Green Public Procurement: An empirical analysis of the uptake of organic food policy. *

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Abstract:

Our study provides evidence of the determinants underpinning the uptake of green public procurement among public authorities. More specifically, we analyze the response among Swedish municipalities following a national procurement policy launched in 2006 which stipulated at least 25 percent of public food consumption to be organic in order to contribute to increased organic farming. We employ survey data on Swedish municipalities' organic food procurement from the period 2003-2016, supplemented with municipal characteristics, and estimate the uptake of the policy, accounting for potential selection bias. Results show that political ambitions have a significant and positive effect on the share of organic foods purchased, suggesting that local policy is in fact implemented. Secondly, higher political ambitions seems to be associated with increased organic expenditures, suggesting that conventional foods are at least partially replaced by their organic counterpart and not replaced by cheaper alternatives as a means to minimize added costs.

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Key words: Green Public Procurement, organic food policy.

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1. Introduction

Public purchases constitute a significant share of most countries' GDP. For example, the average share of GDP spent on works, goods and services in the European Union (EU) was about 13 percent in 2015 (European Commission, 2016), and about 12 percent in the OECD (OECD, 2017). The political idea of using the public sector's purchasing power as a policy instrument is growing stronger worldwide, and Green Public Procurement (GPP) is one of its key concepts (Nash, 2009; Cheng et al., 2018). GPP can be described as a purchasing process where a public authority strives to procure goods, services and works with less environmental impact compared to the non-green alternatives (European Commission, 2008a). Public authorities are thereby expected to use their market power to shape trends in consumption and production in favour of greener products (Li and Geiser, 2005). Policies on GPP have been launched in several OECD countries, and EU institutions have highlighted the role of GPP since 2001 (European Commission, 2001a; 2001b). Previous studies show that the impact of GPP depends largely on market characteristics (Marron, 1997, 2003; Lundberg et al., 2016), and that the frequency of including green criteria when awarding public contracts differs between products as well as between countries (Nissinen et al., 2009; Renda et al., 2012). Financial constraints, knowledge gaps, lack of organizational goals and structure, and lack of political commitment may also impede the implementation of political ambitions on public procurement (Cheng et al., 2018). To understand the potential effect of GPP it is thus necessary to study what factors influence the uptake of GPP while taking into account that these factors may differ across markets and regions.

In 2008, the European Commission issued a set of GPP criteria for different product groups in order to facilitate member states' implementation of GPP (European Commission, 2008b). For the group *Food and catering services*, the core criterion points out organic food purchases as a means to stimulate the organic market (European Commission, 2014). This criterion is directly

linked to an EU environmental objective of increased organic production (European Commission, 2004).[1] Although several local and regional initiatives emphasizing organic food procurement have been launched within the EU,[2] there are (i) few examples of large scale and/or nation-wide policy measures, and (ii) few studies analysing the uptake of GPP policies in public procurement of food and catering services (Cheng et al., 2018).

The present paper studies local governments' response to a national organic food policy, launched by the Swedish government in 2006. The policy stated that the value of public organic food purchases should increase to 25 percent of total food purchases in the public sector by 2010, in order to reach a target of 20 percent organic farmland by the same year. Specifically, we analyse the uptake of this voluntary, non-binding GPP policy among Sweden's 290 municipalities, where uptake refers to the municipality's organic food purchases, measured in shares and SEK/capita, respectively. Given the decentralized structure of the Swedish political system, which lends extensive sovereignity to municipalities to finance and organize public services, the policy encouraged municipalities to formulate their own political goals for organic food purchases. However, an increased share of organic food products increases expenditures, all else equal, due to organic food price premiums, search costs, etcetera. Given these increased expenditures, the policy's non-binding nature and its decentralized implementation, it is of interest to study if a GPP policy on local level actually translates into GPP uptake, and how local authorities balance the policy target against the organic price premium.

[1] Organic production involves cultivation and animal keeping while striving for environmental consideration, management of resources, and a high degree of self-reliance (Government Communication, 2006).
[2] See http://ec.europa.eu/environment/gpp/case_group_en.htm for a list of case examples within the EU.

Using an extensive set of survey data from 2003 to 2016 on municipalities' food policy and organic food purchases, coupled with municipality characteristics, we analyze the relation between GPP policy and GPP uptake, while controlling for other factors influencing organic food purchases, including political, financial and, to some extent, GPP awareness factors.

Voluntary surveys on green procurement will likely have a higher response rate among more environmentally committed responders (Ochoa and Erdmenger, 2003; Jörgensen, 2012), suggesting that there is reason to suspect that the data suffers from selection bias (Heckman, 1979). When testing for selection bias, we find that this is also the case, which is an interesting finding in itself. After correcting for selection bias, we find that the existence of an organic food policy has a positive and significant effect on the share of organic food purchases, and that this effect increases with the objective level. Further, this positive and significant relationship also holds when organic expenditures per capita is the outcome variable, suggesting that municipalities do not recompose their food baskets to include organic products with lower price premiums, but are in fact investing or re-allocating resources to reach their objectives. How this is financed is not known to us and out of scope for this study.

Our study contributes to a growing body of literature that studies the uptake and implementation of GPP (Erdmenger, 2003; Preuss, 2007; Carlsson and Waara, 2007; Preuss, 2009; Testa et al., 2016). A substantial strand of the existing literature addresses the general existence of environmental criteria among public authorities (Nissinen et al., 2009; Palmujoki et al., 2010; Renda et al., 2012; Testa et al., 2012). While these studies mainly consider GPP uptake to be a binary variable, e.g., applying environmental criteria or not, the present study deepens the understanding of uptake, by treating GPP uptake as a continuous variable, measured in shares of organic food and organic expenditures per capita, respectively. Although limited in scope, product-wise, our approach means that we do not bundle vastly different procurements, thereby running the risk of obtaining biased parameter estimates.

Previous studies of GPP uptake have often studied a specific procurement case (Clement et al., 2003; Uttam and Roos, 2015), a specific procurement division (Erridge and Hennigan, 2012; Swanson et al., 2005), or implementation across subjects at a specific point in time (Michelsen and de Boer, 2009; Walker and Brammer, 2009; Brammer and Walker, 2011; Renda et al., 2012). The data used for this study spans over all of Sweden's 290 municipalities for a period of about 14 years. In this aspect, our paper adds significant value of scope with its relatively large coverage and longitudinal and quantitative approach.

The rest of the paper is organized as follows: Section 2 presents previous literature. Section 3 presents the context and background of the policy. Section 4 describes the data used, followed by an outline of the empirical strategy in Section 5. Our findings from the empirical analysis are presented in Section 6, and Section 7 concludes the paper.

2. Prior literature – factors influencing GPP uptake

By synthesizing the existing literature on GPP, Cheng et al. (2018) identify the common barriers for succesful implementation of GPP as: (i) financial constraints - green products are normally perceived as more costly than the conventional alternative, (ii) lack of environmental knowledge and awareness, (iii) lack of organizational goals and structure, and (iv) lack of political commitment.

Based on a survey of 860 public authorities across 25 EU member states, Bouwer et al. (2006) find that the main obstacle when implementing GPP relates to the perception of green products being relatively more costly. Other major obstacles include political factors - about one third of the respondents claimed there was a lack of organizational resources and promotional policies on GPP, and cognitive factors – about one third of the respondents complained about lack of training and competence in environmental matters and the use of environmental criteria. Based

on the findings, Sweden and six other member states are grouped as the "Green 7",[3] with GPP practices relatively well consolidated within this group.

Similar results are found in a survey of 106 British public authorities, where top management support and well designed tender documents are seen as the main facilitators of GPP (Walker and Brammer, 2009). In a survey of Italian public authorities by Iraldo et al. (2007), about one fourth of the respondents adopting GPP practices deems the main implementation problems to be; lack of information about a products' environmental impacts; difficulty in finding suppliers; difficulty in preparing call for tenders and lack of guidelines from higher-level authorities.

A few studies address the determinants of GPP uptake, using econometric analysis, although they do not study specific areas of purchase and consider the outcome variable to be binary, i.e., applying environmental criteria in tender documents or not. Based on regression analysis and cross-sectional survey data on 156 public authorities in Italy, Testa et al. (2012) conclude that awareness (on GPP toolkit and regulations) and municipality population size significantly influence the decision to include environmental criteria in the call for tenders. In a study on GPP practices in Norwegian municipalities, Michelsen and de Boer (2009) find that municipality size is positively correlated with the frequency of including environmental demands in the call for tenders, as well as with having a purchasing department and a purchasing strategy. However, they do not find a correlation between the size of the municipality and its view on whether purchasing is of strategic importance or not, suggesting that merely formulating a strategy does not necessarily mean it will be implemented. This phenomenon is illustrated by the fact that a large share of the Norwegian municipalities put forward environmental demands in their call for tenders, but refrain from using this information later on in the process.

[3] The other member states in this group are Austria, Denmark, Finland, Germany, Netherlands, and the UK.

The voluntary nature of many GPP policies, i.e., it is a self-regulating policy instrument, is also adressed in Zhu et al. (2013). Interestingly, they find that increased knowledge on GPP regulations tend to make procurement officials more reluctant to implement green purchasing practices. This counter-intutitive finding is explained by the GPP policies being voluntary and the accountability of not adhering being ambiguous.

A public authority's ability to implement GPP also depends on the availability of green products and whether there is a clear and transparent set of green criteria to apply in the call for tenders. Nissinen et al. (2009) refer to this as a product's level of "greenness" and conclude that the level of "greenness" of food products in the Nordic countries was relatively high already in 2003. Since 2008, the EU common set of GPP criteria applies the EU organic label, which indicates that production is controlled and certified and, to a minimum, complies with the council regulation 834/2007. Regional labels often co-exist and organic food products in Sweden can also use the KRAV label[4] (Government Communication 2006; Swedish Parliament 2010).

