Are they pigs with lipstick? Examining firms excelling at seeking subsidies.

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Abstract This paper develops a theory regarding firms whom seek and receive multiple innovations subsidies from the Swedish government. We suggest that these firms are better than other firms at seeking support but that this talent is not obvious to the firms before they have succeed in seeking and receiving supports. These firms might also have a lower opportunity cost of the effort in seeking subsidies due to lower productivity or a greater need due to lower profits. We test this theory by estimating the probability of receiving subsidies with several different probability estimators. The results are in line with the theoretical predictions which is worrying from a public policy perspective.

Keywords: rent-seeking, firm subsidies, innovation policy

JEL: H25, O38, P16, D72

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1 Introduction

Every year the Swedish government spends several billion SEK in subsidizing private firms in order to increase the amount of innovations being produced. The rational behind these subsidies is that small and innovative firms are likely to have a lack of capital due to asymmetric information (Akerlof, 1970). Since these firms are important for innovations, and given that innovation is important for long term economic growth, these subsidies are intended to increase the economic growth in the long run (Acs and Audretsch, 1988; Romer, 1990) Most firms that receive innovation subsidies in Sweden only receive one subsidy, but about 15 % receives more than one subsidy. Previous research on innovation subsidies have in general not been able to identify these kinds of firms due to data limitations, relying on survey data on single programs. However, due to the newly constructed MISS-database[1] which collects from the three major sources of innovation subsidies in Sweden, in combination with register data on firm characteristics, we are able to identify these firms. Most subsidies in Sweden are distributed via three different agencies: Vinnova, Swedish Agency for Economic and Regional Growth (SAERG) and the Swedish Energy Agency (SEA). Data regarding these subsidies have in recent years been collected into the MISS-database. Other sources of subsidies do exist, but these play a minor role in the Swedish economy and are not included in the MISS-database. By combining the data from the MISS-database with firm register data from Statistics Sweden, it is possible to both identify most firms receiving subsidies from the Swedish government and follow these firms over time in order to evaluate the effect from these subsidies, as well as other firms which act as the control group.

This paper main focus is on a sub-section of subsidized firms, namely firms that receives more than one subsidy during the time that is registered in the MISS-database. These firms consists of a relatively small minority of around 1400 firms compared to around 10,000 firms that receive only one subsidy. These multiple supported firms might receive more than one subsidy by a single agency, or they might receive multiple subsidies by combining subsidies by any of the three different agencies.

The fact that there are more firms that receive only one subsidy is slightly surprising. Given that there is a fixed cost of seeking support in terms of bureaucracy and learning how to push papers in a correct way, it might have been reasonable to assume some form of learning by doing (Arrow, 1962). If this was the case, then there would be a majority of firms that receive multiple supports. Single supported firms should mostly show up at the end of the panel, as in firms that have not yet received their second support. The fact that

[1] Mikrodatabas över Statliga Stöd till Näringslivet - Micro database over public subsidies to private firms. The database is administered by the Swedish agency Growth Analysis.

the result is the opposite is therefore interesting and requires a more detailed theory.

We suggest, in a similar way of Holmström (1999) that firms learn if they have a talent for seeking supports in the process of seeking and if the returns of seeking subsidies are large enough. Only firms that afterward realize that they have a comparative advantage of seeking subsidies repeats the process of seeking subsidies. Since the goal of these subsidies are to solve (assumed) market failures on the capital market for innovative firms, it is not certain if the firms that have a comparative advantage in seeking subsidies should be targeted. In order to maximize the output, these supports should be targeted at firms that have capital constraints but do have innovation potential that could be realized with additional funds (Hall and Lerner, 2010). It is therefore an interesting empirical question if the firms that excel at seeking subsidies also are the one which produce the largest social surplus from these funds, or if the firms are better can be described as unproductive entrepreneurs (Baumol, 1990). This paper is organized as follows: Section 2 presents a simple theoretical model for firms seeking support and derives some conclusions regarding why firms would seek multiple supports. Section 3 describes the responsible agencies for giving support and descriptive statistics for the subsidized and non-subsidized firms. Section 4 presents our estimation methodology and empirical results. Section 5 concludes.

