group and explains that people tend to compare themselves with others from their own surroundings; hence "...a house of a given size is more likely to be viewed as spacious the larger it is relative to other houses in the same local environment".

background. The second part presents an empirical analysis, which proves the assumed hypothesis.

Material and methods

World Bank estimates of distortions to agricultural incentives

The empirical analysis of the level of support for farmers was based on the NRA estimate (nominal rate of assistance) available in the World Bank database on estimates of distortions to agricultural incentives 1955-2007, updated in June 2013 [Anderson, Valenzuela 2008; Anderson, Nelgen 2013]. The final data set includes data for 82 countries with different development levels and over the years 1955-2010. The NRA for a single product indicates what percent an agricultural producer's income is higher (or lower) from the one he would obtain in the absence of any interference from the state. It can be defined as:

$$NRA = \frac{P_d - P_f}{P_f}$$

where:

P_d – is observed domestic price in local currency

P_f – is the domestic price that would hold in the absence of commodity-market or exchange-rate intervention.

NRA would be zero if there was no government intervention, positive if farmers were supported, and negative if producers were taxed [Masters and Garcia 2010]. NRA for the sector is calculated as a weighted average, where the weights are based on the value of production measured in world prices. Analysis in this paper was based on $NRA_{totd,}$ which includes also non-product specific support and decoupled payments.

Relative deprivation index

Though NRA estimate is a well-established and well-known way of measuring levels of support for farmers, the methodology for measuring relative deprivation is not so evident. The most common way to measure relative deprivation is to use the index proposed by Oded Stark in several of his papers [Stark, Micevska, Mycielski 2009; Stark 2013]. Relative deprivation of an individual earning x_i in population P with an income vector $x = (x_1,...,x_n)$ is equal to the fraction of those whose incomes are higher than x_i times their mean excess income:

$$RD(x_i, x) = [1 - F(x_i)] \cdot E(x_i - x_i | x_j > x_i)$$

In order to calculate the average level of farmer relative deprivation we need do modify the equation as follows:

$$\overline{RD}(ag) = [1 - F\big(x(ag)\big)] \cdot (\bar{x}(nonag) - \bar{x}(ag) | \bar{x}(nonag) > \bar{x}(ag))$$

Hence the country's average level of farmer relative deprivation is equal to the fraction of those working outside agriculture times the difference between average income in the non-agricultural sector minus average income in the agricultural sector, providing that average income outside agriculture is higher than average income within agriculture.

Because comparable and reliable data on income within and outside the agricultural sector in countries with different development levels is not available, I decided to use gross value added data available in the World Bank database. In the case of the agricultural sector, gross value added is an even better measure, since it does not include income subsidies. Hence the value added can be seen as an approximation of what a farmer would earn if there was no government support. Following, the average level of farmer relative deprivation in a single country can be calculated as a fraction of the work force in non-agricultural sectors multiplied by a difference between mean gross value added per worker in non-agricultural sectors and mean gross value added per worker in the agricultural sector:

$$\overline{RD}(ag) = \big[1 - F\big(GV(ag)\big)\big] \cdot (\overline{GV}(nonag) - \overline{GV}(ag) | \overline{GV}(nonag) > \overline{GV}(ag))$$

A positive result means that farmers are relatively deprived in comparison to other members of the society, but if a result is negative, then the relative deprivation equals zero.

However, the index of relative deprivation proposed by O. Stark is useful when analyzing individuals or countries in the same reference group. For example, it can be used to compare relative deprivation between farmers within one country or between farmers from countries with similar levels of income per capita, like France and Germany. It makes less sense when comparing the level of relative deprivation between farmers in countries with significant differences in levels of income per capita[4]. To solve this problem, an assumption was made that even though farmers in high-income economies are relatively less poor (in comparison to non-farmers) than farmers in most of the low-income countries, they still feel relatively deprived and their relative deprivation is even stronger because those earning more (non-farmers) are higher than in the low income economies. In other words, in international comparison it makes no difference how big the income excess is. What farmers care about is the percentage of society working in non-agricultural sectors when they earn more than farmers. Following this assumption, I used a dummy variable set to one if mean gross value added per worker in non-agricultural sectors was higher than mean gross value added per worker in agricultural sector and modified the relative deprivation index:

$$\overline{RD}(ag) = \big[1 - F\big(GV(ag)\big)\big] \cdot (1 | \overline{GV}(nonag) > \overline{GV}(ag))$$

or

[4] Since mean excess depends on difference in average absolute income, it would also influence relative deprivation index.