In a qualitative study of GPP uptake, Neto and Caldas (2018) review over 20 schemes related to procurement of food and catering services in order to analyse the use of green criteria among public authorities in the EU. The criterion most commonly mentioned in the reviewed schemes refers to *organic production*, followed by *seasonal and fresh produce* and *staff training*[5]. Although their analysis do not address the actual procurement outcome, it is evident that the core criterion of organic production dominates GPP schemes related to food procurement, and thus serves as a relevant focus for the study of GPP uptake in the case of food procurement.

3. Policy background and context

[4] KRAV complies with council regulation 834/2007, but has a more extensive set of rules than, especially for the parts of production that concerns animal wellbeing and climate effects (Swedish Parliament, 2010).
[5] Other common criteria mentioned are *transportation and packaging*, *menu planning*, *waste management (including food waste)*, *marine and aquaculture products* and *animal welfare*.

3.1 Policy background

The GPP policy launched by the Swedish Government in 2006 aimed at stimulating the demand for domestic organic production, and let the market bear a larger share of the costs that farmers incur when converting to organic production.[6] This difference in preferences between organic and conventional food refers to wide-held beliefs on organic food's positive effects on, e.g., health, environment and climate, and animal welfare. Although these arguments are discussed within the scientific literature,[7] it is evident that organic food products entail higher prices than conventional ones, ceteris paribus, as a policy on organic food procurement would otherwise be obsolete. The organic price premium is estimated by Jörgensen (2012), using Swedish procurement data, where the price of an organic food basket is found to be on average 66 percent higher than the price of a conventional one.

The GPP policy from 2006 stated that the value of public organic food purchases should increase to 25 percent of total food purchases in the public sector by 2010, in order to reach a target of 20 percent organic farmland by the same year. Sweden's 290 municipalities were encouraged, but not regulated to contribute to the food procurement target, and were not provided any financially compensation for doing so. In 2017, an updated version of the policy was issued, stating that the public sector's organic food consumption should amount to 60 percent by 2030, and the share of organic farmland to 30 percent (Swedish Government, 2017). Increased organic production was expected to contribute to several of the national environmental quality objectives and improve the competitiveness of Swedish agricultural production (Government Communication, 2006).[8] By 2015, public consumption amounted to about 31 percent

[6] These costs relate to lower productivity due to, e.g., mandatory agro-chemical reductions, lower livestock density, and increased labor intensity (Tranter et al. 2009). Jörgensen (2012) points out that organic production entails investments in production means and knowhow, and that larger variations in yield levels create uncertainty.
[7] For organic foods' nutritional content, see, e.g., Baránski et al. (2014), Smith-Spangler et.al. (2012), and Dangour et al. (2009). For its environmental impact, see, e.g., Tuomisto et al. (2012) and Bahlai et al. (2010).
[8] These objectives include "A varied agricultural landscape", "A rich diversity of plant and animal life", "A non-toxic environment", "Good-quality groundwater", "Zero eutrophication", and "Reduced climate impact".

(Ekomatcentrum, 2016), whereas the share of organic farmland was still below the targeted level at 15.4 percent (Statistics Sweden, 2016). Lindström et al. (2018) address the impact of the Swedish GPP policy, while controlling for other agricultural policies, and find evidence for a small but significant positive impact from organic purchasing on domestic organic farmland.

As a non-binding policy instrument, the GPP policy studied is a self-regulatory practice. This means that any adoption of the policy on municipality level does not necessarily lead to increased share of organic food, nor will non-compliance lead to any reprisals, apart from possible distrust from its local consistuency (Lundberg et al., 2015). Analogous to this, municipalities are also able to purchase organic food withouth any formal adoption of an organic food policy.

3.2 Policy context – municipal food procurement

Targeting the public sector with a policy on organic food purchases has potentially great leverage in terms of market power. For example, in the UK the public sector spends about 2.7 bn EUR yearly on food and catering services (Bonfield, 2014). In Sweden, public sector bodies serve about 3 million meals each weekday with total public food expenditures (CPV code 15) amounting to about 0.9 bn EUR in 2017, of which 86 percent was spent by municipalities. (Swedish Food Agency, 2018; Swedish Competition Authority, 2018). Schools, social care, and elderly care are three main areas in which Swedish municipalities are responsible for organizing welfare services, and providing healthy and nutritious meals is part of this task.

Although responsibilities are similar, Swedish municipalities have a constituional right of self-government. This means that they are relatively free to decide how to organize the quality and quantity of their welfare services, and set the local proportional income tax accordingly. Swedish municipalities are, although comparably large, heterogenous in terms of, e.g., size, demography, and political representation. The allocation of resources will therefore differ between municipalities depending on demographic, economic, and political factors. This translates to

the implementation of GPP. Procurements across (or within) procuring authorities are carried out more or less independently of each other at a decentralized level, and executed by procurement officials required to have extensive knowledge on environmental policy (Gains, 2004), while balancing political ambitions against financial resources. Additional degrees of freedom arise when procurement officials decide on supplier selection methods and scoring rules, which can also take heed of political and economic factors (Lundberg and Marklund, 2011).

In the context of this study, a municipality's procurement official about to compose and procure a food basket must take into account the political targets (if any) regarding organic food purchases, as well as the financial conditions for achieving that target, considering the organic price premium. Balancing political and economic factors implies that the following strategies may apply: (i) Stay with the original composition, but switch to organic alternatives, requiring increased spending, or (ii) stay within the given budget and change the composition of the food basket, by switching to food products with relatively low organic price premiums.[9] As the latter alternative suggests, it is thus possible to reach a percentage target without incrasing expenditures as such. The former alternative on the other hand requires extra funding, either by taxes or fees, or by a re-distribution of resources from other areas of the municipality's operations.

Consequently, the actual uptake of the policy will effectively depend on factors pertaining to the authority's financial restrictions, political goals, and its procurers' overall knowledge and awareness regarding green procurement. The variables used to control for these factors in our estimations are presented in the next section.

4. Data

[9] For example, the price premium for organic vegetables is generally higher than for organic meat. See Table 4 in Jörgensen (2012) for more details on price premiums for different food products.

As described above, the 2006 GPP policy is formulated and launched at the Swedish national level. However, its implementation concerns first and foremost the municipalities, meaning that the policy's uptake may vary according to local preferences and conditions. The data used in this study consists of panel data from Sweden's 290 municipalities between the years 2003-2016. Two main categories of data are used in the estimations: (i) procurement data mainly collected from surveys, and (ii) municipality characteristics mainly sourced from Statistics Sweden (SCB). Estimations are performed using two different outcome variables and three different definitions of the policy variable, these are described in more detail below. Descriptive statistics are found in Table 1 and are presented for all municipalities, respondents and non-respondents, respectively. Correlations are in Table A1 in Appendix A.

Table 1. Descriptive statistics, 2003-2016

		All municipalities			Survey respondents			Non-respondents		
Variable	Definition (label)	Mean	Std. Dev.	N[1]	Mean	Std. Dev.	N	Mean	Std. Dev.	N
Food	Share of organic foods procured (%)	13.6	11.4	2669	13.6	11.4	2669	.	.	0
TCOcap	Organic food expenditures (SEK/capita)[2]	87.2	76.2	2650	87.2	76.2	2650	.	.	0
SCBexp	Municipality food expenditures (1000 SEK), inflation adjusted	18514.1	28671.5	4050	21210.5	32238.9	2663	13337.1	19092.3	1387
Goal	Policy goal (continuous)	9.5	12.3	4060	13.3	12.9	2669	2.2	6.1	1391
Rank	Policy goal, scaled 1-3	1.5	0.6	4060	1.7	0.7	2669	1.1	0.3	1391
Adopt	Policy goal ≥10 % (1=yes, 0=no)	0.4	0.5	4060	0.6	0.5	2669	0.1	0.3	1391
Green	Green Party share of votes (%)	4.2	2.7	4060	4.6	2.5	2669	3.4	2.7	1391
Centre	Centre Party share of votes (%)	12.6	8.5	4060	12.1	8.2	2669	13.5	8.9	1391
Population	Population in thousands	32.4	64.6	4060	37.3	73.5	2669	23.1	40.1	1391
Popdensity	Population per square kilometre	136.6	474.1	4060	145.9	503.4	2669	118.7	411.6	1391
Employment	Employment intensity age 20-64 (%)	78.2	4.0	4060	78.3	4.1	2669	78.0	3.9	1391
Meals	Share of population aged under 19 or above 80 (%)	29.3	1.8	4060	29.0	1.7	2669	29.9	1.7	1391
Private	Private provision of school and/or elderly care (1=yes, 0=no)	0.4	0.5	4060	0.4	0.5	2669	0.3	0.45	1391
Education	Share of population age 16-74 with three or more years of higher education (%)	12.7	5.4	4060	13.5	5.5	2669	11.1	5.0	1391
Surveyinstru-ment	Share of responses to voluntary survey on democracy (%)	92.3	23.1	870	92.5	25.5	631	91.7	25.5	239

[1]All variables are observed all 14 years for all municipalities, except for Food (9.2 years) and TCOcap (9.1 years).

[2] SEK = Swedish krona, 1 SEK is approximately equal to EUR 0.09 and USD 0.1.

4.1 Survey data collection

The procurement data used for this study's purpose comes mainly from three different surveys. The main source is the organization Ekomatcentrum,[10] which is a non-profit independent organization collecting and distributing information about organic food. Ekomatcentrum has carried out yearly surveys on municipalities' organic food procurement since 1999. Surveys are voluntary and distributed per e-mail. The survey includes questions on organic food shares (percent), total food purchases (SEK), organic food purchases (SEK), and the municipality's political goal (if any) on organic food purchases. Additional observations on organic food shares are retrieved from the association of Swedish Eco-municipalities (Sekom).[11] Sekom publishes yearly statistics on member municipalities' sustainability indicators, of which one is the share of organic food purchases. Sekom retrieves data mainly from Ekomatcentrum (see above), but municipalities can also report directly to Sekom. The third source of data on organic food shares is the official database Kolada[12]. From 2008-2017, Kolada collected data from municipalities on their share of organic food purchases for the year's first six months.