2 The subsidy seeking decision problem

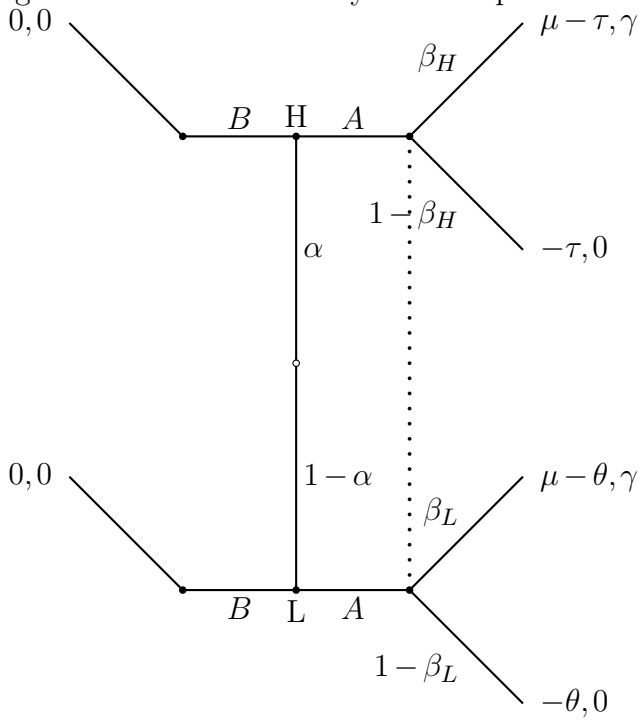
Figure 1 illustrates the choices facing a firm that considers to seek public supports. A firm can either be of the high skilled at seeking subsidies, H with probability α or low-skilled, L, with probability 1-α . When deciding to seek subsidies, A, the firm does not know its own type. If the firm decides to not seek subsidies, B, the decision problem is by definition over. If the firm decides to seek support it receives a subsidy worth μ units with probability β_H or β_L, or do not receive any subsidies with probability 1-β_H or 1-β_L. Depending on the firms type, the process of seeking support costs either τ unit or θ units. '

The responsible agency receives some positive number γ from handing out a subsidy. We abstain from further modeling the incentives and payoff function for the responsible agencies. While is it is interesting to study the responsible agencies, it is beyond the scope of this paper which focuses on the firms decisions.

A high probability of being efficient at seeking, and a high probability of receiving subsidies will, ceteris paribus, lead to more firms seeking and receiving subsidies. The lower cost of seeking subsidies might also be interpreted as a low opportunity cost of time. This might be the case for firms with a low productivity in the market and its therefore more profitable to spend time and resources at applying for subsidies. Also, these firms might

have low profits due to other reasons, and there is therefore a need to compensate this lack of profit with subsidies. While this decision problem do resemble a classic signaling game, notice that unlike a signaling game the player deciding between A and B does not know his own type until player 2 (the agency) has done his decision. Also, we do not strategically model the decisions of the agencies, making this a a decision problem and not a formal game. The question is therefore not if the Bayesian equilibrium is pooling or separating, but the number of firms that chooses to repeat the processes of seeking subsidies.

Figure 1: The firms subsidy decision problem



$$\alpha > 0, \beta_L > \beta_H > 0$$
$$\mu > 0, \gamma > 0$$
$$\theta > \tau$$

$$\mathbf{E}\left(\Pi^H\right) = \beta\left(\mu - \tau\right) + \left(1 - \beta\right)\left(-\tau\right) > 0 \tag{1}$$

$$\mathbf{E}\left(\Pi^L\right) = \beta\left(\mu - \theta\right) + \left(1 - \beta\right)\left(-\theta\right) \leq 0 \tag{2}$$

Firms that might be qualified for the subsidies faces two decision: first if they should apply for subsidies, i.e choose A rather than B, and secondly if they should re-apply. In this setting, only firms that have realized that they are high skilled will re-apply since $\mathbf{E}\left(\Pi^L\right)$ is non-positive. Firms decision on entering therefore depends on their expectation on α, their probability of being highly skilled at seeking subsidies. Given that most firms that we observe seems to be low skilled at seeking support, why would any firm seek a subsidy in the first place? There might be two independent explanations for this. First, while $\mathbf{E}\left(\Pi^L\right)$ is non-positive, it might be close to zero rather than significantly negative. Therefore the expected profit of the entire application processes might be positive. Secondly, players might overestimate their probability of being high skilled, in line with the literature that entrepreneurs tend to be over-confident (Forbes, 2005).

Based on this small decision problem, we hypothesize that firms with a lower productivity and/or lower profits compared to other firms will be over-represented among firms seeking subsidies, especially amongst the firms that receive multiple subsidizes.

