Determinants of Grant Approvals - The Climate Leap Program

Local investments fighting the global climate changes

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Abstract

This paper evaluates the determinants of application approval in the Climate Leap program, using a Reveled Preference approach and a probit model. The data used in this paper is from the Swedish Environmental protection agency and the Climate Leap program, from 2016 to 2019. Measures of the cost efficiency, the total co2e emission reduction were included in the analysis, as well as 10 dummy variables representing the different types of projects one can apply for and 5 dummy variables for the type of organization applying for the grant. The results for the study shows that municipalities and municipal companies, have a higher predicted probability than other types of organizations. Projects concerned with gas emission reduction have the highest predicted probability of approval amongst the different types of projects. The higher the total amount of co2e emission reduction is, the higher the predicted probability of approval, the same pattern is true for cost efficiency.

Key Words: Environmental protection agency, Climate Leap, Reveled preferences, Probit model.

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1. Introduction

The threat of climate change is not a new concept, but it has never been more urgent (United Nations Framework Convention on Climate Change 2019a). Leading scientists strongly warns against an average global temperature rise of 1.5 degrees Celsius above pre-industrial levels, and the dire consequences it would entail. On land, such temperatures have already been measured, illustrating the need for immediate action (Intergovernmental Panel on Climate Change 2018). Climate change is a global issue, calling for global cooperative initiatives. Consequently, international organizations have been involved in the decision-making processes, as well as in the creation of new policies. The United Nations (UN) has been a major advocator for an agenda of responsibility and collaboration, creating a wide range of agreements aiming at limiting the damage of climate change. The most ambitious, the Paris Agreement, brings all nations into the common cause of keeping a global temperature rise below 2 degrees Celsius, as well as strengthening nations' abilities to face the impact of climate change (United Nations Framework Convention on Climate Change 2020a).

Sweden, who has signed the Paris Agreement, has set up the goal of implementing large initiatives on climate and the environment. For example, in 2017 a historical cross-party agreement for long term energy policy was created. The agreement constituted the aim of Sweden running a 100 percent renewable energy production by 2040, as well as having a zero-net emission of greenhouse gases by 2045 (Ministry of the Environment 2016). Furthermore, in 2017 Sweden was the largest donator to the UN:s climate fund, calculated per capita. The donations reached 4 billons Swedish kroners, SEK (Ministry of Foreign Affairs 2017). In addition to the above mention initiatives, a local investment support program has been created: the Climate Leap. The program is designed to support local investments to help limit emissions in carbon dioxide equivalents (Ministry of Foreign Affairs 2017).

1.1 Evaluating the Climate Leap

In order to ensure that efforts taken meet the objectives of signed agreements and declared goals, governmental policies and programs need to be consistently evaluated. As efficiency will not be tested on the market, they require applied assessments. Furthermore, tax paying citizens funding the projects must be guaranteed that standards are appropriately met. Therefore, the purpose of the study is to evaluate the Swedish governmental program, the Climate Leap, in order to assess if the government grant is distributed according to cost efficiency and is equally

distributed between different types of projects and organizations applying. The question is if the Environmental Protection Agency, responsible for the distribution of the grant, have other preferences for who is approved the grant that are not related to the efficiency of the project.

It is important to look at this in order to see if one type of organization is systematically favored over another. The hypothesis is that some types of applicants have certain characteristics that are favored over others. There might be a preference to approve projects applied for by *municipalities*, as a way of redistributing government funds. It can be the case that the cost of the project is more impotent than the benefits, as seen in a study by Fridstrom & Elvik (1996), when investigating road investment in Norway. Total reduction of co2e emission might play a role in the probability of approval, even though the size of the projects benefit should only matter in relation to the cost of the project i.e. the cost efficiency. If there exists some kind of preference for a type of organization or type of project, it could lead to a skewed competition.

In order to meet the purpose of the study, I aim to answer the following research questions: ***Does the EPA have preferences for certain characteristic of the applicants for the Climate Leap not related to cost efficiency? Is one kind of applicant systematically favored over another?***

The question will be analyzed using the consumers choices theory, revealed preference theory, in combination with a probit model calculating the predicted probabilities of approval conditional of different characteristics. The theory of revealed preferences will be applied using the government agency as the consumer, revering their preferences for a type of project, when they consume a project, choose to grant the investment support to an applicant.

The research question will be answered using a probit model calculating the predicted probability of approval of the Climate Leap investment support, conditional on different types of organizations, type of projects, total reduction in co2e emissions, and co2e emission reduction per invested SEK. This will reveal the preferences for different characteristics in projects.

The result from the study indicates that *municipalities* and *municipal companies* have a lager probability of being approved the Climate Leap grant compared to other types of organizations. This can be an indication that the Climate Leap is working with artificially redistributing government funds to the *municipalities.* The result also shows that the larger the total co2e

emission reduction is for a project the higher probability the applicant have for being approved the Climate Leap investment support.

1.2 Disposition

First, the background of the problem will be discussed. Here, the study will touch upon the question of governmental interventions, as well as introduce the Climate Leap initiative and how it came to be. Second, a report on relevant literature concerning the evaluation of local climate investment support programs will be outlined for the reader. Third, the study's theoretical framework of revealed preferences is presented. Fourth, the econometric method of the evaluation and the data used in the study will be presented. Finally, the results generated from the probit model will be analyzed, followed by a discussion and some concluding remarks.

2. Background

This chapter includes a discussion on why the free market is not enough to solve the problem of co2e emissions, leading to climate change and why governments should/need to intervene. Furthermore, it outlines UN agreements leading up to the creation of the Climate Leap, as well as provides a summarized description of the program itself.

2.2 Externalities and Why Government Intervention is Important

Clime change is a problem the market cannot solve on its own. It is not unusual that the true cost of producing something is larger than the market price of that good. The cost of causing climate change does not have a natural market price, resulting in governmental interventions potentially being the most efficient solution. Market failure, a term used in economics, occurs when the free market fails to generate the most efficient outcome. It generally calls for government intervention (Gruber 2016: p 125).

Perfect competition implies that prices are known by all economic actors on the market (Nicholson & Snyder 2017: p 407). However, this assumption does not correspond with the real world, where environmental externalities leads to in efficient allocations because the known market prices do not correspond with the true cost (Nicholson & Snyder 2017: p 685). An externality is when an actor does something that makes a second actor worse off than before but does not bear the cost, or alternatively, when the first actor makes the second actor better off but is not compensated for it. In such cases, government intervention can help correct the market (Gruber 2016: p124-125, 138).

The greenhouse gases, that get emitted into the atmosphere during economic activities on the market, are examples of externalities. Here, the social cost is a lot higher compared to the private one as the cost of the emission is not included in the private cost for the emitter (Tietenberg & Lewis 2018: p 25-26, 399-400). Sometimes, the cost can be internalized via taxes, using the logic of letting the polluter pay for his emissions. However, it may not be the best way to go, even if it is proven to be efficient in economic terms as well as bring in revenue to the state (Gruber 2016: p 138-139). When the risk of leakage, i.e. the risk of the emissions moving from one country to another, is too large, a tax is not to be recommended. High emission taxes could make it too expensive to pollute in Sweden. Consequently, the polluting activity or part of the

polluting activity, could move to a country where it is cheaper, or even free to pollute, rather than changing business activity.

2.2 The National Environmental Quality Goal of Restricting the Climate Impact

The UN has a series of treaties and agreements signed by Sweden, including The Paris Agreement and the Agenda 2030. The Paris Agreement is an agreement that was drafted in 2015 and entered into force the year after. It has since then been ratified by189 parties. When accepting the agenda, the countries agree to establish National Determined Contributions, reporting long term goals for reducing emissions. This report is to be submitted every five years, with new and ambitious goals (United Nations Framework Convention on Climate Change, 2019b) (United Nations Framework Convention on Climate Change 2020b). The 2030 Agenda for Sustainable Development was also adopted by the UN General Assembly in 2015 (General Assembly 2015). It consists of 17 Sustainable Development Goals (SDG), covering, not only environmental aspects, but also taking social questions into consideration. The 13th SDG, the goal of Climate Action, is most relevant for this paper. The essential goal of Agenda 2030 is to limit the impact on the climate (United Nations 2019). The average global temperature increase is to be limited to below 2 degrease Celsius above the pre-industrial level. Preferably, efforts are to be made to keep it under a 1.5 degrees rise. Sweden has agreed to work on both national and international levels in order to support the global work. The Climate Leap constitutes one of several initiative working towards the national environmental quality goal of restricting the climate impact in order to make Sweden decrease its greenhouse gas emissions in accordance with above stated ambitions (Naturvårdsverket 2020a) (Sveriges miljömål 2018).