We primarily use data from the Ekomatcentrum survey and if missing, use observations of organic food shares reported to Sekom. Since data on organic food shares reported to Kolada differs somewhat from the other two surveys', Kolada data is used as a last resort. The number and share of observations from each source is shown in Table 2. A description of the survey questions used for this study's purpose can be found in Appendix B.

Table 2. Survey data sources and observations of organic food shares, 2003-2016.

Data source	Number of observations	Share of observations
Ekomatcentrum	2259	85 %
Sekom	142	5 %
Kolada	268	10 %

[10] See http://www.ekomatcentrum.se.
[11] See http://www.sekom.se.
[12] See http://www.kolada.se.

Total	2669	100 %

Source: Authors

As pointed out earlier, municipalities self-report data on organic food procurement to all three surveys. Response rates differ considerably over the years and increase notably around 2008.[13] The average municipality participates in at least one of the surveys around nine out of thirteen years. Yearly response rates are provided in Table 3. Although response rates increase over the years, the voluntary nature of the survey(s) suggests that non-response bias may arise.

Table 3. Response rates. Share and number of municipalities reporting organic food shares in at least one survey, 2003-2016.

Year	Response rate (%)	Response rate (N)	Year	Response rate (%)	Response rate (N)
2003	30	89	2010	78	226
2004[1]	8	22	2011	80	233
2005	41	122	2012	82	238
2006	50	143	2013	89	257
2007	46	135	2014	90	262
2008	62	180	2015	89	259
2009	78	229	2016	94	274

Source: Ekomatcentrum, Kolada and Sekom.

Notes: [1]No survey performed by Ekomatcentrum in 2004. All responses come from Sekom

4.2 Variables measuring uptake of organic food

We measure uptake of organic food in municipality *i* in year *t* using two different outcome variables. The variable $Food$ measures organic food purchases in percentage shares and is collected from the surveys as described above. The variable $TCOcap$ measures organic food purchases in SEK per capita and is derived by multiplying the municipality's reported share of organic foods with its total, deflated, food expenditures[14] before dividing by its population.

[13] This increase could be caused by the survey gaining increased media attention, which also brought them more resources to collect survey responses (e-mail conversation with Eva Fröman, Ekomatcentrum 2016-04-20).
[14] Total food expenditures are reported as a part of "Kommunernas räkenskaper" to SCB. These are reported in current prices, which is why we deflate using consumer price index for foods with 2003 as base year.

Analyzing outcomes in both shares and levels is warranted, since a municipality can increase its share of organic food purchases without increasing absolute expenditures, as described earlier. Should political ambitions be positively associated with the share of organic food purchases, but not with the absolute expenditures on organic food, all things equal, there is reason to believe that the food basket is recomposed to include a larger share of organic items with low organic price premiums.

As illustrated in Figure 1a, the share of organic foods procured varies across municipalities and increasingly so over the years, from 0 to about 80 percent, with a mean share increasing from a few percent in 2003 to about 25 percent in 2016. The costs per capita follow the same pattern, with figures ranging from 0 SEK per capita to 484 SEK per capita in Figure 1b.

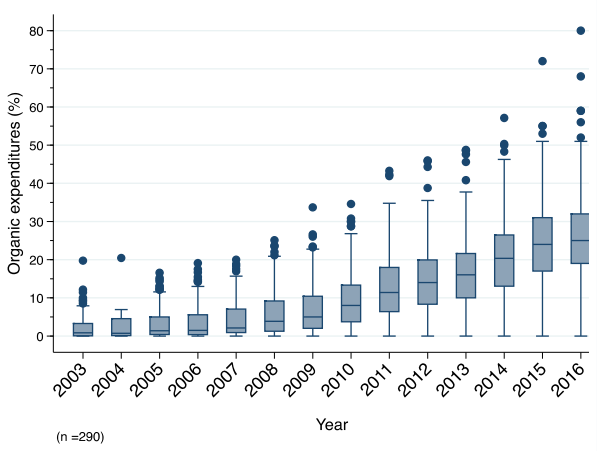

Figure 1a. Share of organic foods (%), 2003-2016.

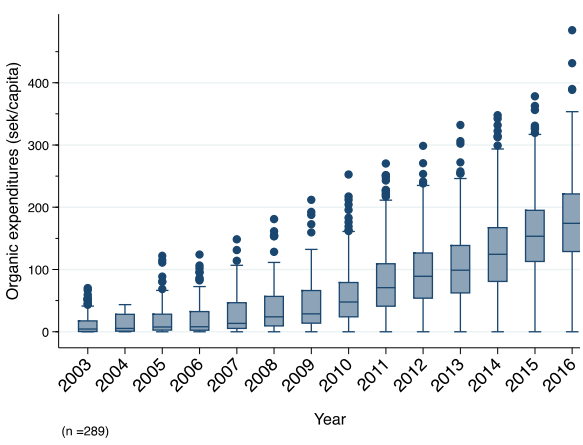

Figure 1b. Organic food expenditures (SEK/capita), 2003-2016.

Source: Ekomatcentrum, Kolada, Sekom, and SCB.

4.3 Food policy variables

Data on organic food policy is retrived from the Ekomatcentrum survey described above, and from municipalities' official policy documents in the case of non-respondents. Food policies on organic food purchases are normally formulated as a percentage target to be reached a certain year. A target is assumed to remain in subsequent years unless nothing else is reported. In a few cases (<1 %), targets describe specific products to be organic, e.g.," organic milk/coffee". We

translate these targets to a percentage value, using Jörgensen's (2012) table of product groups, and corresponding budget percentage as reference. For those municipalities that report a long-term goal, we use linear interpolation in order to arrive at a goal for year *t*. About one fourth of the observations are therefore linearly interpolated. If a municipality lacks a stated goal on organic food purchases, the value for that year corresponds to 0.

When estimating the relationship between a municipality's organic food policy and its actual purchases, the analysis includes three different specifications of the policy. Specification (1) uses $Goal$, a continuous variable corresponding to a value between 0 – 100 percent reflecting the percentage target of the policy in year *t.* Specification (2) employs a binary variable, $Adopt$, that takes the value 1 if municipality i has adopted a goal of at least 10 percent in year t, and 0 otherwise. Finally, in specification (3), we use a ranked categorical variable, $Rank$, where the policy is transformed to a scale of 1-3 based on the policy target for year *t.* Definitions and frequencies of variables *Adopt* and *Rank* is found in Table 4.

Table 4. Defintions and observations of policy variables *Adopt* and *Rank*

Variable	Definition	Number of observations	Share of sample
Adopt			
0	0 <=*Goal* < 10 %	2437	60 %
1	10 % ≤ *Goal* ≤100 %	1623	40 %
	Total	4060	100 %
Rank			
1	0 ≤*Goal* < 10 %	2437	60 %
2	10 % ≤ *Goal* <30 %	1334	33 %
3	30 % ≤ *Goal* ≤ 100 %	289	7 %
	Total	4060	100 %

Source: Authour's own classification, based on dialogue with the National Agency for Public Procurement.

Based on Figures 1a, 1b, and 2, organic food purchases (in both shares and absolute expenditures), as well as political ambitions regarding organic food purchases, have increased over the time period studied. When looking at adoption rates more closely, the number of municipalities

reporting no target or a target of 0 percent decreased by more than 50 percent when comparing the four year period leading up to 2006 and the four years after.

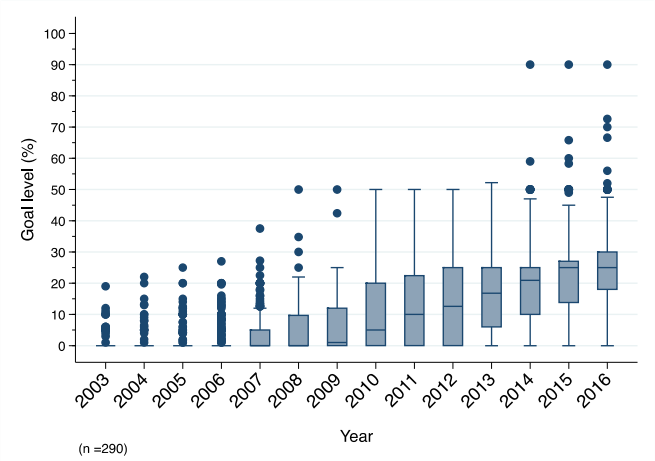

Figure 2. Organic food policy targets of Swedish municipalities 2003-2016.
Source: Ekomatcentrum, muncipalities' official documents.

4.4 Political variables

Sweden has a multi-party, proportional election system, which can roughly be divided into a left and right-wing, and a middle. Given this system, Folke (2014) shows that even small parties affect policy outcomes within secondary policy areas, e.g., environmental policy. The two parties with a tradition of environmental focus are the Green Party ($Green$) and the Centre Party ($Centre$), where the latter is historically seen as the agrarian party. We control for the political influence of these parties on food procurement outcomes, by including their share of votes in the last municipal election. Although their mean shares of the council seats are relatively small, 4.2 and 12.6 percent, respectively, both parties belong to the middle of the political spectrum and can thus exert bargaining power by providing majority to either side of the spectrum.

4.5 Financial variables

It follows from Cheng et al. (2018) that financial constraints can be a barrier for GPP implementation. In Sweden, the financial strength of municipalities differs, and thus potentially also

the ability to pay the price premium for organic foods. To control for financial strength, we use the variable $Employment$, defined as the share of the population aged 20-64 with an employment. The idea is that the potential barrier or driver to implement the policy is related to a municipality's tax base and the economic pressure associated with high unemployment.