3 The Swedish innovation system and summary statistics

There are primarily three Swedish agencies whose purpose is to promote innovations, growth and competitiveness of Swedish firms by subsidies: the Swedish Innovation Agency (Vinnova), the Swedish Energy Agency (SEA) and the Swedish Agency for Economic and Regional Growth (SAERG). These agencies administer and implement direct firm subsidy programs that will be analyzed in our quantitative study below. In short, SAERG promotes entrepreneurship in general, Vinnova finances high-risk projects and SEA focuses on projects within the energy industry. Many of SAERGS subsidies also have co-financing from the European Union, giving them more of a regional aspect due to EU regulations. Although the practicalities of each program differ, firms that fulfill certain conditions of size and company form, and who plan projects that are judged to be relevant to the program, may apply for economic subsidies, normally up to 50% of eligible costs. Depending on the program, the money may be used to finance investments in human and/or physical capital, employee training, inventories and costs associated with research and development.

Since the model presented in section section 2 is not solved in a formal manner, it is necessary to test empirically what drives firms into seeking one and multiple subsidies. The data used is based on the MISS-database of firms receiving subsidies and is collected by Growth Analysis[2] This data is matched with register data on Swedish firms from Statistics Sweden. Firms with less than 2 employees are excluded in order to reduce noise due both to small firms being volatile and because there is a lack of register data (small firms are not required to report data in the same manner as larger firms). As a further step to reduce unwanted heterogeneity in the control group, firms with a NACE-code related to agriculture, restaurants and publicly funded industries were excluded[3]. These sectors are seldom targeted for these types of subsidies and one would not expect comparable effects from the subsidies. This creates an unbalanced panel from 1997 to 2011.

[2]Growth Analysis is a Swedish government agency with responsibility to analyze and evaluate Swedish growth policy.

[3]More specifically, firms related to SNI2002-codes 1-5, 55 and 75-99 were excluded.

Table 1: Summary statistics

	Observations	Mean	Median	Std. Dev.
Never subsidized				
Number of employees	1686877	14	4	108
Wage costs per employee	1686877	130	124	122
Share of high skilled labor	1545196	.44	0	1.63
Gross investments	1686877	1392	45	28154
Net sales	1686877	29065	3982	319766
Capital Stock	1686877	40133	2220	884873
Total amount support received	1686877	0	0	0
Subsidized				
Number of employees	96331	53	7	537
Wage costs per employee	96331	136	132	86.5
Share of high skilled labor	90419	.44	0	1.5
Gross investments	96331	5656	151	82319
Net sales	96331	126804	8030	1712429
Capital Stock	96331	198571	4781	3748531
Total amount support received	96315	530214	108602	2904811

Notes: Summary statistics for subsidized and non-subsidized firms between 1997-2011

Table 2: Summary statistics

	Observations	Mean	Median	Std. Dev.
Never subsidized				
Number of employees	1768024	15	4	137
Wage costs per employee	1768024	130	125	121
Share of high skilled labor	1621277	.44	0	1.63
Gross investments	1768024	1517	48	30852
Net sales	1768024	31236	4098	360281
Capital Stock	1768024	44438	2278	1096819
Total amount support received	1768016	2674	0	169867
Multiple subsidized				
Number of employees	15184	133	14	967
Wage costs per employee	15184	146	139	74.6
Share of high skilled labor	14338	.55	0	.789
Gross investments	15184	13916	356	142047
Net sales	15184	396399	14361	3843851
Capital Stock	15184	544028	10304	5996663
Total amount support received	15176	1130310	298813	4708089

Notes: Summary statistics for subsidized and non-subsidized firms between 1997-2011

Table 3: Number of firms receiving only one subsidy

Firm type	Number of unique firms
Subsidized by Vinnova	727
Subsidized by SAERG	7781
Subsidized by SEA	133
Total number of single subsidized firms	8641
Never subsidized	276021

Table 4: Number of firms receiving multiples subsidies

Firm type	Number of unique firms
Multiple subsidies by Vinnova	213
Multiple subsidies by SAERG	901
Multiple subsidies by SEA	0
Multiple subsidies by Vinnova & SAERG	229
Multiple subsidies by Vinnova & SEA	65
Multiple subsidies by SAERG & SEA	18
Total number of multiple subsidized firms	1426
Ratio of multiple to all subsidized firms	14,1 % (1426/10067)
Control group	274120