2.3 The Swedish Environmental protection Agency and the Climate Leap

The Swedish Environmental Protection Agency (EPA) is a public agency funded via government appropriations. The main purpose of the EPA is to collect research on questions about the environment, nationally and internationally, together with policy development and implementation (Naturvårdsverket 2019). The implementation of the local investment support program the Climate Leap falls upon the EPA (Naturvårdsverket 2020a).

The Climate Leap was initiated in 2015. The purpose of the initiative is to help reach the environmental quality goal of restricting climate impact. It is a part of the Paris Agreement under the National Determined Contribution. The local climate investment support will, alongside a variety of climate policies such as different taxes and subsidies, guide and transform

the market into a more sustainable and environmentally friendly one, without affecting the efficiency and growth of the market. The investment support cannot be given to projects that are already obligated under law, as it aims to reach the activities that are not covered by other environmental policies and governance. The object of the program is to interplay with other environmental policies, such as the EU Emissions Trading System, EU ETS, too work as a compliment and to reach activities not already covered (Naturvårdsverket 2020a).

In the beginning of 2019, the Climate Leap stopped accepting applications due to budget restraints following parliamentary decisions. However, in June 2019, a budget of 1.5 billion SEK was granted to the Climate Leap for the upcoming period, making it possible for the local climate investment support program to re-open for submissions from applicants (Regeringskanliet 2019).

The support can be given to, inducing but not limited to, private companies, regions, county councils, municipalities, municipal corporations, and associations. Private persons, on the other hand, cannot be granted investment support (Naturvårdsverket 2020b). Factors determining whether a project gets approved or not are reduced greenhouse gas emission per invested SEK as well as the project's cost efficiency. The applicant must also be able to prove the capacity to pay for parts of the project not supported by the Climate Leap and ensure the project's finalization. Furthermore, they must provide calculations showing that the repayment period is long enough not to be financially profitable for the organization applying. This is required to support the argument that the investment would not be made without the support, to ensure additionality. These calculations are carefully examined and controlled by the Swedish Environmental Protection Agency. In the case of an equal reduction of carbon emission per SEK, aspects such as effects on other environmental quality goals, employment effects and distribution, as well as introductions to new technology are taken into account (Naturvårdsverket 2020a).

3. Previous literature

In this next section an overview of some previous literature will be presented. The broad spectra of literature below give support to the interpretation of the Revealed Preference theory used in this paper. Literature on Reveled Preference theory applied on government choices have been the focus for this literature summary.

The theory of revealed preferences is mainly a consumer choice theory, but later it has been adopted for a wider use than just evaluating consumers consumption behaviors. Subsequently, the theory is now broadly used for evaluating government decisions, for example Fridstrom and Elvik (1996) used it to evaluate government decisions for investments in road work in Norway. However, papers evaluating preferences revealed in connection to the execution of environmental policies, such as Fernandez (2004) looking at the North American Free Trade Agreement (NAFTA) environmental project, have been considered extra relevant for this research paper.

Fernandez wrote an article in 2004 evaluating a program initiated by NAFTA, called the Border Environmental Cooperation Commission (BECC). The aim of the BECC was for the US and Mexico to cooperate in the questions of environmental problem effecting the border land. In order to do so, the BECC was giving out certificates for environmental improvement projects. In order to examine which project attributes, affect the approval of the projects, Fernandez used the approach of Revealed Preferences (Fernandez 2004: p 224-226). He used panel data from 1995-2002 taken from the self-reported information in the application, as well as from the reports made by the BECC regarding approvals versus rejections. Some of the variables included were effects on: public health, environment, reuse value, transboundary problems, jobs, how the large population will be affected, the total cost of the project, and the location (Fernandez 2004: p 231, 234). The article concludes that there were preferences for projects supporting the polluter pays method and projects reducing transboundary waste water pollution. This is in order with the original mandate for the BECC, to approve projects which affects both public health and environmental problems. (Fernandez 2004: p234-237).

Furthermore, Chung and Turnbull evaluated behavior of government bureaucracies in local public sectors in Taiwan, including the Revealed Preference methods and a probit model in their approach **(**Chung & Turnbull 2002: p191-193). In their article, they created three different models: time series, cross sectional, and panel data. First**,** the cross-sectional data is used to

look for violations against the, general axiom of revealed preferences (GARP). The test shows only two violations, both in the same year, 1987. This indicated consistency in the preference structure and across time of the bureaucracies. The results from testing the pooled cross section-time series data supports the hypothesis for bureaucratic utility maximization in Taiwan's local public sector. Second, a probit model is set up with the pooled data to evaluate the detriments of the violations of the GARP, to test the determinants of utility maximizing behavior by the local bureaucracy. The results indicate that the preference of the local government largely depends on the preferences of the Kuomintang (KMT). The model also suggests that the spending decisions are going to change drastically as the democratization process in Taiwan proceeds (Chung & Turnbull 2002: p 198-200, 202-206).

In addition, McFadden (1975) (1976) is presenting a multinomial logit model of choice to reveal the preferences of government bureaucracies. The subject of the articles is the California Division of Highways. This division makes decisions on large investments in the highway infrastructure, which projects and which routes to approve. The multinomial logit model provides evidence that the California Division of Highways acts in consistency with the theory of utility maximization (McFadden 1975: p 416). The results presented in the article from 1976 shows that economic criterions were important, the cost-benefit ratio especially. The local governments have a large influence on the route decisions. The schools, churches, public buildings, hospital etc. affected by the route decision have no significant effect on the decision process according to the empirical evidence presented in the article. The decision-making process appears to be very consistent (McFadden 1976: p 70-72).

Another example of how reveled preference theory have been applied is Helland (1998), who tested the determinants of the stringency of enforcement of the Clean Water Act in the different states in the US. An ordered probit model were created, and panel data for the four quarter of the year 1990 were used. The type of inspection served as a proxy for the stringency of enforcement (Helland 1998: p 245-248). The results suggest that resource constraints are an important determinant of the frequencies of inspection. States faced with a lower budget, relative to other states, have a deceased probability of using one specific type of inspection. They seem to decrease the frequency of the least stringent inspection the most. A non-sampling inspection, the cheapest least stringent one, is 10 times less likely to detect a violation as a sampling one. The overall result from the study suggest a problem, it is not clear that states faced with a higher budget will increase the overall stringency of the enforcement of the Clean

Water Act. It is only clear that when faced with a lower budget states focus their resources to inspections with higher stringency (Helland 1998: p 254-260).

Moreover, Fridstrom and Elvik examined the preferences of road investments in Norway. They used an ordered nominal logit model, they investigated determinants of the priority of the different projects (Fridstrom & Elvik 1996: p 147-150). There is no evidence that projects that have an advantageous coat-benefit ratio have a higher priority than projects that don't. The cost of a project is twice as important as the benefits from the project. Noise pollution and safety have little impact on the decision (Fridstom & Elvik 1996: p 150-162, 164-165).

Table 1 Summary of Literature Overview

Reference	Short summary	Years of Investigation	Type of Data	Method Applied
Fernandez (2004)	Revealed preferences of a NAFTA environmental investment support program. The program supported investments positively effecting the Border land between the US and Mexico.	1995-2002	Panel data	Probit model & marginal effects
Chung and Turnbull (2002)	The behaviors of the local public sector bureaucracies in china is evaluated via a revealed preference approach.	1986-1994	i) Time series data ii) Cross sectional pooled data iii) Pooled sample	i) Utility maximization consistency test ii) Utility maximization consistency test iii) Probit
McFadden (1975)	The theory behind reveled preferences of governments are discussed. An empirical example about the California Division of Highways is presented.	1958-1966	Panel data	Multi nominal logit model
McFadden (1976)	Continuing the previous work form 1975. The empirical evidence is discussed in more detail. The example on California Division of Highways is furthered developed.	1958-1966	Panel data	Multi nominal logit model

Helland (1998)	The stringency of the enforcement of the Clean water Act in different states were evaluated using the theory of revealed preference.	1990, q1-q4	Panel data	Ordered probit model
Fridstrom & Elvik, (1996)	The determinants of road investments in Norway were evaluated with a revealed preference approach.	1990-1993	Panel data	i) Rank order logit model ii) Four-alternative logit model

The studies mentioned above evaluates the preferences of different government bureaucracies and agencies. They show that it is not always clear what the preferences of an organization is until they are evaluated more closely. Furthermore, the preferences are not always consistent with the aim of the organization and then it is important to shed light on the phenomenon so that the tax paying citizens get what they think that they paid for. McFadden (1975, 1976) included variables for the benefits, the costs and the cost-benefit ratio, so did Fernandez (2004) and Fridstrom and Elvik (1996). The studies show that the cost benefit ratio, cost efficiency, is not always the most important determinant for a government decision.