Another potential financial barrier is the share of citizens receiving food services from the municipality. To control for variation in the food related welfare services, we include the variable $Meals$. This variable is defined as the municipality's percentage share of population aged 80 and older and 19 and younger, as these age groups represent the main recievers of a municipality's food related services. Almost 13 percent of senior citizens aged 80 and older live in nursing homes, and another 23 percent has assistance at home (The National Board of Health and Welfare, 2013). All children attending day care (1 to 5 years of age) are served breakfast, lunch and snacks and children aged 6 to 19 years are served school lunch.

Although day care, schooling, and elderly care in Sweden are tax funded responsibilities of the municipality, the provision of the services can be private. Since the beginning of the 2000's, the number of private providers of day care, schooling, and elderly care services, have increased in Sweden. This may affect the book value of the *costs* of a municipality's food purchases, as these costs will show up in the books of the private provider instead. For this reason, we control for the presence of private providers when using $TCOcap$ as outcome variable in our regression analysis. The dummy variable $Private$ indicates whether any pupils in grade 1-9 attend school with a private provider or if any senior citizens stay in a nursing home with a private provider.

4.6 Knowledge and awareness variables

Numerous studies show that pro-environment attitudes are largely correlated with education levels, see, e.g., Nordlund et al. (2013). To capture the general knowledge and awareness of the procurement officials, we include the proxy variable $Education$, reflecting the share of the

municipality's population with three or more years of higher education. Thus, we control for general awareness rather than specific knowledge and awareness of GPP guidelines and environmental criteria related to organic food procurement. However, as Nissinen et al. (2009) argues, the "level of greenness" of food products is relatively high from a purchaser's perspective, given the existence of verifiable criteria (EU organic or KRAV label) and available products.

5. Empirical strategy

Due to survey participation being voluntary for the municipalities in our case, attrition occurs and the presence of selection bias is likely. This bias stems from the fact that outcomes are only observed for those that respond to the survey, i.e., for those that self-select into the sample. The binary decision to respond or not is explained by a separate regression, and selection bias may occur if the error term in the main equation is correlated with the error term in the equation explaining selection. (Wooldridge, 2010). The direction of the bias is not obvious. Surveys on green procurement will likely have a higher response rate among more environmentally committed responders (Ochoa and Erdmenger, 2003; Jörgensen, 2012). However, benchmarking the own organization in relation to other municipalities may be more interesting for municipalities in the early phases of increasing its organic purchases. Municipalities that already fulfil their own and national targets may be less concerned about this benchmarking. Lastly, the probability of selecting into the sample, i.e., responding to the survey, can also be correlated with unobserved time-invariant heterogeneity.

To deal with this, we use Heckman's selection model (Heckman, 1979), modified according to (Wooldridge, 1995) and Semykina and Wooldridge (2010). Heckman (1979) viewed sample selection as a specification error and introduced a two-stage procedure to correct for the selection bias. However, Heckman's procedure is more commonly used when dealing with cross-sectional data and might not be appropriate if sample selection changes over time. Secondly,

Heckman's original selection model cannot account for unobserved heterogeneity. The approach suggested in Wooldridge (1995) and Semykina and Wooldridge (2010) adresses both of these problems. The test and correction for selection bias applied in this study's context are described in more detail below.

5.1 Testing for selection bias

In our case, the main equation models organic purchases (percent and SEK/capita, respectively) of municipality *i* in year *t* as the dependent variable y_{it} according to:

$$y_{it} = \boldsymbol{x_{it}}\boldsymbol{\beta} + c_{i1} + D_t + u_{it1} \quad (1)$$

where $\boldsymbol{x_{it}}$ is a vector of the time varying explanatory variables described in section 4, c_{i1} is an unobserved municipality-fixed effect, D_t is a year-fixed effect and u_{it1} is the error term. Following Wooldridge (2010), selection is modelled using a latent variable, s_{it}^*, and an indicator function to identify selection, i.e., whether or not y_{it} is observed:

$$s_{it} = 1[s_{it}^* \geq 0] = 1[\boldsymbol{z}_{it}\boldsymbol{\delta}_t + c_{i2} + u_{it2} \geq 0] \quad (2)$$

where $\boldsymbol{z}_{it}$ contains all variables of $\boldsymbol{x}_{it}$ and some additional instrumental variables (i.e., $\boldsymbol{x}_{it}$ is a strict subset of $\boldsymbol{z}_{it}$), c_{i2} is an unobserved fixed effect, and u_{it2} is an idiosyncratic error term. s_{it} equals 1 if $s_{it}^* \geq 0$, i.e., if municipality *i* reports organic shares or expenditures larger than or equal to 0 in the survey in year *t*, and 0 otherwise.

The test for selection bias follows the two-stage procedure proposed in Wooldridge (1995) and Semykina and Wooldridge (2010), which uses fixed effects to remove unobserved heterogeneity.[15] In the first stage, all observations are used to estimate *t=1...T* probit equations with s_{it} as dependent variable and with c_{i2} modelled using Mundlak's (1978) approach, according to:

$$c_{i2} = \bar{\boldsymbol{z}}_i\boldsymbol{\xi} + a_{i2} \quad (3)$$

[15] Testing and correction are derived under an assumption of normality of the errors in the selection equation (2).

and $$P(s_{it} = 1[\boldsymbol{z}_{it}\boldsymbol{\delta}_t + \bar{\boldsymbol{z}}_i\boldsymbol{\xi}_t + v_{it2} \geq 0]) \quad (4)$$

where $\bar{\boldsymbol{z}}_i \equiv \mathrm{T}^{-1}\sum_{=1}^{\mathrm{T}}\mathbf{z}_{\mathrm{it}}$. It follows that $v_{it2} = a_{i2} + u_{it2}$. The probit estimates are then used to obtain the inverse Mills ratios, $\hat{\lambda}_{it}$.[16] In the second stage, the main equation (1) is estimated with FE-OLS, using only the selected sample and including $\hat{\lambda}_{it}$ as an explanatory variable according to (5), where a significant *t*-statistic for ρ indicates the presence of selection bias:[17]

$$y_{it} = \boldsymbol{x_{it}\beta} + \rho\hat{\lambda}_{it} + c_{\boldsymbol{i1}} + D_t + e_{it1} \quad \text{for all } s_{it} = 1 \quad (5)$$

5.2 Correcting for selection bias

In order to correct for selection bias, FE-OLS can not be used, as it will only be consistent if selection is strictly exogenous conditional on the unobserved effect. This rarely holds, especially not if the errors of the selection equation (2) contain an unobserved effect, implying serial correlation (Semykina and Wooldridge, 2010). Instead, pooled OLS is used to derive consistent estimates, using Mundlak's (1978) approach to model the unobserved heterogeneity, $c_{\boldsymbol{i1}}$:

$$c_{i1} = \bar{\boldsymbol{z}}_i\boldsymbol{\vartheta} + a_{i1} \quad (6)$$

where $\bar{\boldsymbol{z}}_i$ are the within means of the panels. The first stage of the correction procedure is the same as above, using probit to estimate equation (4) for each *t* in order to retrieve *T* inverse Mills ratios. The second stage equation is estimated using pooled OLS and can be written as:

$$y_{it} = \boldsymbol{x_{it}\beta} + \bar{\boldsymbol{z}}_i\eta + \rho\hat{\lambda}_{it} + D_t + e_{it1} \quad \text{for all } s_{it} = 1 \quad (7)$$

When correcting for selection bias, the variance-covariance matrix must also be adjusted for the first step estimation. As suggested by Semykina and Wooldridge (2010), standard errors are panel bootstrapped in order to arrive at the asymptotic variance.

[16] Following assumptions in Wooldridge (1995); $E(u_{it1}|z_i, c_{i1}, v_{i2}) = E(u_{it1}|v_{it2}) = \rho v_{it2}$. If selection is not random, then $E(u_{it1}|z_i, c_{i1}, s_i) = \rho E(v_{it2}|z_i, s_{it})$. We need only $E(v_{it2}|z_i, s_{it} = 1)$, which is equal to $\lambda(z_{it}\delta_t^a + \bar{z}_{it}\xi_t^a)$ from probit equations, where $\delta_t^a \equiv \delta_t/\sqrt{1+\sigma_a^2}$, $\xi_t^a = \xi_t/\sqrt{1+\sigma_a^2}$, and $\lambda(\cdot)$ is the Inverse Mills ratio.

[17] In order to allow for ρ to differ across time, one can add the interactions of $\hat{\lambda}_{it}$ with year dummies and perform a joint t-test to test the hypothesis of H_0: $\rho_1 = \cdots \rho_T = 0$.

The main difficulty with implementing this type of selection model is to find an instrumental variable to include in $\boldsymbol{z_{it}}$ with considerable explanatory power in predicting selection ($s_{it} = 1$), but is uncorrelated with the outcome y_{it}. According to Ekomatcentrum, non-responses are likely (also) due to organizational reasons such as; insufficient routines for data collection, de-centralized purchasing responsibilities, lack of time or interest of contact person to look up information, etcetera. We argue that a large organization makes it; (i) more difficult to reach the correct contact person, and (ii) more difficult for that person to retrieve correct information due to lack of time or insight in all purchasing activities of the municipality. As a proxy for organization size, we use population density ($Popdensity$) as instrument in the first stage equation as population density may explain the decision to respond to one of the surveys, without having much or any impact on the organic food purchases.[18]

The specifications for each outcome variable are defined based on the three policy variables. Policy variables are lagged one year, as a policy set for year *t* may take time to be implemented. Regressions are linear in levels when the outcome variable is in shares. With SEK/capita as outcome variable, all continuous variables are logarithmic, except $Goal$ due to several zero observations.[19] Since the survey was not carried out by Ekomatcentrum in 2004, the analysis does not include any observations from this year.