4 Empirical estimations

Based on the theoretical model, the firms seeking only one subsidy should be the ones who believe they are skilled at seeking subsidies, but turn out to not to be. This should be contrasted with the firms that receive multiple subsidies, i.e firms that turn out to be high skilled, and firms that do not receive any subsidies at all. The later group either did not enter the apply for a subsidy at all or got their application rejected. Unfortunately, we cannot observe those firms that did get their applications rejected. This might bias our estimations, since these firms enter the control group in a non-random way. However, given the size of our control group they should be such a small group that they do not affect the results. In order to estimate what drives firms in receiving subsidies, and seeking multiple subsides, first a logit regression is run for a dummy variable the year before the firm receives their subsidy. In this regression, both single and multiple subsidized firms are treated as subsidized. Hence, multiple subsidized firms have several dummies for each time that they receive a subsidy. The following regression is run:

$$T_{it} = \alpha_0 + \beta X'_{it} + \delta_j + \theta_t + \epsilon_{ijt} \tag{3}$$

where α_0 is a constant, $\beta X'_{it}$ is a vector of relevant variables, δ_j are industry dummies, θ_t are year dummies and ϵ_{it} is an error term. All independent variables are defined in table 5. T_{it} is a 0-1 dummy defined above. This regression is performed in two different versions, once with value added per labor and wage per labor as an exogenous variables and once with gross operating surplus as exogenous variable. Since gross operating surplus is a function of both wage costs and value added it must be regressed on its own. In both models capital per labor, number of employees, ratio of high skilled labor to total labor is included. Value added per labor is our measurement of productivity, capital per labor is a measurement of capital intensity and the number of employees is a measurement of firm size. All independent variables excepts the ratios and dummies are in log form. The definition of gross operating surplus is due to Vandenberghe (2013). We repeat this regression by regressing only the single-subsidized firms and the multiple subsidized firms in order to see if the results change depending on firm type.

A logit regressions is not designed to handle multiple outcomes such as the probability of receiving multiple subsidies. Instead a count data regression is used, in this case a zero-inflated negative binomial (ZINB). Since a clear majority of the firms in the panel do not receive any subsidy, the ZINB is should perform better than a non-zero inflated model[4]. This

[4]A Voung-test was also performed to test the ZINB model versus a regular negative binomial model (Greene, 2012). The results clearly reject the null that a zero-inflated model is inappropriate.

opens up the choice between a zero-inflated Poisson (ZIP) model or a ZINB model. Since the standard error of the subsidies, according to table 3, is around 4 times larger than the mean it is clear that the variance is not equal to the mean. Hence, the data is overdispersed and the ZIP is not an appropriate technique. We therefore run the following regression:

$$Nrsupport_{it} = \alpha_0 + \beta X'_{it} + \delta_j + \theta_t + \epsilon_{ijt} \tag{4}$$

Due to conformity problems, the industry dummies was dropped for the restricted sample ZINB-regressions and only included in the inflation-regression.

Since our firms can be divided into three different type, namely firms that never receives any subsidies, those that receives one subsidy and those that receive multiple subsidies, we can also run the following multinomial logistic regression:

$$Group_{it} = \alpha_0 + \beta X'_{it} + \delta_j + \theta_t + \epsilon_{ijt} \tag{5}$$

Here, the dependent variable is if the firm belongs to either the group that never receives subsidies, if they receive one or multiple subsidies. In all regressions, we do not use panel regressions even though we have panel data. This is because we do not want to estimate the effect of the subsidy, but rather what kind of firms that are more likely to become subsidized. Therefore, pooling the data is more efficient, especially since we are interested in what drives the firm into seeking subsidies.

Table 5: Independent Variables

Variables	Definition
Average wage costs	Log of total wage costs divided by the number of employees
Firm size	Log of number of employees
Productivity	Log of total value added divided by the number of employees
Capital stock	Log of current assets plus fixed assets
Share of high skill labor	Number of tertiary educated workers divided by the total number of workers
Gross operating surplus	Log of total value added divided by the total wage costs
Gross investments	Log of gross investments
Equity ratio	Firm equity divided by capital plus debts