$$\overline{RD}(ag) = 0 | \overline{GV}(nonag) < \overline{GV}(ag)$$

Hence, the average level of farmer relative deprivation in a given country is assumed to be equal to the fraction of people working in non-agricultural sectors in the case when average gross value added in the non-agricultural sector is higher than in the agricultural sector, and zero (farmers are not deprived) in the case when average gross value added in the non-agricultural sector is lower than in the agricultural sector.

Panel data analysis

The above-described data set on support for agricultural sector and relative deprivation is an example of macro-economic panel data. This kind of data describes observed population in more than one dimension, for example time and spatial dimension. The main advantage of panel data is the ability to increase the research sample, thus increasing the number of degrees of freedom and efficiency of estimation. Panel data also allows for greater heterogeneity of the observed individuals. For these reasons, panel data is often used in social studies, including economics. The most commonly used models for panel data are: pooled model, model with fixed effects and model with random effects [Gruszczyński 2012].

Pooled model regression can be used in a situation where the sample is homogeneous or when all individuals are similar. Estimated parameters of the model are the same for all individuals and in each time unit. Differences between the empirical and the theoretical values result only from random noise. In other words, the individual effects do not occur or are irrelevant. In that case, we treat data as cross-sectional data and estimate regression with use of ordinary least squares (OLS) method. The model is denoted as:

$$y_{it} = \beta_0 + x_{it}\beta + \varepsilon_{it}$$

where:

$i = 1 \ldots N$ - individual dimension
$t = 1 \ldots T$ - time dimension
y_{it} - dependent variable,
x_{it} - independent variable,
β_0, β - coefficients,
ε_{it} - error term

In order to decide whether to use the OLS method, it is worth running the Breusch-Pagan test, which verifies the hypothesis about the existence of random effects [Kufel, 2007]. In practice, the null hypothesis that variances across entities are zero can rarely be accepted.

The second type of panel data estimation is the fixed-effects model. This model assumes that objects have their own individual characteristics, which means that their variances differ. In order to eliminate differences in variances, the model includes individual coefficient α_i, [Wyrobek 2004], which can be interpreted as an individual intercept for each observation. This model can be denoted as:

$$y_{it} = x_{it}\beta + \alpha_i + \varepsilon_{it}$$

where:
$i, t, y_{it}, x_{it}, \beta, \varepsilon_{it}$ - same as above,
α_i - the unobserved time-invariant individual effect for each observation i. The significance of the individual effects can be assessed with the Wald test.

Another method of panel data analysis is the random-effects model. This model assumes that individual effects are a random variable and are uncorrelated with the independent variable. In order to estimate the RE model, one must use a generalized last square (GLS) method. The model is denoted as

$$y_{it} = \beta_0 + x_{it}\beta + v_{it}$$

where:
$i, t, y_{it}, x_{it}, \beta_0, \beta$ - same as above,
$v_{it} = \alpha_i + \varepsilon_{it}$ - error term being a sum of between-entity error and within-entity error.

To decide between fixed or random effects, one can run a Hausman test where the null hypothesis is that unique errors are not correlated with the regressors [Kufel 2007].

Results and discussion

The final data set includes 70 countries and 1560 observations[5]. The full dataset is presented in Figure 1, which suggests a positive relation between nominal rate of assistance (NRA) and average relative deprivation (RD) of farmers. This figure suggests also that for some observations RD equals zero, which means that average gross value added in the non-agricultural sector is lower than in the agricultural sector. Such a situation happened regularly in Argentina, Bulgaria, Nicaragua, Nigeria, Ukraine and Slovenia[6].

Table 1, which presents the top ten countries with the highest and the lowest level of NRA estimate in year 2001-2004[7], provides further support to this tendency. Share of non-agricultural labor force, which determines the level of relative deprivation, is high in countries with the highest level of nominal rate of assistance. On the other hand, in countries with low level of NRA (or even negative), the share of the non-agricultural labor force is much lower. There are exemptions like Argentina, Nicaragua or Niger, where the majority of the labor force works outside agriculture and the NRA is negative. Auxiliary dummy variable equal to zero suggests, however, that in these countries average gross value added in the non-agricultural sector is lower than in the agricultural sector, hence farmers are not deprived and they have no incentive to lobby for support.