6. Results

6.1 Sample selection

The test for selection bias is carried out as described in section 5.1, using estimations robust to heteroskedasticity and serial correlation in u_{it}, when estimating Expression (5). Based on the *t*-

[18] The choice of instrumental variable is further discussed in Sub-section 6.3.
[19] Since *TCOcap* also contains observations with zeroes, we employ the logarithm of *TCOcap+1*.

statistic of $\rho = 0$, we conclude that sample selection bias is prevalent when accounting for unobserved heterogeneity, as indicated by the statistically significant coefficient of λ in Tables C1 and C2 in Appendix C, respectively.[20] This indicates that the decision to report information on organic food purchases is related to the uptake of organic food. The coefficient of λ can be interpreted as the effect of *not* being selected into the sample, on the outcome variable. The direction of the selection bias is not straightforward, as the sign of the coefficient is different when the outcome variable is share of organic foods and log SEK/capita, respectively, in Tables C1 and C2. Regardless of its direction, the selection bias should be accounted for.

6.2 Results when accounting for selection bias and unobserved heterogeneity

Results from correcting for selection bias, i.e., estimating expression (7) with panel-bootstrapped standard errors, and accounting for unobserved heterogeneity are presented in Tables 5 and 6 below. Due to space constraints, results from first stage yearly probits, are not presented, but available upon request. Table 5 shows the results when organic food shares is the dependent variable in the main equation, and Table 6 includes the results when the dependent variable is the log of organic purchases (SEK/capita). Each table presents three specifications (1-3), where each specification corresponds to one of the three measures of the policy variable.

From Table 5, we conclude that the coefficient estimates of all policy variables indicate a significant positive effect on the organic food share, and that the effect increases with ambition level. Increasing the policy target with one percentage unit is associated with, on average, an increase of 0.3 percentage units in the share of organic foods purchased. Municipalities with a goal of at least 10 percent in previous year ($Adopt_{t-1}$=1), report an organic food share which is on average around 4 percentage units higher than those with no goal or a goal below 10

[20] Tests are also performed using time trend instead of year fixed effects, and with added interaction between $\hat{\lambda}_{it}$ and year dummies. Significant t-statistics for ρ (or $\rho_1 = \cdots \rho_t) = 0$ remain. Results are available upon request.

percent. Similarly, the share of organic foods is on average about 4 percentage units higher for municipalities belonging to $Rank2_{t-1}$ (policy target of 10 to 29 percent), compared to those belonging to the reference category $Rank1_{t-1}$, and the corresponding measure for the most ambitious municipalities ($Rank3_{t-1}$) is about 8 percentage compared to the reference category.

Table 5. Results from selection models (Pooled OLS) accounting for unobserved heterogeneity and selection bias. Dependent variable organic food shares (%).

	Specification 1 Goal		Specification 2 Adopt		Specification 3 Rank	
$Goal_{t-1}$	0.315***	(0.03)				
$Adopt_{t-1}$			3.995***	(0.46)		
$Rank1_{t-1}$					-	-
$Rank2_{t-1}$					4.050***	(0.44)
$Rank3_{t-1}$					7.904***	(2.86)
Green	0.207	(0.19)	0.412*	(0.23)	0.236	(0.23)
Centre	0.026	(0.08)	0.040	(0.08)	0.017	(0.08)
Employment	-0.260	(0.17)	-0.345*	(0.19)	-0.300*	(0.18)
Meals	0.028	(0.44)	0.242	(0.52)	0.297	(0.46)
Education	1.155**	(0.50)	1.430**	(0.65)	1.174**	(0.52)
λ	1.661*	(0.93)	2.028**	(1.02)	-0.166	(0.76)
Year FE	Yes		Yes		Yes	
Within-means, $\bar{\boldsymbol{z}}_i$	Yes		Yes		Yes	
N	2558		2558		2316	
df_m	25		25		27	
R2 adjusted	0.745		0.664		0.667	

Note: Panel bootstrapped standard errors in parenthesis. * p<0.1 ** p<0.05 *** p<0.01.

Among municipality characteristics, the coefficient of $Green$ is significant positive in one specification, indicating that environmental party voting shares are positively associated with organic food purchases. The proxy for GPP awareness, $Education$, is also significant positive which is in line with expectations. Employment levels, however, are negatively associated with organic food purchases, as indicated by the (weakly) significant negative coefficient of $Employment$ in two of the specifications. Several of the municipality characteristics variables are close to time-invariant. This can, in part, explain why many coefficients are non-significant when including within-means of the explanatory variables as well as year-fixed effects.

Results from Table 6 show that coefficient estimates differ somewhat when the dependent variable is organic purchases in SEK/capita. The significant positive effect of the continuous policy variable $Goal_{t-1}$ remains stable, indicating that an increase in last year's target by 1 percentage unit increases organic purchases in SEK/capita with about 2.5 percent. The binary policy variable $Adopt_{t-1}$ also remains significant positive, indicating that organic food purchases in SEK/capita increases, on average, by about 27 percent in municipalities with a goal of at least 10 percent organic food. Also, the significant coefficient of $Rank2_{t-1}$ indicates that organic purchases (SEK/capita) are on average 21 percent higher in municipalities with a target of 10-29 percent organic food, compared to the reference category.

Table 6. Results from selection models (Pooled OLS) accounting for unobserved heterogeneity and selection bias. Dependent variable organic food expenditures (log SEK/capita).

	Specification 1		Specification 2		Specification 3	
	Goal		Adopt		Rank	
$Goal_{t-1}$	0.025***	(0.00)				
$Adopt_{t-1}$			0.275***	(0.07)		
$Rank1_{t-1}$					-	-
$Rank2_{t-1}$					0.210***	(0.06)
$Rank3_{t-1}$					0.085	(0.24)
lnGreen	0.037	(0.11)	0.110	(0.10)	0.118	(0.10)
lnCentre	-0.330**	(0.15)	-0.084	(0.21)	-0.038	(0.22)
lnEmployment	-0.075	(1.69)	0.359	(1.68)	1.271	(1.84)
lnMeals	-1.923	(1.58)	-1.670	(1.40)	-0.138	(1.51)
Private	-0.110	(0.07)	-0.146**	(0.06)	-0.159**	(0.07)
lnEducation	1.984*	(1.09)	0.752	(1.05)	0.234	(1.14)
λ	-0.399**	(0.17)	-0.250	(0.15)	-0.136	(0.14)
Year FE	Yes		Yes		Yes	
Within-means, $\bar{\boldsymbol{z}}_i$	Yes		Yes		Yes	
N	2539		2539		2297	
df_m	27		27		29	
R2 adjusted	0.592		0.581		0.561	

Note: Panel bootstrapped standard errors in parenthesis. * p<0.1 ** p<0.05 *** p<0.01.

However, the coefficient of the policy category ranked as the most ambitious, $Rank3_{t-1}$, is not significantly different from the reference category. The number of observations are somewhat reduced when using policy variable $Rank_{t-1}$ in the panel regressions. This is beacuse some

categories of $Rank_{t-1}$ predict selection outcomes perfectly for some of the years, and observations are dropped if there is no variation in the discrete variable when yearly probits are estimated for the selection equation. The majority of the dropped observations belong to municipalities with a policy corresponding to $Rank3_{t-1}$. This may, in part, explain the lack of a significant positive coefficient for $Rank3_{t-1}$ in Table 6.

While some of the control variables' coefficients in Table 6 are in line with expectations, several of them are, again, non-significant when including within-means and year fixed effects in the main equation, indicating that many of these variables are close to time-invariant. This will be dealt with in the robustness analysis below.

To summarize results so far, our findings indicate that although voluntary policies do not necessarily mean the desired outcome will be attained, the policy targets set by the public authorities in our sample do in fact impact GPP uptake. Results suggest that having an organic food policy increases the share of organic food purchases, and the higher the target, the higher is the actual outcome. Further, we see that this positive relationship also holds when the outcome variable is organic expenditure per capita. This suggests that municipalities, at least to some extent, increases budget expenditures following political ambitions, and do not merely switch to food products with lower organic price premiums in order to reach a percentage target without increasing their budget.

6.3 Robustness checks

Identification: Many of the municipal characteristics variables (e.g., $Employment$, $Meals$, and $Education$) are close to time invariant, making identification difficult when including both within-means and year-fixed effects. As an alternative specification, we estimate Expression (7) using a time trend instead of year-fixed effects. Results are presented in Table C3 and C4 in

Appendix C and are generally in line with the results in Table 5 and 6, although coefficients of both $Green$ and $Meals$ are significant when the dependent variable is log SEK/capita.

Pooled Heckman: For comparison, estimations are also performed without accounting for unobserved heterogeneity, i.e., treating the data as a large cross-section. Here, we use Heckman's original two-stage selection model (1979) and Stata's -Heckman- command (StataCorp., 2013) with the full information maximum likelihood (FIML) option. First- and second-stage results from these estimations are presented in Table C5 and C6 in Appendix C. Test statistics at the bottom of the tables confirm that the selection model is warranted, as the correlation coefficient, ρ, for the two error terms u_{it1} and v_{it2} is significantly different from zero in both cases. The hypothesis of ρ=0 is also tested and rejected at 5 percent level using a likelihood ratio test.[21]

The second-stage coefficient estimates in Table C5 show, in line with results above, that the share of organic food purchases is higher for municipalities with a goal of at least 10 percent organic food, and that the share of organic purchases increases with the policy's ambition level. This significant and positive relationship also holds when the outcome variable is log SEK/capita. Among the control variables, coefficient estimates are, generally, significant and of larger magnitude compared to the estimations using Wooldridge's two-stage approach and accounting for unobserved heterogeneity. Environmental party voting shares indicate a positive effect on the share of organic food purchases, whereas the voting shares of the Centre party, does not (for neither of the outcome variables). The coefficients for the financial variables are in line with expectations. Employment levels, i.e., tax bases, are positively associated with organic food purchases in all specifications but one, while the coefficient for $Meals$ indicate that municipalities with a large share of the population subject to tax funded food services, have lower shares of organic food purchases. The coefficient for the dummy variable $Private$ shows expected

[21] This is computationally the comparison of the joint likelihood of an independent probit model for the selection equation and a regression model on the observed wage data against the Heckman model likelihood.

sign in Table C6, indicating that private provision of school and/or elderly care is negatively related to the public sector's expenditures of organic food. GPP awareness also seems to matter since the coefficient for $Education$ shows expected sign, indicating that organic food purchases are on average higher in municipalities with higher education levels. However, without accounting for unobserved heterogeneity, there is reason to suspect that the pooled Heckman model may cause upward biased coefficients. Municipality fixed effects, that are to some extent controlled for in Expression (7) using within means, $\bar{\boldsymbol{z}}_i$, will in a completely pooled context be positively correlated to the coefficients via the error term.