4.1 Regression results

Table 6: Results from logit regressions

	Full sample	Full sample
L.mtreatmentdummy		
Log of Capital Stock per Employee	0.016	-0.00047
	(0.016)	(0.016)
Log of employed	0.13***	0.12***
	(0.014)	(0.014)
Log of value added per labor	-0.27***	
	(0.023)	
Log of wage cost per employee	0.15***	
	(0.031)	
Share of high skilled labor	0.0062***	0.0061***
	(0.0016)	(0.0016)
Log of gross investments	0.11***	0.11***
	(0.0097)	(0.0098)
Equity ratio	-0.0030***	-0.0029***
	(0.0010)	(0.00099)
Gross operating surplus		-0.23***
		(0.023)
Constant	-4.73***	-5.22***
	(0.18)	(0.13)
Observations	913530	913530

Standard errors in parentheses

Dependet variable: Dummy for firms that are receives a subsidy during the panel. Cluster robust s.e. at firm level. Year and industry fixed effects

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

Table 7: Results from logit regressions

	Single	Multiple	Single	Multiple
L.mtreatmentdummy				
Log of Capital Stock per Employee	-0.029*	0.11***	-0.043**	0.095***
	(0.018)	(0.032)	(0.017)	(0.032)
Log of employed	0.059***	0.28***	0.055***	0.28***
	(0.015)	(0.030)	(0.015)	(0.030)
Log of value added per labor	-0.24***	-0.33***		
	(0.024)	(0.044)		
Log of wage cost per employee	0.15***	0.22***		
	(0.033)	(0.068)		
Share of high skilled labor	0.0051***	0.0080***	0.0049***	0.0080***
	(0.0016)	(0.0015)	(0.0017)	(0.0014)
Log of gross investments	0.11***	0.14***	0.11***	0.14***
	(0.011)	(0.021)	(0.011)	(0.021)
Equity ratio	-0.0025**	-0.0040***	-0.0024**	-0.0040***
	(0.00099)	(0.0010)	(0.00098)	(0.0010)
Gross operating surplus			-0.21***	-0.30***
			(0.025)	(0.044)
Constant	-4.63***	-7.14***	-5.03***	-7.62***
	(0.20)	(0.40)	(0.14)	(0.27)
Observations	903084	860444	903084	860444

Standard errors in parentheses

Dependet variable: Dummy for firms that are receives a subsidy during the panel. Cluster robust s.e. at firm level. Year and industry fixed effects

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

Table 8: Results from ZINB regressions.

	Full sample	Full sample
Number of supports, cumulative		
Log of Capital Stock per Employee	0.19***	0.20***
	(0.050)	(0.050)
Log of employed	0.28***	0.29***
	(0.023)	(0.022)
Log of value added per labor	-0.20***	
	(0.045)	
Log of wage cost per employee	0.24***	
	(0.051)	
Share of high skilled labor	0.033***	0.034***
	(0.011)	(0.011)
Log of gross investments	0.031***	0.031***
	(0.011)	(0.011)
Equity ratio	0.0023	0.0021
	(0.0047)	(0.0042)
Gross operating surplus		-0.21***
		(0.034)
Constant	-4.30***	-4.14***
	(0.39)	(0.26)
lnalpha		
Constant	-1.73***	-1.73***
	(0.42)	(0.42)
Observations	1135765	1135765

Standard errors in parentheses

Dependent variable: Number of cumulative supports a firm receives. Cluster robust s.e. at firm level. Year fixed effects in both main and inflation regression. Single digit industry controls in main regression, two digit in inflation regression. 50 iterations. Inflation regression omitted.

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

Table 9: Results from multinominal logit regressions

	mlogit1		mlogit2	
	Single_subsidized	Multiple_subsidized	Single_subsidized	Multiple_subsidized
Log of Capital Stock per Employee	-0.028**	0.098***	-0.041***	0.089***
	(0.013)	(0.025)	(0.012)	(0.024)
Log of employed	0.13***	0.33***	0.13***	0.32***
	(0.011)	(0.021)	(0.011)	(0.021)
Log of value added per labor	-0.20***	-0.31***		
	(0.016)	(0.031)		
Log of wage cost per employee	0.12***	0.24***		
	(0.017)	(0.048)		
Share of high skilled labor	0.0033	0.0071**	0.0029	0.0070***
	(0.0029)	(0.0028)	(0.0028)	(0.0026)
Log of gross investments	0.093***	0.13***	0.093***	0.13***
	(0.0053)	(0.012)	(0.0053)	(0.012)
Equity ratio	-0.0036**	-0.0049**	-0.0035**	-0.0049**
	(0.0018)	(0.0020)	(0.0017)	(0.0020)
Gross operating surplus			-0.17***	-0.29***
			(0.014)	(0.031)
Constant	-2.18***	-5.25***	-2.48***	-5.52***
	(0.12)	(0.28)	(0.10)	(0.23)
Observations	1135765	1135765	1135765	1135765

Standard errors in parentheses

Dependent variable: Dummy variable depending on if a firm receives zero, a single or multiple supports. Firms with zero subsidies as base group. Cluster robust s.e. at firm level. Year and industry fixed effects.