In the study by Fernandez (2004) a variable for which country applied for the aid was included and proven to be important. It was shown that projects applied for by the US hade a higher probability of being approved the state aid, than applications from Mexico. This gave inspiration to use the type of organization as a determinant in my model. In the case of the Climate Leap, it is more interesting to look at the distribution of the aid between types of organizations, than for example municipalities. Arguing that applicants included in the same organization type, have more in common than applicants in the same geographical area. Fernandez also looked at different kinds of projects, supporting the inclusion of type of project in this research paper.

The literature presented above use different probability models. Fernandez (2004), Helland (2002), Chung and Turnbull (2002) all used probit models to calculate the predicted probabilities in their studies. McFadden (1975, 1976) used a multi nominal logit, while Fridstrom and Elvik (1996) used a rank ordered logit. These previous works give great support for the use of the binary probit model and the application of the Revealed Preference theory in

this paper. They also give support to the hypothesis that the reported preferences of the Climate Leap might not be consistent with the revealed preferences.

4. Theory

In this chapter an overview of the Reveled Preference theory will be given. Opening with a general presentation, the creation and the development of the theory. Followed by a discussion on how it will be applied in this paper.

The classic consumer choices are based on unobservable functions. The demand function cannot be observed in real life, the choices and the preferences on the other hand, can be observed from data of price and chosen consumption bundles. Revealed Preference theory was created by Samuelson in 1938. If Revealed Preference theory is an extension of, or an alternative framework to, consumer choice theory and ordinal utility theory is debated. The theory differs from traditional consumer choice theory in the way that the starting point is not a utility function. Instead, the starting point is the actions of consumers; the choices that they make reveal their preferences. The actions of the consumer under certain prices and budget constraint give the demand function. The footing of Samuelson's theory is the Weak Axiom of Revealed Preferences (WARP). This is a condition of consistency, the preferences of the consumer must be consistent in time, facing the same budget constraint and the same prices. WARP says that if a first bundle (x) is directly revealed preferred to a second one (y), then the second bundle cannot be revealed preferred to the first one. Bundle x is revealed preferred to y, if x is purchased at price p_0, when y was affordable. The only way the second bundle y will be chosen is if the first one, x, is not affordable, either because the price has increased, or the budget have decreased. So, if y is chosen at p_1 then x was not affordable at the new price p_1. The bundle which yields the largest utility is the bundle chosen. So, if $p_y^0 y$ is cheaper or equal to $p_x^0 x$, and is still not chosen then x is revealed preferred to y. If $p_x^1 x$ is too expensive at the new prices at p_1 then $p_y^1 y$ might be chosen as a substitute (Wade Hands 2014: p 85-89).

$$\boldsymbol{p_x^0 x \geq p_y^0 y \rightarrow p_x^1 x > p_y^1 y}$$

The Strong Axiom of Revealed Preferences (SARP), is an extension of WARP and is viable in a setting with more than two commodities. The transitivity axiom, if x is preferred to y, and y is preferred to q, then x is preferred to q, by transitivity, the preferences must have a stable ranking order (Wade Hands 2014: p 90).

General Axiom of Revealed Preferences (GARP) is satisfied if $\boldsymbol{x_t R x_s}$ implies $\mathbf{p_s x_s \leq p_s x_t}$. This relaxation of SARP makes it possible for two bundles to yield the same utility, it is possible to

have more than one utility maximizing bundle (Varian 2005: p7). The GARP-based analysis starts from a demand perspective.

The Afriat theorem is used to conduct a utility function. The conditions that makes the data set consistent with the utility maximization hypothesis is provided by this theorem (Demuynck & Hjertstrand 2019: p 1)

Afriat's Theorem:

"Given a finite data set of observed prices and choices $S= (p_t,x_t)_{t=1,...,T}$*, the following conditions are equivalent:*

1. There exists a locally non-satiated utility function $u(x)$ *that rationalizes the data set S, i.e. for all observations t and all bundles* x*, if* $p_t x_t \geq p_t x$ *then,* $u(x_t) \geq u(x)$.

2. The data set S *satisfies the generalized axiom of revealed preference (GARP), i.e. for all observations* t *and* s*, if* $x_t R x_s$ *,* *then* $p_s x_s \leq p_s x_t$.

3. For all observations t*, there exists a number* U_t *and a number* $\lambda_t > 0$ *such that the Afriat inequalities hold, i.e. for all observations* t *and* s*,*

$$U_s - U_t \leq \lambda_t p_t (x_s - x_t).$$

4. For all observations t*, there exists a number* V_t *such that the Varian inequalities hold, i.e. for all observations* s *and* t*,*

if $p_t x_t \geq p_t x_s$ *then,* $V_t \geq V_s$ **(1)**

if $p_t x_t > p_t x_s$ *then,* $V_t > V_s$ **(2)**

5. There exists a continuous, monotone and concave utility function $u(x)$ *that rationalizes the data."*

(Demuynck & Hjertstrand 2019: p 3)

The utility function can then be used to make estimates of the consumers behavior in response to changes in different parameter. The empirical approach consists of finding consistent patterns in a limited data set and the matching utility function. These patterns are then used to create comparable patterns but with different parameters (Wade Hands 2014: p 92-93).

In this paper, evaluating the Climate Leap program, the government agency the EPA will be acting as the consumer, purchasing projects to help limit the emissions of co2e. Subsequently, the EPA is the consumer and the projects applied for are the products that can be consumed or not consumed. By granting the investment support to an applicant the EPA is purchasing the project. The act of approving an application for funds is to be seen as the choice of consuming that project. The different project chosen holds different parameters, characteristics. Assuming that Afriat's theorem holds, the pattern of these preferred characteristics can be identified via the choices the EPA makes, and through that proses their preferences can be revealed.

5. The Method

In this section, the chosen method of this paper will be discussed. An overview of the data and the probit model will be presented, followed by the econometric models of this paper.

5.1 Data

This chapter will describe the data. First an outline of the data and the variables will be introduced. Next a longer discussion on the variables will follow. This discussion will include thoughts on validity of the data, and motivations for possible exclusion of data.

5.1.1 Introducing the data

The data used in this paper is from 2016-02-15 to 2018-10-15. It has been gathered from the EPA. The Climate Leap program started in 2015 but changed its administrative system in 2016 and because of logistical complications the data from 2015 is excluded.

The outcome variable is binary, and is called *Approval, coded as 1 id the application is approved and 0 if the application is denied.* In this analysis, there is going to be two continues variables, *total co2e emissions reduction*, and a variable for *co2e emission reduction per invested SEK*, working as the cost efficiency. There will be 19 dummy variables that can be divided in three categories. Type of organization, type of project and ability to complete project. In the first category, type of organization there are 5 dummies, *Private company*, *Housing cooperative*, *Non-profit organization*, *Municipality* and *Municipal company*. In the second category type of project there are 11 dummies, *Waste*, *Energy efficiency, Energy conservation, Vehicle, Gas emissions, Information initiative, Infrastructure, Base station, Biogas production, Transport* and *Other type of project*. In the final category, there is only three variables, *Applied for or granted other EU support*, *Assets,* and *Other external financing.* The variables in my analysis are not supposed to affect the decision proses according to the aims of the project, but if they do, it can contribute to a skewed completion.

5.1.2 Validity, reliability and exclusion of data

The data have some validity problems. The case workers running the Climate Leap program are concerned with working efficiently, not collecting data for econometric analysis. This have created some validity problems especially regarding the denied applications. This data is not always updated, even when flawed information is found.

There is a total of 5473 applications, 2936 approved and 2537 denied, giving us an approval rate of 53.65%. For the binary outcome variable, *Approval*, some observations had to be excluded due to unclarity in the data of what the situation actually was. The startup for the Climate Leap program was fast and the investment program is still evolving and working on finding the most efficient way of coping with the task at hand. For this reason, there were some categories in the data that had no clear meaning and are no longer used by the case workers. These categories were therefore excluded. The data set used in this paper will consist of applications marked *approved, paid-out,* and *denied*. The *paid-out* applications are going to be coded as approved, since before they were fully paid-out, they were approved. This leads to the exclusion of 112 observations, leaving the data set at a total of 5473 observations.

The variable *Total co2e emissions reduction* can create validity problems within the analysis. The EPA only recalculated the reduction of co2e if there is something wrong with the co2e emission reduction reported by the applicant, and the EPA don't always update the data if the application is to be denied. So, for the *Total co2e emission reduction* the updated information will be used if available, the same goes for *co2e emission reduction per invested SEK*. It is important to note that even the updated information is not always 100 percent reliable, but it is the best data available on the Climate Leap program. Both *Total co2e emissions reduction* and *co2e emission reduction per invested SEK* is measured in kilograms. In the model these two continues variables are used in natural logarithms, to avoid problems with skew large values.