Using FIML to estimate a pooled Heckman selection model requires the assumption that error terms from the selection and main equation are jointly normally distributed with mean 0. It is thus less general than Heckman's original two-step estimator, which does not require the main equation's error term to be normally distributed. However, two-step estimation may be less efficient and can not compute clustered standard errors or the variation of rho. As a robustness check, we perform two-step estimations of the pooled regressions, with results presented in Table C7 and C8 in Appendix C. The test statistics ($Mills\ lambda$) indicate presence of selection bias in all specifications but one and point estimates do not differ much from FIML results.

Alternative instruments: The instrument(s) used in the selection equation should have considerable explanatory power in predicting the probability of survey response, but be uncorrelated with the organic purchases. Based on the correlation coefficient (see Table A1) and the first-stage results presented in Tables C5 and C6, $Popdensity$ appears to meet these requisities. However, a drawback of instrumenting with $Popdensity$ is that it is almost time-invariant, meaning that its ability to predict probabilities for individual years may be insufficient. Finding a measure of a municipality's attitude towards surveys is difficult, but for three non-consecutive years we have information on response rates to a voluntary survey on democracy questions, aimed at municipalities. As the number of observations are severly reduced, estimations using

the alternative instrument variable $Surveyinstrument$ do not account for the panel structure. Results are presented in Tables C9 and C10 in Appendix C and are generally in line with results in Tables C5 and C6. Estimations are also performed using the municipality's population ($Population$) as instrument, with results reported in Table C11 and C12 in Appendix C.[22]

7. Conclusions and discussion

The aim of this paper is to analyze the local implementation of a national GPP policy in Sweden, where the policy objective is to incentivize farmers to convert to organic farming by increasing the share of public organic food purchases. Municipalities in Sweden have a self-government status and are, as such, encouraged but not obligated to set their own policy targets. The analysis is motivated by the fact that increased organic food purchases incur added costs for the municipality and that setting and adhering to a target is voluntary for the individual municipality. Therefore, we analyze the role of political, financial and awareness factors when municipalities decide on their actual food purchases. Two outcome measures are used; the share of organic food purchases, and organic food expenditures in Swedish krona per capita. The policy is measured as a continuous variable in percent, as a discrete measure (adopted a food policy or not), and as a category variable with three ambition levels.

Based on an extensive panel data set on Swedish municipalities we draw three main conclusions from our analysis. Firstly, political ambitions and the level of them matter for the actual share of organic food purchases. In other words, it appears as if Swedish municipalities adhere to their locally decided policy targets, when the outcome variable is measured as a percentage share. Secondly, the results from regressions using organic expenditures per capita as outcome variable suggest that municipalities are not necessarily occupied with recomposing their food baskets when engaging in organic food procurement, as an effort to minimize added costs.

[22] Estimations are only performed for Expression (7) as Heckman models do not converge with this instrument.

Thirdly, financial and awareness variables, measured by municipality characteristics, also matter for the implementation of the policy. Financial restrictions have a negative effect while awareness, measured by education level, has a positive effect when the data is treated as a cross-section. However, in all cases but a few, these variables' coefficients are non-significant when within-means and year-fixed effects are added. We also find that selection bias is present in the survey data, which is an interesting finding in itself.

Some caveats apply. As to the effectuation of an organic food policy, we do not observe whether the procurement officials actually recieve more financial resources in order to implement the policy. Neither do we make any assesment of a policy's stringency and whether the purchasing goals are formulated in a *plan*, a *policy* or a set of *guidelines*, even though there are certain judicial and signaling differences between the document types.

While we strive to identify whether municipalities choose to recompose their food basket, we only observe the monetary level of the organic food purchases. For a more detailed picture of the outcome of switching from conventional to organic food products, it would be informative to observe potential restructurings of the food basket in terms of product characteristics (i.e., beans instead of meat, imported instead of domestically produced, etcetera). As results indicate that expenditures do increase (somewhat) with higher political ambitions regarding organic food, the question of funding, and redistributions of resources within the municipality arises.

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Appendix A Correlation coefficients

Table A1. Correlation coefficients from pairwise correlation test.

	Food	TCOcap	Goal	Population	Popdensity	Education	Employment	Meals	Green	Centre	Private	Report	Surveyinstrument
Food	1.000												
TCOcap	0.927	1.000											
Goal	0.812	0.755	1.000										
Population	0.145	0.050	0.195	1.000									
Popdensity	0.120	-0.001	0.074	0.586	1.000								
Education	0.356	0.213	0.324	0.466	0.508	1.000							
Employment	0.033	0.039	-0.025	-0.163	-0.059	0.167	1.000						
Meals	-0.245	-0.238	-0.321	-0.207	-0.152	-0.008	0.370	1.000					
Green	0.415	0.282	0.358	0.349	0.291	0.556	0.091	-0.174	1.000				
Centre	-0.152	-0.079	-0.151	-0.259	-0.246	-0.365	0.049	0.084	-0.300	1.000			
Private	0.134	0.028	0.185	0.344	0.274	0.501	-0.036	0.023	0.318	-0.286	1.000		
Report	.	.	0.432	0.105	0.027	0.210	0.031	-0.239	0.224	-0.079	0.122	1.000	
Surveyinstrument	-0.019	0.004	-0.028	0.002	-0.001	-0.008	0.036	-0.008	-0.012	0.039	0.027	0.016	1.000

Appendix B Survey questions and response rates

Survey questions regarding share of organic foods procured:

How large was the total cost of purchasing foods for the entire municipality's/region's departments year 2012?

How large was the total cost of purchasing organic foods for the entire municipality's/region's departments year 2012?

How large was the organic share of food procurement? (Ekomatcentrum, 2013)

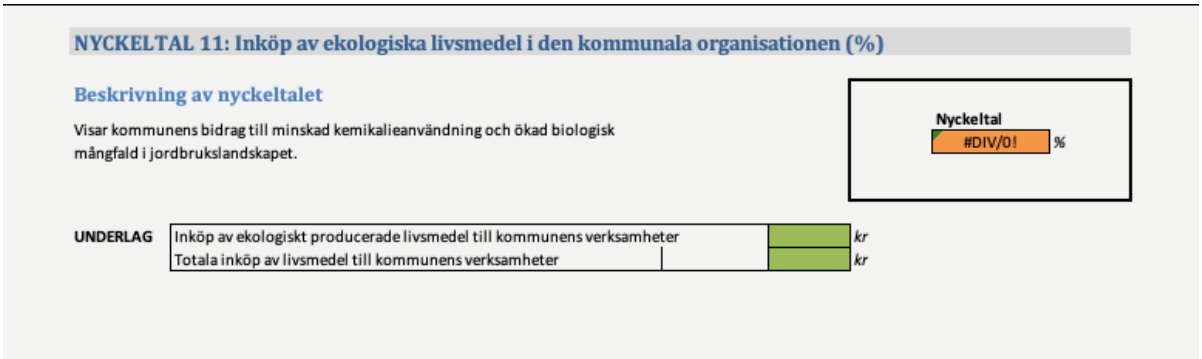
Survey questions regarding food policy:

Has your municipality/region taken any decisions regarding organic food procurement?

What type of decision or goal has been taken regarding organic food procurement?

What percentage is that goal set out to be? (Ekomatcentrum, 2014)

Figure B1. Picture of Excel survey to be filled in by municipalities reporting directly to Sekom



Source:www.sekom.se

Appendix C

Table C1. Testing for selection bias - FE-OLS. Dependent variable organic food shares (%).

	Specification 1 Goal		Specification 2 Adopt		Specification 3 Rank	
$Goal_{t-1}$	0.305***	(0.03)				
$Adopt_{t-1}$			3.694***	(0.44)		
$Rank1_{t-1}$					-	-
$Rank2_{t-1}$					3.856***	(0.41)
$Rank3_{t-1}$					9.253***	(2.38)
Green	0.250	(0.16)	0.363**	(0.17)	0.230	(0.18)
Centre	0.062	(0.06)	0.085	(0.07)	0.053	(0.07)
Employment	-0.190	(0.15)	-0.205	(0.16)	-0.333**	(0.16)
Meals	0.485	(0.37)	0.848**	(0.41)	0.412	(0.39)
Education	0.793*	(0.45)	0.925	(0.56)	1.029**	(0.44)
λ	2.410***	(0.82)	2.924***	(0.85)	1.245*	(0.65)
Year FE	Yes		Yes		Yes	
Municipality FE	Yes		Yes		Yes	
N	2558		2558		2316	
df_m	17		17		18	
R2 adjusted	0.800		0.774		0.765	

Note: Clustered standard errors in parenthesis. * p<0.1 ** p<0.05 *** p<0.01.

Table C2. Testing for selection bias - FE-OLS. Dependent variable organic expenditures (log SEK/capita).