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

Beginning with the logit regressions, profits and productivity is negatively related to the probability of receiving a subsidy. We interpret this results as suggesting that both the opportunity cost of time, measured by productivity, and the need for money due to low profits, are important when the firm decides to seek subsidies. The larger absolute value of the coefficients in the regressions for firms which receives multiple subsidies are in line with the model in section 2. Although this result is in line with our model, it is still a bit surprising. Firms that receives multiple subsidies have been through several vetting processes and been approved by the relevant agencies. They have received more money, which is meant to trigger investments and future productivity. Even though we pool the regressions and firms therefore are evaluated both before and after they receive their subsidies, the fact that productivity and profits remains negative is interesting.

Profits remain negative when we estimate with reported gross profits instead, strengthening the results. The motivation behind using gross operating surplus rather than normal gross profits is due to firms having an incentive to decrease their reported profits in order to avoid paying corporate tax[5].

Since investments and wage costs are positive, it is not obvious that these firms are capital constrained. A high skill level is weakly significant, which suggest that firms with a more educated work force is better at receiving subsidies. This might be due both to them having higher skills in filling out paperwork or that these firms are to a higher extent eligible for subsidies.

The non-significant capital intensity indicates that the model from Baldwin and Robert-Nicoud (2007) is at first sight applicable. According to this model, firms with a high capital stock but with low profitability should be the most active in seeking government support since the capital stock acts as an entry barrier. Therefore, any rents created by the subsidies are not competed away. However, the capital intensity is significant for the logit regressions when we only include the the firms that receives multiple subsidies. It is therefore possible that the capital intensity of the firms act as a entry barrier, i.e. only sufficiently capital intense are able to seek and receive subsidies.

The results from the ZINB and multinomial logit regressions show a similar pattern. These results strengthen our logit results. Unproductive and unprofitable firms are more likely to receive multiple subsidies when we estimate the probability of receiving one additional subsidy or when looking at groups of firms. These models are more complicated both regarding their estimation technique and what probabilities we actually are looking at. We find no evidence of a vetting process that selects the best firms and therefore that receiving more subsides should be associated with a probability of being productive or profitable.

[5]Swedish corporate taxes where 28 % during most of our panel, being decreased to 26,3 % in 2009.

4.2 Robustness checks

In order to strengthen or results, we run a battery of robustness checks. One argument against our results could be that these firms are unproductive and unprofitable when they receive their subsidies, but after receiving their subsidies they will become more productive and make large profits. This might be true, given that this is the main idea behind these subsidies. In order to test this theory, we re-run all our regressions using the 5 year forward value of productivity and profits. The length of the variables is in line with what previous research has found for product life times for small and medium sized firms (Bilir, 2014; Griffin, 2002). If these firms will become productive in the future, these coefficients should switch signs and become positive. We find no evidence of this. In the best case, the forward values of productivity and profits become insignificant, although the signs are still negative.

Given that Vinnova in a large extent than SAERG aims to subsidy firms with innovation capability, the firms that receives subsidies from Vinnova should respond better to these than the more regional based SAERG subsidies. However, we find little evidence of this when splitting the sample depending on which agency that hands out the subsidy. Firms that receives multiple subsidies from Vinnova however do not have significantly negative productivity. When measured by the forwards value, both profits and productivity becomes insignificant, although still negative. This indicates that firms that are subsidized by Vinnova are better than the firms that are subsidized by SAERG. Still, these firms are either worse or not significantly better than the non-subsidized firms. Also, due to our unbalanced panel, we lose a large amount of observations when using a five year forward variables. Final, one could question our choice of measurements of productivity and profits. Hence we re-run the main regressions with different variables. For productivity, we estimate a productivity variable with due to sales and cost of materials in line with Levinsohn and Petrin (2003); Petrin et al. (2004). For profits, we use the gross profits reported by the firms although as previously noted this variable might be downwards biased. The results remain consistent with the main estimates.