[5] Although there is inevitably much measurement error and lack of data regarding both NRA estimate and relative deprivation index, this data still covers a very large fraction countries over a very long time period, which makes it possible to detect new trends and patterns.
[6] Value added in agricultural sector happened to be higher than in non-agricultural sector also in Armenia, Bosnia and Herzegovina, Guyana, Kyrgyz Republic, Lebanon, Macedonia, Micronesia, Moldova, Mongolia, Tonga and Uzbekistan. These countries were, however, excluded from analysis because NRA data were not available.
[7] This time range was chosen because of the highest number of available data.

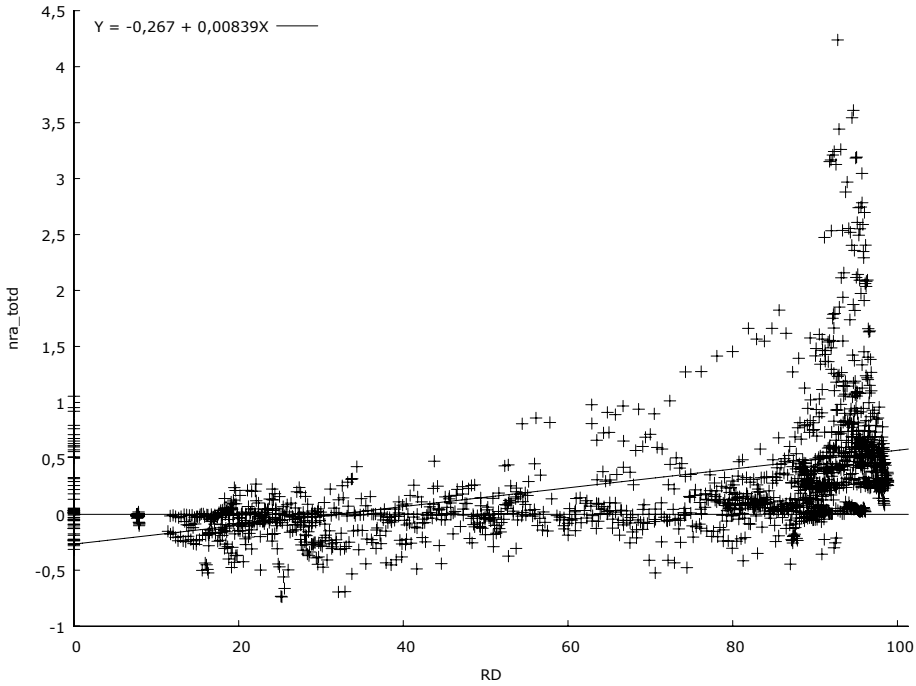

Figure 1. Relation between average relative deprivation of farmers (RD) and nominal rate of assistance for farmers (NRA), 70 countries, 1560 observation, (1980 to 2011).

Source: author's own derivation based on World Bank data base.

The preliminary visual analysis of the dataset suggests that there might be a positive relation between average level of relative deprivation of farmers and a country's level of support for farmers. Panel data analysis seems to be an adequate method to verify this hypothesis.

Table 1. Top ten countries with the highest and the lowest level of NRA estimate (2000-2004 average).

Country	NRA	Share of non-agricultural labor force (in %)	Auxiliary RD dummy variable	Country	NRA	Share of non-agricultural labor force (in %)	Auxiliary RD dummy variable
Switzerland	2.31	96	1	Zimbabwe	-0.38	39	1
Norway	2.22	96	1	Coted'ivoire	-0.28	54	n.a.
Iceland	1.82	93	1	Argentina	-0.19	91	0
Korea	1.45	92	1	Zambia	-0.14	32	1
Japan	1.15	97	1	Tanzania	-0.10	21	1
Ireland	0.80	91	1	Ethiopia	-0.09	19	1
Romania	0.66	87	1	Nicaragua	-0.05	82	0
Morocco	0.64	70	1	Nigeria	-0.04	69	0
Netherlands	0.57	97	1	Sudan	-0.01	42	1
Austria	0.56	95	1	Senegal	-0.01	27	1

Source: author's own derivation based on World Bank data base.