There are 11 different types of projects, base station for electric cars, *Base station*, is the category with the most applications, 2880 (1926 approved, and 954 denied), followed by *Energy conservation* with 1079 applications (612 approved, and 467 denied). The category *Another project type* indicates that the project is not included in any of the 10 specified project categories. This category *Another project type* was dropped out of the final analysis because all 36-project included in this category was denied the grant, presenting a zero probability of being approved the grant. See table 2 for more information about the different types of projects applied for. The different types of projects are included in the analysis as they can provide insights on the preferences of the EPA, for different projects with different purposes.

A number of dummy variables have been created for different types of organizations that can apply for the Climate Leap investment support. The type of organization can be proven important by the way the grant is distributed between the organization types can say a lot about the preferences of the EPA. A preference for municipalities or municipal companies can be an

indication of artificial redistribution of funds. A preference for private companies can be a way of supporting the Swedish business community. In the dataset 762 blanks are found under organization type, were 257 of them were approved. Under the category organization type, 72 different under categories were found, and 13 of these were just different terms for community association. This problem was found for several other categories as well. So, I took the five largest categories, *Private company*, *Housing cooperative*, *non-profit organization*, *Municipalities* and *Municipal companies* and used these as the main organization types to investigate and used the others as controls in the constant. A *housing cooperative* is an association of people owning apartments in the same building, owning the building together. In the variable *non-profit organization* organizations such as sports clubs, charities, cultural clubs etc.

Applied for or granted other EU support, is a variable included to indicate how the organization is working. If they have applied for other EU-support, it can indicate that they are used to working with the authorities and with this kind of applications and there for they might have a better chance of being approved.

There are 5384 observations on the variable *Asset*, 1922 of these have a reported value of zero. 1128 of them have been approved and 794 have benne denied the grant. There are 141 observations that are acting on a competitive market, for example *Privet companies* or *Municipal companies*, and still have reported a value under 100kr for their *Assets* this is assumed to be a mistake in the initial application. The information has probably been updated later on in the process in dialog with the case worker, but never reported in the database. The majority of the observations that have a value of zero assets are organizations that are not required to report a value for asset, for example *non-profit organization* and *hosing cooperatives*. The uncertainty in this data set creates validity problem. To avoid some of these problems, a dummy variable is created. The variable for representing if the applicant has reported assets or not can have possible multicollinearity problems with the dummies for type of organizations.

Other external financing specifies if the applicant have any other financing or if they are financing the whole project themselves with help only form the Climate Leap program. If the applicant has external financing it shows that they have resources, increasing the security that funds for finishing the project will be available. This dummy says something about the how the organization works and the ability of the applicant to complete the project. If they have other

external financing, they might be better at applying for money because they are used to doing so, they have already convinced financers of the benefits of the project, then they might be better at convincing the authorities as well.

Cost per project was not included in the analysis due to problems with multicollinearity with type of projects. The same was true for the amount the applicant applied for.

5.1.3 Table summaries

In this section of the paper the data will be presented in a number of tables and graphs. This is done to give more perspective of what the data looks like and how the different variables are related to one another. In table 2 below is a summery table over that data used in this research paper.

Table 2 Summary Statistics of the Climate Leap project data

Variable	Description	Nr of applications:	Nr of approved applications:	Mean	Std.Dev.	Min.	Max.
Approval	Binary outcome variable, 1=approved, 0=denied	5472	2936	.536	.499	0	1
Total co2e emission reduction	Continues	4,210	2304	10.675	2.709	0	20.723
Co2e emission reduction/ invested SEK	Continues	5 471	2936	.860	1.125	0	11.802
Private company	Binary variable, private company = 1, other organization type = 0	2 879	1,487	.536	.499	0	1
Housing cooperative	Binary variable, housing cooperative = 1, other organization type = 0	709	630	.13	.336	0	1
Non-profit organization	Binary variable, non-profit organization = 1, other organization type = 0	134	27	.024	.155	0	1
Municipality	Binary variable, Municipalities = 1, other organization type = 0	305	147	.056	.229	0	1
Municipal company	Binary variable, municipalities companies = 1, other organization type = 0	340	221	.062	.241	0	1
Waste	Binary variable, waste = 1, non-waste related project = 0	58	9	.011	.102	0	1
Energy efficiency	Binary variable, Energy efficiency = 1, non-energy efficiency related project = 0	297	45	.054	.227	0	1

Energy conservation	Energy conservation variable, waste = 1, non-energy conservation related project = 0	1079	612	.197	.398	0	1
Vehicle	Binary variable, Vehicle = 1, non-Vehicle related project = 0	188	49	.034	.182	0	1
Gas emission	Binary variable, gas emission = 1, non-gas emission related project = 0	45	19	.008	.090	0	1
Information initiative	Binary variable, information initiative = 1, non-information initiative related project = 0	288	49	.053	.223	0	1
Infrastructure	Binary variable, infrastructure = 1, non-infrastructure related project = 0	95	33	.017	.131	0	1
Base station (electric cars)	Binary variable, base station = 1, non-base station related project = 0	2,880	1,926	.526	.499	0	1
Biogas	Binary variable, biogas = 1, non-biogas related project = 0	73	32	.013	.115	0	1
Transportation	Binary variable, transportation = 1, non-transportation related project = 0	375	161	.069	.253	0	1
Another type of project	Binary variable, other = 1, included in another category = 0	36	0	.007	.081	0	1
Applied for or granted or other EU support	Binary variable, if applied of or granted EU support = 1, not applied for or granted EU-support = 0	237	82	.043	.204	0	1
Assets	Binary variable, if the applicant has reported assets = 1, no assets reported = 0	3 551	1 808	11.304	8.912	0	30.053
Other external financing	Binary variable, other external financing = 1, no other external financing = 0	2 936	187	.096	.295	0	1

Note: *The table presents a summery of the data used in this research paper. Number of applications, number of approved applications, the mean, the standard deviation, the minimum and the maximum value reported can be seen in this table.*

Below to the left, figure number 1 is showing the distribution of applications between different types of projects. To the right, figure number 2 is presenting the distribution of applications between the five largest organization types. *Private companies* are the group with the highest amount of applications, and base stations are the most popular type of project.

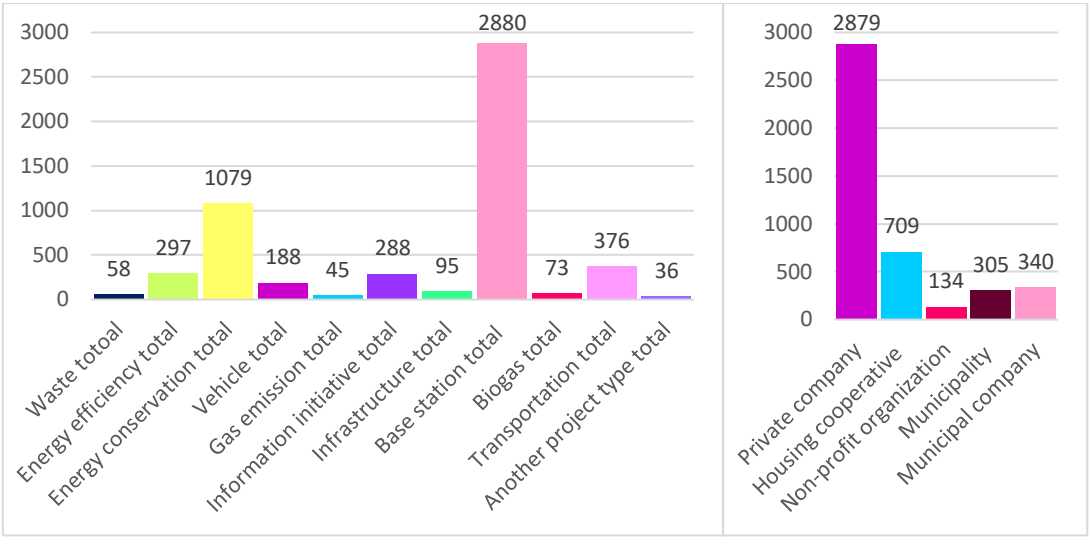


Figure 1, Type of project, number of applications. *Figure 1 shows the distribution of the applications across the different types of projects in the Climate Leap. The bars in the figure show the total number of applications in that category. On the y-axis is the number of applications, in intervals of 500.*

Figure 2, Type of organization, number of applications. *Figure 2 shows the distribution of the applications across the different types of organizations applying for the Climate Leap grant. The bars in the figure show the total number of applications in that category. On the y-axis is the number of applications, in intervals of 500.*

In figure 3, the approval ratio per project type is presented. Waste have the lowest approval percentage per application, followed by energy efficiency, information initiative and other project types with zero approved applications. Energy conservation and base station for electric cars have the highest approval percentage.