5 Conclusions

Solving market failures in the capital markets for innovative firms is difficult. Markets are in general good at aggregating information and providing funds to the right firms (Hayek, 1945). When markets fail, it is not obvious how governments should respond to this failure. On the one hand, governments might be able to solve the market failure and improve the equilibrium with appropriately targeted subsidies and interventions. On the hand, there

Table 10: Robustness checks

	Productivity	Profits
Forward variables	Negative**	Negative***
Vinnova single	Negative***	Negative***
Vinnova multiple	Negative	Negative***
SAERG single	Negative***	Negative***
SAERG multiple	Negative***	Negative***
Alternative inputs	Negative***	Negative***
Forward alternative inputs	Negative***	Negative*

Notes: Summary of results from logit, ZINB and multinominal logit regressions.
* p<0.1, ** p<0.05, *** p<0.01

is a large risk for these subsidies being targeted at the wrong firms since firms incentives are not in line with the social optimal outcome. According to our paper, the subsidies that the Swedish government hands out seems to in a certain extent go to firms with low productivity and profitability, but with a high capital intensity, high wages and high skilled labor force. These firms are more likely to be skilled at seeking subsidies than being a clear case of an innovative firm that suffers from market failures in the capital markets. Our results remain similar when we split the sample depending on the responsible agency, use different measurements of profits and productivity and use the forward values of profits and productivity.

Based on these results, some conclusions can be drawn: First, while further research is needed regarding in the exact treatment effect of multiple subsidies, the evidence so far indicates that these firms rather than being innovative at creating market value are expert in seeking subsidies[6]. Secondly, further research needs to investigate the incentives for the responsible agencies which provide the subsidies, perhaps with more qualitative methods and why some firms do receive multiple subsidies.

From a policy perspective, if our results are robust, these subsidies will not be efficient at creating new innovations and growing firms but rather creating unproductive entrepreneurs. Rather than having a boosting on the effects on the firms, the subsidies are more like putting lipstick on a pig. And even with lipstick, a pig is still a pig.

[6]The econometric literature regarding multiple treatment diff-in-diff is still in its infancy, see e.g. Lee (2005)

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A

Summary statistics

Table 11: Summary statistics

	Observations	Mean	Median	Std. Dev.
Vinnova				
Number of employees	8908	150	12	932
Wage costs per employee	8908	174	162	178
Share of high skilled labor	8499	1.1	1	1.38
Gross investments	8908	13672	222	130935
Net sales	8908	434278	12304	3834855
Capital Stock	8908	848133	11535	9349702
Total amount support received	8896	757106	339155	1757936

Notes: Summary statistics for firms receiving one Vinnova subsidy between 1997-2011

Table 12: Summary statistics

	Observations	Mean	Median	Std. Dev.
SAERG				
Number of employees	82980	28	7	345
Wage costs per employee	82980	130	129	60
Share of high skilled labor	77687	.34	0	.564
Gross investments	82980	1866	140	30687
Net sales	82980	42070	7666	416617
Capital Stock	82980	32120	4279	333681
Total amount support received	82980	284698	94318	759589

Notes: Summary statistics for firms receiving one SAERG subsidy between 1997-2011

Table 13: Summary statistics

	Observations	Mean	Median	Std. Dev.
SEA				
Number of employees	1340	211	19	491
Wage costs per employee	1340	173	159	281
Share of high skilled labor	1268	1.3	1	6.78
Gross investments	1340	99708	938	381844
Net sales	1340	896875	31400	2971365
Capital Stock	1340	3222176	51095	1.67e+07
Total amount support received	1340	3236547	693799	1.08e+07

Notes: Summary statistics for firms receiving one SEA subsidy between 1997-2011

Table 14: Summary statistics

	Observations	Mean	Median	Std. Dev.
Number of employees	2303	166	11	1028
Wage costs per employee	2303	150	144	69
Share of high skilled labor	2203	.94	1	6.7
Gross investments	2303	6744	233	42396
Net sales	2303	301794	10411	2000276
Capital Stock	2303	354632	8110	2393796
Total amount support received	2300	646691	211972	2421976

Notes: Summary statistics for firms receiving multiple subsidies from Vinnova and SAERG between 1997-2011

Table 15: Summary statistics

	Observations	Mean	Median	Std. Dev.
Number of employees	510	1314	86	3302
Wage costs per employee	510	168	162	90.2
Share of high skilled labor	488	1	1	.749
Gross investments	510	191018	3246	594331
Net sales	510	4426499	72289	1.32e+07
Capital Stock	510	6290364	107491	1.63e+07
Total amount support received	510	8881685	1914212	1.66e+07