A dependent variable in the regression equating one used the NRA estimate for the total agricultural production, which includes also non-product-specific assistance and decoupled payments (nra_totd). Two potential independent variables were introduced. The first of these is a relative deprivation index (RD). This variable is equal either to a fraction of the non-agricultural labor force or to zero, depending on the relation between average gross value added in the agricultural sector and in non-agricultural sectors. The assumption is made that only the economically active population is willing to engage in collective actions, since only this group of society possess required resources. The second independent variable is the real GDP per capita calculated at constant prices from year 2005 in U.S. $ (gdppcp00). This variable helped to verify the hypothesis that due to Engel's law, increase of income reduces public opposition to agricultural subsidies, since the relative cost of such support for consumers declines[8]. In substantive reasons, the Breusch Pagan test and the Hausman test suggested that the best method of analysis of collected panel data would be a fixed-effects model. Results are presented in Table 2.

Table 2. Results of fixed-effect model; 70 countries: dependent variable: NRA estimate (nra_totd); independent variables: relative deprivation index (RD), real GDP per capita at constant prices from 2005 in U.S. $ (gdppcp00).

	Model 1 - All countries	Model 2 - Developed countries	Model 3 - Developing countries
RD	0.226 ***	2.880 *	0.172 ***
	(0,059)	(1.570)	(0.046)
Gdppcp00	0.004 ***	0.006 ***	0.0001
	(0.0002)	(0.001)	(0.0005)
Adjusted R^2	0.75	0.62	0.74
Wald test	74.95	81.88	38.76
	p < 0.000	p < 0.000	p < 0.000
Observations	1560	479	1081

Standard errors in parenthesis, significance *** p<0.01, ** p<0.05, * p<0.10

Source: author's own derivation based on World Bank data base

Adjusted determination coefficient R^2 shows that variability of the independent variables (relative deprivation and income per capita) explains the variation of NRA in 75%. Both independent variables are statistically significant and with the expected sign. The Wald test confirms the significance of the individual effects. When this panel data is separated by region, results varies. The model for developed countries explains less variation of NRA and the RD variable is significant only with p less than 0.1. The model for developing countries explains the variation of NRA almost as well as the model for the full data set, however income per capita turned out to be insignificant. All three models confirm the assumed hypothesis, that there exists a positive relation between level of a country's average support for farmers and level of country's average relative deprivation of farmers.

[8] Relations between income per capita and assistance to agriculture have been extensively analyzed by agricultural economists. For some examples see Krueger (1992) or de Gorter and Swinnen (2002).

Conclusions

The main aim of this paper was to analyze the phenomenon of relative deprivation of farmers and its relation to assistance for agricultural producers. The author suggested that the feeling of relative deprivation, which depends upon the percentage of the wealthier part of society, might serve as an incentive for farmers to act collectively and lobby for greater support. Theoretical considerations and empirical analysis have led to the following conclusions:

1. Support for farmers measured with the use of NRA estimate and the relative deprivation of farmers measured with the use of modified index of relative deprivation are positively related, which confirms the assumed hypothesis;
2. Empirical analysis confirms also that the relation between GDP per capita and agricultural support is significantly positive, which verifies the hypothesis that increase of national income reduces public opposition to agricultural subsidies, since the relative cost of such support for consumers declines;
3. Farmers in high-income economies compare themselves with other members of their own society and see that a significant fraction of society has higher incomes. Additionally, since the opposition to agricultural subsidies is reduced by high income per capita, farmers act intensively and with success to lobby for support from policymakers.
4. Farmers in developing countries, even though their incomes are also lower than incomes of non-farmers, constitute the majority of society. Seeing most of the society as equally poor, they feel less deprived and have weaker incentives to lobby for support. Additionally, because of the lower national income per capita, the cost per capita of supporting agriculture would be high and would cause social opposition.
5. The author of this paper is aware of the limitations of this approach and sees the need for further deepening of these considerations, since there are some countries, like New Zealand and Australia, where there is a high level of relative deprivation of farmers, but level of support for agricultural producers is low. Another issue worth consideration would be including data on owned assets such as land.

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