	Specification 1 Goal		Specification 2 Adopt		Specification 3 Rank	
$Goal_{t-1}$	-0.001	(0.00)				
$Adopt_{t-1}$			0.223***	(0.06)		
$Rank1_{t-1}$					-	-
$Rank2_{t-1}$					0.167***	(0.06)
$Rank3_{t-1}$					-0.155	(0.14)
lnGreen	0.164	(0.11)	0.154	(0.10)	0.192*	(0.11)
lnCentre	-0.221	(0.16)	-0.200	(0.16)	-0.187	(0.18)
lnEmployment	0.254	(1.78)	0.530	(1.79)	1.138	(2.02)
lnMeals	-1.851	(1.60)	-1.878	(1.57)	-1.169	(1.68)
Private	-0.126*	(0.07)	-0.136*	(0.07)	-0.122*	(0.07)
lnEducation	0.519	(1.24)	0.558	(1.23)	0.550	(1.28)
λ	-0.463***	(0.14)	-0.358***	(0.14)	-0.222*	(0.13)
Year FE	Yes		Yes		Yes	
Municipality FE	Yes		Yes		Yes	
N	2539		2539		2297	

df_m	18	18	19
R2 adjusted	0.639	0.641	0.635

Note: Clustered standard errors in parenthesis. * p<0.1 ** p<0.05 *** p<0.01.

Table C3. Correcting for selection bias – Pooled OLS with time trend – Dependent variable organic food shares (%).

	Specification 1 Goal		Specification 2 Adopt		Specification 3 Rank	
$Goal_{t-1}$	0.320***	(0.03)				
$Adopt_{t-1}$			4.101***	(0.46)		
$Rank1_{t-1}$					-	-
$Rank2_{t-1}$					4.162***	(0.44)
$Rank3_{t-1}$					8.026***	(2.97)
Green	0.278*	(0.16)	0.471**	(0.20)	0.354*	(0.19)
Centre	0.019	(0.07)	0.036	(0.08)	0.003	(0.07)
Employment	-0.211*	(0.12)	-0.261**	(0.13)	-0.153	(0.12)
Meals	-0.157	(0.39)	0.071	(0.46)	0.090	(0.41)
Education	1.131**	(0.48)	1.393**	(0.62)	1.068**	(0.49)
λ	1.959**	(0.89)	2.465***	(0.97)	0.249	(0.74)
Time trend	Yes		Yes		Yes	
Within-means, $\bar{\boldsymbol{z}}_i$	Yes		Yes		Yes	
N	2558		2558		2316	
df_m	16		16		18	
R2 adjusted	0.744		0.664		0.665	

Note: Panel bootstrapped standard errors in parenthesis. * p<0.1 ** p<0.05 *** p<0.01.

Table C4. Correcting for selection bias – Pooled OLS with time trend – Dependent variable organic purchases (log SEK/capita).

	Specification 1 Goal		Specification 2 Adopt		Specification 3 Rank	
$Goal_{t-1}$	0.003	(0.00)				
$Adopt_{t-1}$			0.287***	(0.06)		
$Rank1_{t-1}$					-	-
$Rank2_{t-1}$					0.223***	(0.06)
$Rank3_{t-1}$					0.151	(0.24)
lnGreen	0.169*	(0.09)	0.150*	(0.09)	0.161*	(0.09)
lnCentre	-0.146	(0.20)	-0.125	(0.20)	-0.079	(0.22)
lnEmployment	0.537	(1.39)	0.373	(1.36)	0.727	(1.42)
lnMeals	-2.469*	(1.29)	-2.511**	(1.28)	-1.297	(1.38)
Private	-0.122**	(0.06)	-0.142**	(0.06)	-0.146**	(0.06)
lnEducation	0.546	(1.06)	0.664	(1.04)	0.103	(1.13)
λ	-0.478***	(0.14)	-0.250*	(0.15)	-0.151	(0.14)
Time trend	Yes		Yes		Yes	
Within-means, $\bar{\boldsymbol{z}}_i$	Yes		Yes		Yes	
N	2539		2539		2297	
df_m	18		18		20	

R2 adjusted	0.591	0.579	0.560

Note: Panel bootstrapped standard errors in parenthesis. * p<0.1 ** p<0.05 *** p<0.01.

Table C5. Testing and correcting for selection bias. First and second-stage results from pooled Heckman selection models (FIML). Dependent variable organic food shares (%).

First stage pooled probit, marginal effects.

	Specification 1 Goal		Specification 2 Adopt		Specification 3 Rank	
$Goal_{t-1}$	0.014***	(0.00)				
$Adopt_{t-1}$			0.244***	(0.02)		
$Rank1_{t-1}$					-	-
$Rank2_{t-1}$					0.236***	(0.02)
$Rank3_{t-1}$					0.318***	(0.03)
Popdensity	-0.000***	(0.00)	-0.000***	(0.00)	-0.000***	(0.00)
Green	0.014*	(0.01)	0.017**	(0.01)	0.016**	(0.01)
Centre	0.001	(0.00)	0.001	(0.00)	0.001	(0.00)
Employment	0.001	(0.00)	-0.000	(0.00)	0.000	(0.00)
Meals	-0.028***	(0.01)	-0.031***	(0.01)	-0.031***	(0.01)
Education	0.009***	(0.00)	0.010***	(0.00)	0.010***	(0.00)
N	3480		3480		3480	

Second-stage (FIML), marginal effects.

	Specification 1 Goal		Specification 2 Adopt		Specification 3 Rank	
$Goal_{t-1}$	0.712***	(0.03)				
$Adopt_{t-1}$			13.162***	(0.53)		
$Rank1_{t-1}$					-	-
$Rank2_{t-1}$					11.386***	(0.47)
$Rank3_{t-1}$					25.929***	(1.33)
Green	0.366***	(0.14)	0.673***	(0.18)	0.485***	(0.15)
Centre	0.028	(0.03)	0.019	(0.04)	0.039	(0.04)
Employment	0.200***	(0.06)	0.100	(0.09)	0.182***	(0.07)
Meals	-0.617***	(0.16)	-0.778***	(0.19)	-0.769***	(0.16)
Education	0.237***	(0.07)	0.330***	(0.09)	0.265***	(0.07)
ρ	-0.717***	(0.09)	-0.764***	(0.10)	-0.785***	(0.09)
N, Censored N	3480	922	3480	922	3480	922
chi2, (Prob>chi2)	57.935	(0.00)	62.735	(0.00)	71.044	(0.00)

Note: Clustered standard errors in parenthesis. * p<0.1 ** p<0.05 *** p<0.01.

Table C6. Testing and correcting for selection bias. First and second-stage results from pooled Heckman selection models (FIML). Dependent variable organic food purchases (log SEK/capita).

First stage pooled probit, marginal effects.

	Specification 1		Specification 2		Specification 3	
	Goal		Adopt		Rank	
$Goal_{t-1}$	0.014***	(0.00)				
$Adopt_{t-1}$			0.245***	(0.02)		
$Rank1_{t-1}$					-	-
$Rank2_{t-1}$					0.236***	(0.02)
$Rank3_{t-1}$					0.320***	(0.03)
lnpopdensity	0.022**	(0.01)	0.022*	(0.01)	0.022**	(0.01)
lnGreen	0.034**	(0.02)	0.043**	(0.02)	0.041**	(0.02)
lnCentre	0.038**	(0.02)	0.037**	(0.02)	0.040**	(0.02)
lnEmployment	0.228	(0.27)	0.132	(0.26)	0.178	(0.26)
lnMeals	-0.927***	(0.28)	-0.990***	(0.30)	-0.990***	(0.29)
Private	0.018	(0.03)	0.018	(0.03)	0.016	(0.03)
lnEducation	0.053	(0.05)	0.069	(0.05)	0.065	(0.05)
N	3480		3480		3480	

Second-stage (FIML), marginal effects.

	Specification 1		Specification 2		Specification 3	
	Goal		Adopt		Rank	
$Goal_{t-1}$	0.065***	(0.00)				
$Adopt_{t-1}$			1.135***	(0.08)		
$Rank1_{t-1}$					-	-
$Rank2_{t-1}$					1.075***	(0.09)
$Rank3_{t-1}$					1.611***	(0.13)
lnGreen	0.125	(0.08)	0.034	(0.08)	0.027	(0.08)
lnCentre	0.013	(0.05)	-0.008	(0.05)	0.004	(0.05)
lnEmployment	2.410***	(0.65)	1.691**	(0.69)	1.852***	(0.69)
lnMeals	-3.218***	(0.75)	-3.425***	(0.77)	-3.360***	(0.76)
Private	-0.293***	(0.08)	-0.240***	(0.07)	-0.253***	(0.07)
lnEducation	0.411**	(0.16)	0.564***	(0.15)	0.527***	(0.15)
ρ	-0.296***	(0.11)	-1.679***	(0.24)	-1.663***	(0.26)
N, Censored N	3461	922	3461	922	3461	922
chi2, (Prob>chi2)	6.740	(0.01)	50.388	(0.00)	42.428	(0.00)

Note: Clustered standard errors in parenthesis. * p<0.1 ** p<0.05 *** p<0.01.

Table C7. Marginal effects. Second stage pooled Heckman selection models (two-step). Dependent variable organic food shares (%).

	Specification 1 Goal		Specification 2 Adopt		Specification 3 Rank	
$Goal_{t-1}$	0.699***	(0.03)				
$Adopt_{t-1}$			12.869***	(1.09)		
$Rank1_{t-1}$					-	-
$Rank2_{t-1}$					11.136***	(1.14)
$Rank3_{t-1}$					25.859***	(1.56)
Green	0.357***	(0.08)	0.699***	(0.11)	0.520***	(0.13)
Centre	0.026	(0.02)	0.021	(0.03)	0.042	(0.03)
Employment	0.197***	(0.04)	0.094*	(0.05)	0.156***	(0.06)
Meals	-0.547***	(0.11)	-0.738***	(0.16)	-0.772***	(0.18)
Education	0.215***	(0.03)	0.326***	(0.05)	0.301***	(0.06)
Mills lambda	-2.275	(1.49)	-6.972**	(2.71)	-10.199***	(2.84)
N, Censored N	3480	922	3480	922	3480	922
chi2, (Prob>chi2)	692.982	(0.00)	124.776	(0.00)	286.756	(0.00)

Note: Clustered standard errors in parenthesis. * p<0.1 ** p<0.05 *** p<0.01.