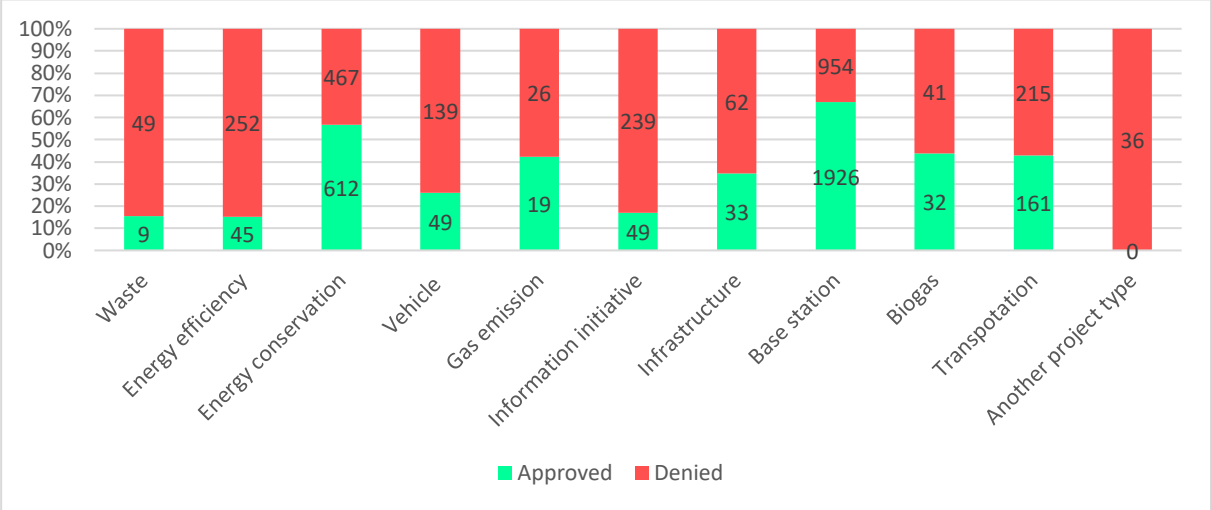


Figure 3, Type of project, approval ratio. *Figure 3 is a 100% stacked bar chart, illustrating the approval ratio across different type of projects. The green part of the bar is representing approval and the red represents denial. On the y-axis the percentage can be read out. On the bar the actual numbers of approval and denial can be read out.*

In figure 4, a similar figure as number 3, is presenting the approval ratio of different organization types. *Housing cooperatives* have the highest approval percentage, and *non-profit organizations* have the lowest.

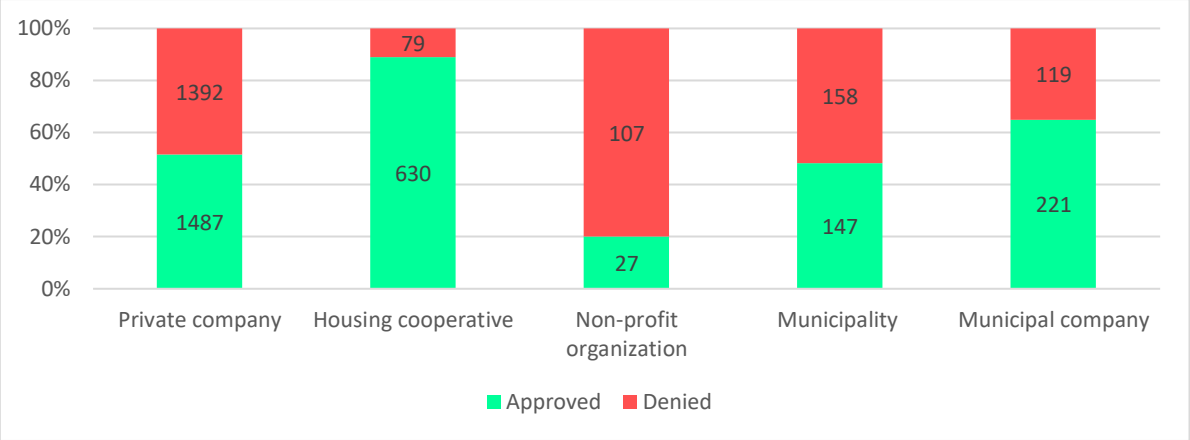


Figure 4, Type of organization, approval ratio. *Figure 4 is a 100% stacked bar chart, illustrating the approval ratio across different type of organization. The green part of the bar is representing approval and the red represents denial. On the y-axis the percentage can be read out. On the bar the actual numbers of approval and denial can be read out.*

In figure 5 the average cost of the projects per organization type is presented. *Housing cooperatives* have a high percentage of approval and from this figure it is clear that their projects are very inexpensive in comparison to the other organization groups. The average coast of a project by a *non-profit organization* is less than half the cost of a project by a *municipality*, jet *non-profit organizations* have the lowest approval ratio of the organization types. Indicating that the total cost of the project is not be the most important component in the application.

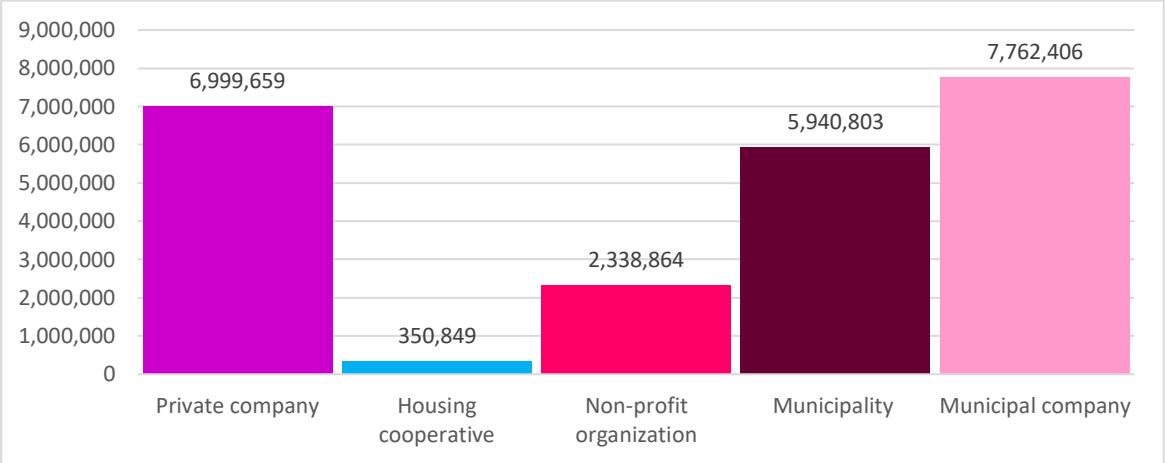


Figure 5, Average cost of project per organization type. *Figure 5 illustrates the average cost of the projects applied for by the different types of organizations. On the y-axis the cost in SEK can be read out in intervals of 1 000 000.*

In figure 6a and 6b the average cost of a project is divided over the different project types. Waste, gas emission, infrastructure, biogas production and transportation are significantly more expensive than energy efficiency, energy conservation, vehicle, information initiative and base stations. This is the reason for splitting the figure in two. Including them all in the same figure will make it hard to compare them and to get perspective. The larger costs, over 10 000 000 SEK will make the smaller ones under 10 000 000 SEK look insignificant or not visible at all.