Table C8. Results from second stage pooled Heckman selection models (two-step). Dependent variable organic expenditures (log SEK/capita).

	Specification 1 Goal		Specification 2 Adopt		Specification 3 Rank	
$Goal_{t-1}$	0.086***	(0.01)				
$Adopt_{t-1}$			1.480***	(0.27)		
$Rank1_{t-1}$					-	-
$Rank2_{t-1}$					1.413***	(0.29)
$Rank3_{t-1}$					2.042***	(0.39)
lnGreen	-0.000	(0.15)	0.114	(0.11)	0.092	(0.11)
lnCentre	0.079	(0.12)	0.046	(0.08)	0.065	(0.08)
lnEmployment	2.896*	(1.61)	2.108**	(1.02)	2.352**	(1.10)
lnMeals	-4.232**	(1.65)	-4.044***	(1.16)	-4.088***	(1.25)
Private	-0.301*	(0.18)	-0.303**	(0.12)	-0.312**	(0.12)
lnEducation	0.377	(0.32)	0.497**	(0.21)	0.453**	(0.23)
Mills lambda	-3.446***	(0.75)	-2.179***	(0.71)	-2.350***	(0.77)
N, Censored N	3461	922	3461	922	3461	922
chi2, (Prob>chi2)	16.282	(0.02)	39.433	(0.00)	34.023	(0.00)

Note: Clustered standard errors in parenthesis. * p<0.1 ** p<0.05 *** p<0.01.

Table C9. Testing and correcting for selection bias. First and second-stage results from pooled Heckman selection models (FIML). Dependent variable organic food (%). Instrument: *Surveyinstrument*

First stage pooled probit, marginal effects.

	Specification 1 Goal		Specification 2 Adopt		Specification 3 Rank	
$Goal_{t-1}$	0.014***	(0.00)				
$Adopt_{t-1}$			0.235***	(0.03)		
$Rank1_{t-1}$					-	-
$Rank2_{t-1}$					0.230***	(0.03)
$Rank3_{t-1}$					0.299***	(0.04)
surveyinstrument	0.000	(0.00)	0.000	(0.00)	0.000	(0.00)
lnGreen	0.025***	(0.01)	0.028***	(0.01)	0.027***	(0.01)
lnCentre	-0.001	(0.00)	-0.001	(0.00)	-0.001	(0.00)
lnEmployment	0.006	(0.00)	0.005	(0.00)	0.005	(0.00)
lnMeals	-0.024**	(0.01)	-0.025**	(0.01)	-0.025**	(0.01)
lnEducation	0.001	(0.00)	0.002	(0.00)	0.001	(0.00)
N	870		870		870	

Second-stage (FIML), marginal effects.

	Specification 1 Goal		Specification 2 Adopt		Specification 3 Rank	
$Goal_{t-1}$	0.708***	(0.03)				
$Adopt_{t-1}$			12.814***	(0.67)		
$Rank1_{t-1}$					-	-
$Rank2_{t-1}$					11.278***	(0.64)
$Rank3_{t-1}$					26.691***	(1.62)
Green	0.189	(0.15)	0.425**	(0.19)	0.297*	(0.16)
Centre	0.043	(0.04)	0.043	(0.05)	0.058	(0.04)
Employment	0.198***	(0.07)	0.099	(0.09)	0.169**	(0.07)
Meals	-0.686***	(0.19)	-0.826***	(0.21)	-0.824***	(0.18)
Education	0.236***	(0.07)	0.323***	(0.09)	0.279***	(0.08)
ρ	-0.628***	(0.14)	-0.721***	(0.11)	-0.737***	(0.13)
N, Censored N	870	239	870	239	870	239
chi2, (Prob>chi2)	18.979	(0.00)	41.506	(0.00)	33.307	(0.00)

Note: Clustered standard errors in parenthesis. * p<0.1 ** p<0.05 *** p<0.01.

Table C10. Testing and correcting for selection bias. First and second-stage results from pooled Heckman selection models (FIML). Dependent variable organic expenditures (log SEK/capita). Instrument: *Surveyinstrument*

First stage pooled probit, marginal effects.

	Specification 1 Goal		Specification 2 Adopt		Specification 3 Rank	
$Goal_{t-1}$	0.014***	(0.00)				
$Adopt_{t-1}$			0.230***	(0.03)		
$Rank1_{t-1}$					-	-
$Rank2_{t-1}$					0.224***	(0.03)
$Rank3_{t-1}$					0.297***	(0.04)
surveyinstrument	0.000	(0.00)	0.000	(0.00)	0.000	(0.00)
lnGreen	0.071***	(0.02)	0.076***	(0.02)	0.076***	(0.02)
lnCentre	0.003	(0.02)	0.001	(0.02)	0.003	(0.02)
lnEmployment	0.394	(0.38)	0.333	(0.38)	0.367	(0.38)
lnMeals	-0.695**	(0.33)	-0.740**	(0.34)	-0.744**	(0.33)
Private	0.024	(0.03)	0.030	(0.03)	0.029	(0.03)
lnEducation	0.045	(0.06)	0.054	(0.07)	0.051	(0.07)
N	870		870		870	

Second-stage (FIML), marginal effects.

	Specification 1 Goal		Specification 2 Adopt		Specification 3 Rank	
$Goal_{t-1}$	0.056***	(0.01)				
$Adopt_{t-1}$			1.054***	(0.08)		
$Rank1_{t-1}$					-	-
$Rank2_{t-1}$					1.420***	(0.09)
$Rank3_{t-1}$					1.936***	(0.13)
lnGreen	-0.131	(0.10)	-0.115	(0.11)	0.121	(0.12)
lnCentre	0.017	(0.06)	0.007	(0.06)	0.017	(0.08)
lnEmployment	1.710**	(0.74)	1.294*	(0.74)	1.434	(0.93)
lnMeals	-3.261***	(0.80)	-3.526***	(0.85)	-3.368***	(0.95)
Private	-0.005	(0.08)	0.007	(0.08)	-0.033	(0.10)
lnEducation	0.464***	(0.18)	0.556***	(0.18)	0.455**	(0.20)
ρ	-1.997***	(0.21)	-2.064***	(0.23)	-0.064	(0.04)
N, Censored N	867	239	867	239	867	239
chi2, (Prob>chi2)	87.778	(0.00)	81.236	(0.00)	2.330	(0.13)

Note: Clustered standard errors in parenthesis. * p<0.1 ** p<0.05 *** p<0.01.

Table C11. Correcting for selection bias – Pooled OLS results with instrument *Population.* Dependent variable organic food shares (%).

	Specification 1 Goal		Specification 2 Adopt		Specification 3 Rank	
$Goal_{t-1}$	0.314***	(0.03)				
$Adopt_{t-1}$			3.975***	(0.46)		
$Rank1_{t-1}$					-	-
$Rank2_{t-1}$					3.983***	(0.44)
$Rank3_{t-1}$					7.732**	(3.09)
Green	0.202	(0.19)	0.413*	(0.23)	0.276	(0.23)
Centre	0.029	(0.08)	0.035	(0.08)	0.023	(0.08)
Employment	-0.269	(0.17)	-0.350*	(0.19)	-0.335*	(0.18)
Meals	0.029	(0.44)	0.242	(0.52)	0.311	(0.46)
Education	1.143**	(0.51)	1.393**	(0.64)	1.131**	(0.52)
λ	2.112**	(0.84)	2.243**	(0.98)	0.377	(0.70)
Year FE	Yes		Yes		Yes	
Within-means, $\bar{\boldsymbol{z}}_i$	Yes		Yes		Yes	
N	2558		2558		2316	
df_m	25		25		27	
R2 adjusted	0.745		0.666		0.667	

Note: Panel bootstrapped standard errors in parenthesis. * p<0.1 ** p<0.05 *** p<0.01.

Table C12. Correcting for selection bias – Pooled OLS results with instrument *Population.* Dependent variable organic food expenditures (log SEK/capita).

	Specification 1 Goal		Specification 2 Adopt		Specification 3 Rank	
$Goal_{t-1}$	0.002	(0.00)				
$Adopt_{t-1}$			0.275***	(0.07)		
$Rank1_{t-1}$					-	-
$Rank2_{t-1}$					0.210***	(0.07)
$Rank3_{t-1}$					0.099	(0.25)
lnGreen	0.109	(0.09)	0.094	(0.09)	0.106	(0.10)
lnCentre	-0.113	(0.21)	-0.102	(0.21)	-0.036	(0.22)
lnEmployment	1.063	(1.70)	1.189	(1.65)	1.966	1.83)
lnMeals	-1.664	(1.40)	-1.939	(1.40)	-0.375	(1.51)
Private	-0.124**	(0.06)	-0.144**	(0.06)	-0.156**	(0.07)
lnEducation	0.466	(1.07)	0.618	(1.05)	0.144	(1.15)
λ	-0.493***	(0.15)	-0.288*	(0.16)	-0.190	(0.14)
Year FE	Yes		Yes		Yes	
Within-means, $\bar{\boldsymbol{z}}_i$	Yes		Yes		Yes	
N	2539		2539		2297	
df_m	27		27		29	
R2 adjusted	0.594		0.580		0.563	

Note: Panel bootstrapped standard errors in parenthesis. * p<0.1 ** p<0.05 *** p<0.01.