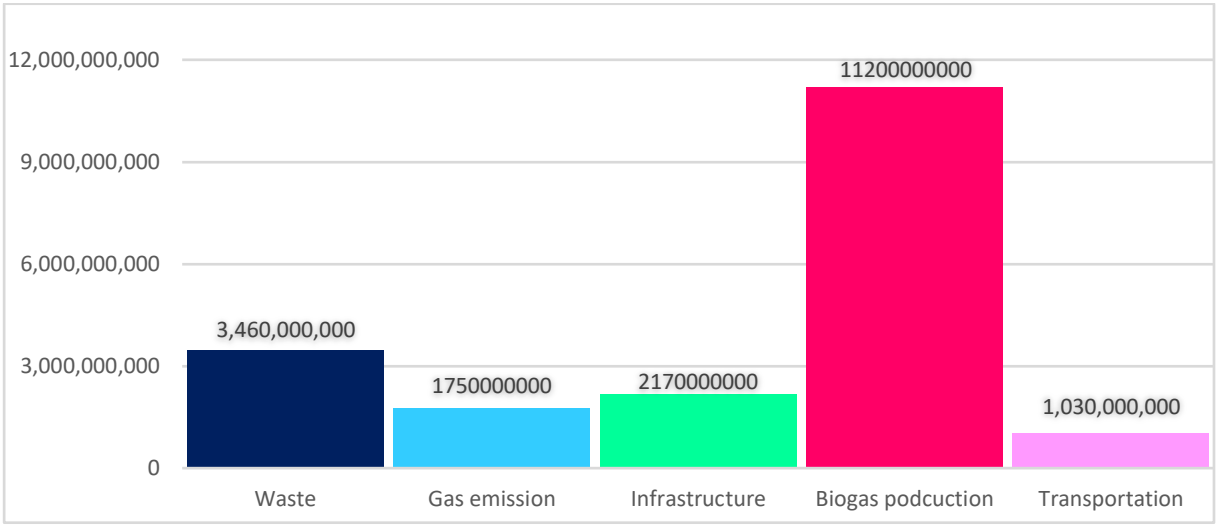


Figure 6a, Average cost of project per project type, costs over 10 000 000 SEK. *Figure 6a illustrates the average cost of the different project types, given that the average cost is over 10 000 000 SEK. On the y-axis the cost in SEK can be read out in intervals of 2 000 000 000.*

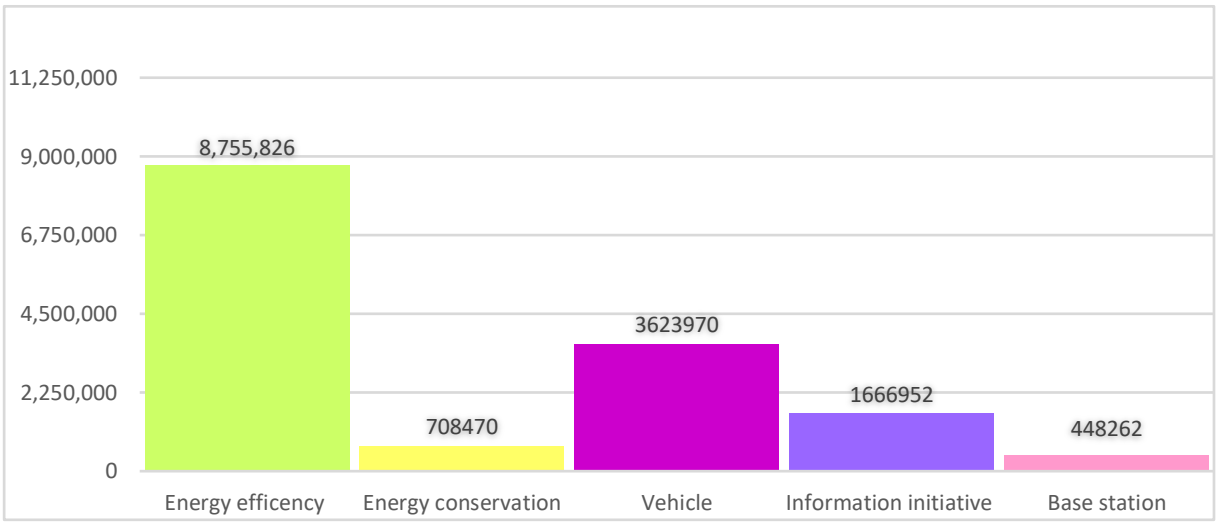


Figure 6b, Average cost of project per project type, costs under 10 000 000 SEK. *Figure 6b illustrates the average cost of the different project types, given that the average cost is under 10 000 000 SEK. On the y-axis the cost in SEK can be read out in intervals of 1 000 000.*

Below in figure 8, is a representation of what kind of project the different types of organizations apply for. *Private companies* apply mostly for base stations for electric cars and energy conservation. *Housing cooperatives* mainly apply for base stations. *Non-profit organizations* apply for information initiatives more than any other organization type. *Municipalities* apply mostly for base stations followed by infrastructural projects and energy conservation. *Municipal companies* just like the others, except for *non-profit organizations*, apply for base stations more than any other project type. *Private companies*, *municipal companies* and *municipalities* apply for roughly the same types of projects, *private companies* apply more for energy conservation and transportation, while *municipalities* apply more for infrastructure and information initiatives.

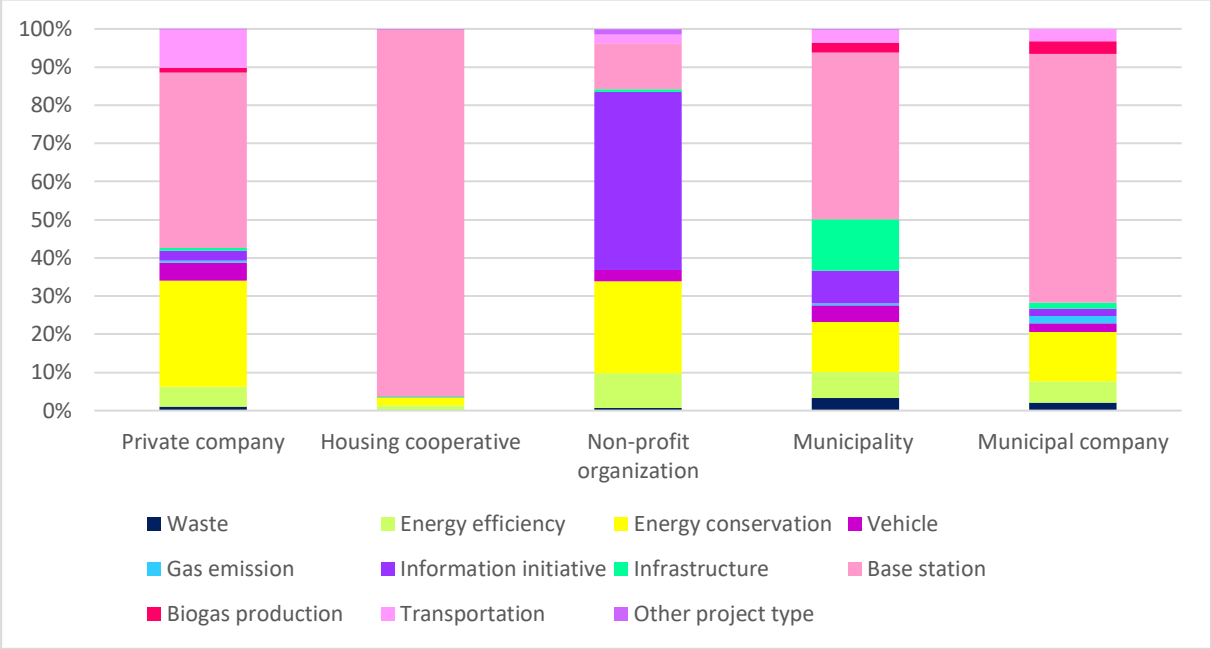


Figure 7, Type of project over organization type. *Figure 7 is a 100% stacked bar chart, illustratig what kind of project the different organizations apply for. On the y-axis the percentage can be read out.*

5.2 The probit model

Brent (1991) presents an overview of previous literature on the subject of Revealed Preferences, as well as the appropriate models to use. His conclusion is that a merge of Basu's implication of an error term with a relation to the vector of net benefit and McFadden's stochastic approach is the best method. In contrast, Brent suggests a probit model instead of the logit model used by McFadden. He argues that the probit model is more reliable then the logit model because the estimates of the probit only contains the mean distributional impact. The logit model, on the other hand, contains both the stochastic and the deterministic elements in its estimates. The

probit model is also more consistent with the theory behind the distribution weights, according to Basu, than the logit model is. Basu presents an error term that is affected by the partial interpersonal comparisons. He means that there is a connection between past distributional weights and weights that are to be assigned distribution in the future (Brent 1991: p 986-991).

Therefore, the probit model is going to be the main model used in this paper. The probit model has the Bernoulli structure, that is, it has a structure with only one tail. The model is used when you have a binary outcome variable and want to perform a regression. The binary outcome is coded as 0 and 1. The model has a cumulative probability distribution function. The conditional probability of Y being equal to 1 is written as $\Pr(Y = 1|X_1, X_2, \dots, X_k)$ and generates a value between 0 and 1.

The probit model is a nonlinear model and has the form of:

$$\boldsymbol{Pr(Y = 1|X_1, X_2, \dots, X_k) = \Phi(\beta_0 + \beta_1 X_1 + \beta_2 X_2 +, \dots, \beta_k X_k)}$$

$$\boldsymbol{z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 +, \dots, \beta_k X_k}$$

Y is binary.
$X_1, X_2, \dots, X_k$ are the regressor.
$B_1, \beta_2, \dots \beta_k$ are the coefficients
Φ indicates the cumulative standard normal distribution function.

Calculating z gives the predicted probability. Holding $X_2, \dots, X_k$ constant, the β_1 coefficient is interpreted as the change in *z* as a result of a one unit change in X_1. A positive value of β_1 indicates a higher z-value, and a higher probability of Y being equal to 1, with every increase in X_1. Following the same logic, a negative value of β_1 leads to a lowered probability of Y being equal to 1 with every increase in X_1 (Stock & Watson 2015: p 337-341).

The probit model will give a predicted probability of Y being equal to 1. In this paper, the model will be coded Y=1=Approval, so the result will be the predicted probability of approval for a project with certain characteristics. The idea is to use the predicted probability for approval conditional to different characteristics to reveal the preferences of the Climate Leap. The probability for a project to be approved will depend on the characteristics of the project, and this will reveal the preferences for particular characteristics in the projects.

5.3 The econometric models

Now that the data and the probit model have been presented, the econometric models of this paper will be presented. The models will be described and motivated one by one.

The first model includes only two variables, later on more and mode variables are included. Adding variables includes more characteristics of the different projects and can increases the understanding of what effects the approval of the Climate Leap grant. The first model with the variable *co2e emission reduction per invested SEK*, used as a measure of cost efficiency and the *Total co2e emission reduction* per project. The second variable is included to see if there is a tendency to approve larger project over smaller ones. Here all the focus is on only co2e emission reductions and no other characteristics are taken into account.

In the second model, the type of organization applying for the grant is included. Only looking at the coefficients and the co2e emissions reduction explains a very small part of what effects the probability of approval. Controlling for the type of organization gives a wider explanation for the predicted probability of being approved the Climate Leap grant.

In the third model, 10 dummy variables for different project types is included. The dummy variable for *Another project type* is excluded from the model since the approval ratio is zero and calculating a predicted probability will give no useful information. The dummies for type of project is included to see if different types of project are favored over others, regardless of the cost efficiency.

In the last model three more variables are added. The variable *Applied for or granted other EU support* is included, answering the question if the project has applied for or been granted other support from the EU. The variable *Other external financing* answers the question if the applicant has other external financing or if they are financing the whole project themselves. The variable *Assets* answers the question if the applicant reported assets in their application.

6. Results

This section presents the results of the four probit models and a discussion of the significance of the models. Next a presentation of the marginal effects of the best fitted model will be reported.

6.1 Results of the probit models

The null hypothesis of the probit model is that all regressors are equal to zero simultaneously. The p-value for model one is 0.0015, indicating a significant level of 99 percent confidence interval. Model two, three and four all have a p-value of 0.0000 also indicating a significant level of 99 percent.

In model four there are two regressor coefficients that are not significant at a 95 percent confidence interval. The variable for Non-profit organization have a p-value of 0.051 and is significant at a 90% confidence interval, the dummy for other external financing have p-value of 0.684 and is therefore not considered significant at all.

Table 3: Probit estimation results

Variable	Model 1	Model 2	Model 3	Model 4
Log Co2e emission reduction per invested SEK	-.0321** (.0163)	.001 (.015)	.075*** (.018)	.082*** (.019)
Log Co2e emission reduction	.023 *** (.007)	.024 *** (.008)	.017 ** (.008)	.019** (.009)
Private company		.341*** (.051)	1.307 *** (.054)	.296*** (.060)
Housing cooperative		1.501*** (.075)	1.307 *** (.079)	1.242*** (.083)
Non-profit organization		-.528*** (.131)	-.261* (.142)*	-.286* (.147)*
Municipalities		.257*** (.084)	.34*** (.09)	.279*** (.093)
Municipal companies		.655*** (.097)	.575*** (.101)	.604*** (.103)
Waste			1.234*** (.471)	1.198*** (.469)
Energy efficiency			1.484*** (.430)	1.439*** (.427)
Energy conservation			2.605*** (.42)	2.569*** (.417)
Vehicle			1.831*** (.432)	1.779*** (.43)

Gas emission			2.261*** (.468)	2.223*** (.461)
Information initiative			1.496*** (.422)	1.437*** (.423)
Infrastructure			1.827*** (.442)	1.792*** (.438)
Base station			2.530*** (.418)	2.479*** (.415)
Biogas production			2.208*** (.448)	2.180*** (.447)
Transport			2.45*** (.423)	2.421*** (.42)
EU support				-.239** (.109)
Assets				-.134** (.063)
External financing				-.032 (.097)
Constant	-.103 (.079)	-.537** (.093)	-.814*** (.428)	-2.721*** (.427)

Note: *(*** significant at 1% level, ** significant at 5% level, * significant at 10% level, standard errors in parenthesis)*

Table 3 presents results from a Wald test for block significance of variables progressively added from model 1 to model 4 which is equivalent to testing if the models are nested within each other. The Wald chi square statistics shows gain in predictive power moving from model 1 to model 2, no gain in predictive power is indicated moving from model 2 to model 3. However, model 3 controls for a wider range of variables which are relevant for explaining the probability of approval. Model 4 has a Wald chi2 of 9.22 and only 3 degrees of freedoms, therefore the last model does not appear to add much explanatory power over model 3, even if the Wald chi square is still significant, at 95 percent confidence interval. The degree of freedom is higher in model 3 than in model 2. This in combination with the wider range of variables and a high significance level leads to the decision to focus on model 3.

Table 4: Wald test

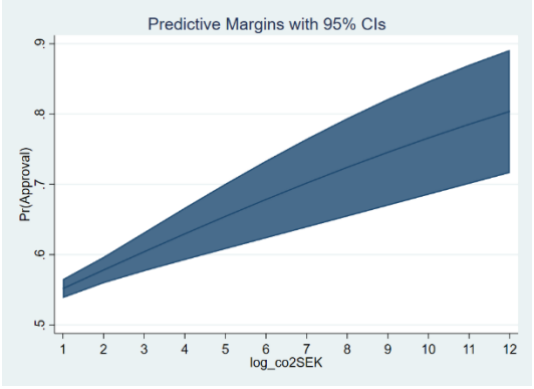
Block	Wald chi2	df	Pr > F
1	13.47	2	0.0012
2	472.56	5	0
3	285.38	10	0
4	9.22	3	0.0265

Note: Results form a Wald F test.

6.2 Marginal effects of model 3

In table 5 the marginal effects of the 15 dummy variables from model 3 is presented. The margins for the continues variables are calculated separately and presented in figure 8 panel a and b.

Carbon dioxide equivalent emissions reduction per invested Swedish kronor in natural logarithms range from 0 to approximately 12. However, all applications reporting zero emission reduction per SEK are denied. Therefore, the marginal effects for this variable is calculated from 1 to 12 at intervals of one and plotted in *figure 8, panel a,* along with the 95% confidence interval. The probability of approval is increasing as co2e emission reduction per invested SEK increases, holding all other factors constant.

(a) 

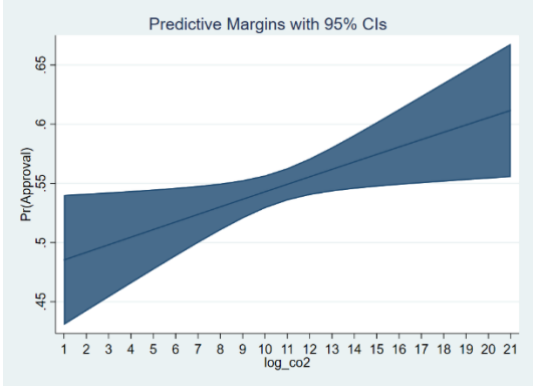
(b) 

Figure 8: panel *(a)* shows the predicted probability of approval with respect to cost efficiency co2e emission reduction per invested SEK. Panel *(b)* shows the predicted probability of approval with respect to total co2e emissions reduction per application.

Total co2e emission reduction in natural logarithms range from 0 to approximately 21. The marginal effects for total co2e reduction are calculated from 1 to 21, as all applications reporting a 0 reduction in co2e emission have been denied, with an interval of 1. In *figure 8, panel b* the marginal effect is plotted along with a 95% confidence interval. The predicted probability of approval is increasing with the total co2e emissions reduction. The higher the total co2e reduction is, the higher the probability of the approval, holding all other variables constant.

Table 5: Marginal effects of model 3.

Variable	Marginal Effects	Std. Err
Private company	0: .498 *** 1: .593 ***	0: .011 1: .012
Housing cooperative	0: .498 *** 1: .850 ***	0: .008 1: .013
Non-profit organization	0: .55 *** 1: .455 ***	0: .007 1: .046
Municipalities	0: .540 *** 1: .629 ***	0: .007 1: .026
Municipal companies	0: .536 *** 1: .720 ***	0: .007 1: .027
Waste	0: .546 *** 1: .856 ***	0: .007 1: .075
Energy efficiency	0: .539 *** 1: .873 ***	0: .007 1: .047
Energy conservation	0: .430 *** 1: .902 ***	0: .007 1: .01
Vehicle	0: .537 *** 1: .914 ***	0: .007 1: .032
Gas emission	0: .544 *** 1: .962 ***	0: .007 1: .020
Information initiative	0: .536 *** 1: .865 ***	0: .007 1: .043
Infrastructure	0: .542 *** 1: .925 ***	0: .007 1: .034
Base station	0: .219 *** 1: .796 ***	0: .017 1: .011
Biogas production	0: .541 *** 1: .957 ***	0: .007 1: .021
Transport	0: .520 *** 1: .954 ***	0: .007 1: .013

Note: *** indicates 1% significance level.

A *Private company* has a 59.3% probability of approval, in comparison to *Municipalities* who has a 62,9% probability of being approved the Climate Leap grant. A *municipal company* has

a 72% probability of being approved. A *municipal company* have more than 10 percentage unit's higher probability of approval than a private one.

A *Housing cooperative* have a probability of being approved of 85%. The joint marginal effects for housing cooperatives that apply for base stations shows that they have a predicted probability of approval at 94%, see appendix.

Non-profit organizations have a probability of being approved of 45.5%. In comparison, all other organization types, not included in the *non-profit organization* category, have a 55% probability of being approved. So, what we can see is that a *Housing corporation* have a higher probability of getting approved in comparison to other forms of uncompetitive organizations. The probability of approval differs with almost 40 percentage units between these two categories.

The predicted probability of approval of *Waste* related projects is 85.6% Applications for projects regarding *Energy efficiency* have a probability of approval 87.3%. *Energy conservation* have a 90.2% probability of approval. *Private companies* applying for *energy conservation* projects have a predicted probability of approval of 91.2%, a *non-profit organization* applying for a similar project have a probability of 87.6% of approval, see appendix. *Municipalities* and *municipal companies* applying for *energy efficiency* projects have higher levels of probability for approval, at 93.3% and 95.1% respectively, see appendix.

Vehicle projects have a 91.4% probability of approval. *Gas emissions* have the highest probability of approval at 96.2% in comparison to other project types. *Information initiative* applications have an 85.6% probability of approval. A *municipality* applying of an *information initiative* have a probability of 90.4, on the other hand a *non-profit organization* have a probability of 84.8% of approval.

Infrastructure projects presents a 92.5% probability of approval; the majority of applications comes from *municipalities*. *Municipalities* applying for support for *infrastructure* projects have a probability of approval 95.1%.

Base station has a 79.6% probability of approval and is the kind of project with the largest number of applications, 2880. At the same time *Base station* is the kind of project with the lowest probability of being approved.

Waste have a probability of being approved at 85.6%. Information initiative have an 86.5% probability of approval. Information initiative projects are mainly applied for by non-profit organizations. Energy efficiency have a probability of 87.3% of approval. *Biogas production* projects have a 95.7% probability of approval. *Transportation* projects have a probability of approval at 95.4%.

6.3 Discussion

The general results indicates that *municipalities* and *municipal companies* have a larger probability of getting their applications for the Climate Leap grant approved, in comparison to other types of organizations. An explanation for this might be that the risk of a *municipality* failing to complete a project because a lack of funds is very unlikely. *Municipal companies* have more than 10 percentage unit's higher probability of being approved the Climate Leap grant, than do a *private company*. The significant results regarding the probability of approval of *municipalities* and *municipal companies* can be interpreted as redistribution of public funds.

When analyzing the number of applications, we can identify that *private companies* is the organization type with most amount of applications, as seen in figure 2. *Municipalities* on the other hand, has the widest spread in their applications, applying for several different project types compared to any other organizational type.

The organization type with the lowest probability of being approved the Climate Leap grant is *Non-profit organizations*. Most of their applications concern *information initiatives*, see figure 7. Their predicted probability of approval is only 83.3% in comparison to a *municipality* applying for a similar project, who has a predicted probability of 90.4%. It can be the case that the Climate Leap is biased towards *information initiatives* from *municipalities* because their specific interests are more aligned. It could be the case that they have a lower ability to complete the project they apply for, due to a lower financial security than other organization types. Because of this, there is the possibility that *Non-profit organizations* are being denied the Climate Leap grant, due to the possible financial insecurity and the work load that would follow a cancelled project. If the approved project is not completed or is cancelled, the approved organization has a repayment obligation of the grant. *Non-profit organizations* are often run by volunteer workers, this can have an impact on the quality of the applications as well. The incentives to hand in a correct application are high, but the volunteer workers might lack the time and resources to complete the application satisfactory.

In figure 8, penal b, it is clear that the *total co2e emission reduction* plays a large role in the decision of approval of the Climate Leap grant. The predicted probability of approval increases as the reduction of emissions of co2e increases. In panel a on the other hand it is clear that the cost efficiency is also an important determinant of the approval of the grant. There is a clear correlation with the probability of approval and the *co2e emission reduction per invested SEK*. Both these results are significant at a 95% significance level. Indicating that the larger the co2e emission reduction is, the more cost efficient the project is.

When analyzing the data in this paper, we can observe that there seem not to be any connection between project with few numbers of applicants and a higher probability of being approved. There are also no indications pointing towards any special treatment towards either high – or low-cost projects. *Gas emission* is the type of project with the highest predicted probability of approval, at 96,2%. Both *gas emission* projects and *waste* related projects can be considered to be high-cost projects, as seen in figure 6a. *Waste* related projects in contrast to *gas emission* related projects, have the next lowest probability of approval, at a level of 85.6%. *Base station* can be considered as a low-cost project, as seen in figure 6b, with the lowest average cost per project and holds the lowest probability for approval, with a probability of 79,6%. The statistics shows that *base stations* have the highest number of applications from all types of organizations, as seen in table 2 and figure 7. It is the most favored project type, we can assume the reason for this is the low economical threshold combined with a small, or no organizational adjustments at all.

7. Conclusion

The focus in this thesis is not the efficiency of the Climate Leap program rather an evaluation of the implementation of the program. The aim of this paper, is to answer these questions:

Does the EPA have preferences for certain characteristic of the applicants for the Climate Leap not related to cost efficiency? Is one kind of applicant systematically favored over another?

Municipalities and *municipal companies* are preferred over other types of organizations. *Transport, biogas production* and *gas emission reduction* are favored over other types of projects. These organizations and project types have a higher predicted probability of approval then others, holding everything else constant. There is a clear increase in the probability of being approved the Climate Leap grant the larger the *total co2e emissions reduction* is, at the same time as there is a clear increase in probability of approval as the cost efficiency increases, indicating that the larger projects are more cost efficient. So, the EPA seams to have preferences for certain characteristics, but also favoring cost efficiency. The fact that some characteristics are favored over others, without any connection to cost efficiency, can contribute to distorting the competition on the Swedish market.

The purpose of the study was to evaluate the determinants of approval of applications for the Climate Leap grant. The study shows that there are factors effecting the probability of approval not related to the cost efficiency, but also that the cost efficiency significantly increases the probability of approval.

The benefits to an investment support program are that it does not give incentives for carbo leakage. Instead, it gives incentives for the market to innovate itself and to adjust to a more environmentally friendly business society. An investment support program like the Climate Leap, helps transform the market place, not just the activity but the attitude towards environmentally friendly alternatives. This paper is not an evaluation of the efficiency of the program itself but an evaluation of the implementation of the program. The aim of the Climate Leap is work together with emission rights trading and co2e taxes, not to compete with them. There is a question of the efficiency of investment support programs, while both emission rights trading and taxes have been proven very effective, this is a question for further research on a different subject.

There is always a need to evaluate government projects and there is reason to look further into the determinants of the Climate Leap. In this study only a few factors were taken in to account, but a lot more could be included in the analysis. Further studies on Reveled Preference on the Climate Leap can instead of including type of project, include the amount applied for. To further examine a possible correlation between the cost of a project and the probability of approval. There seems to be a connection between cost efficiency and the *total amount of co2e emissions reduction*. This led to the question of the efficiency in sponsoring the smaller projects at all, something that can be evaluated in another paper, focusing on efficiency. The consequences of the distorted market is a topic in need of investigation.

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Appendix

Table 2, Joint marginal effects

	Base station	Information initiative	Energy conservation	Infrastructure
Private company	.824 ***		.912 ***	.940 ***
Housing cooperative	.953 ***			
Non-profit organization	.744 ***	.838 ***	.876 ***	
Municipality	.857 ***	.904 ***	.933 ***	.951 ***
Municipal company	.892 ***		.951 ***	.965 ***

The econometrics in this study is carried out with help of STATA16.

The marginal effects have been calculated via the command "margins".