Notes: Summary statistics for firms receiving multiple subsidies from Vinnova and SEA between 1997-2011

Table 16: Summary statistics

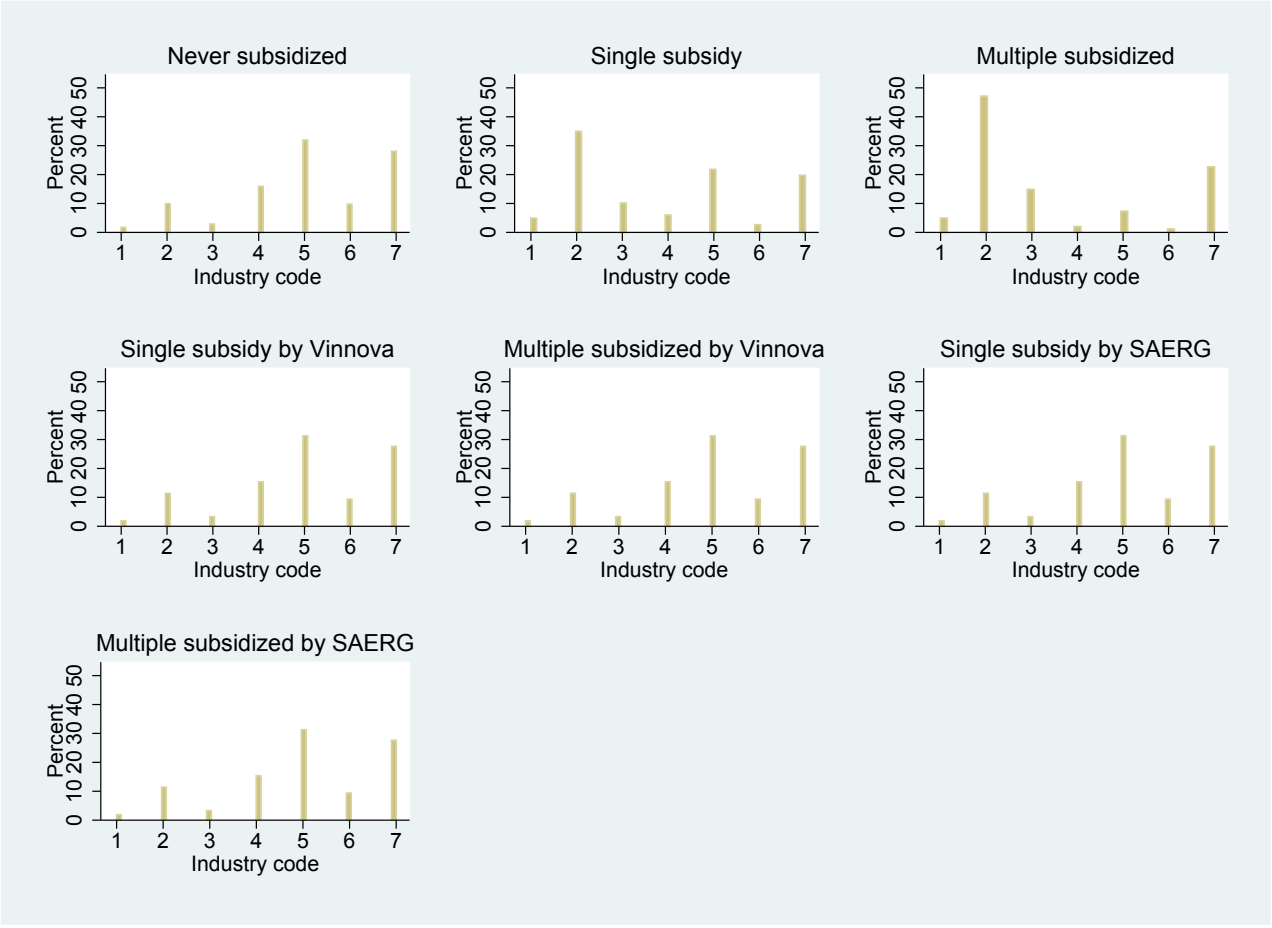
	Observations	Mean	Median	Std. Dev.
Number of employees	141	200	31	349
Wage costs per employee	141	154	151	50.9
Share of high skilled labor	137	.96	1	.496
Gross investments	141	37448	971	104366
Net sales	141	483048	27253	899146
Capital Stock	141	853541	24901	1763677
Total amount support received	141	1634158	598997	4091217

Notes: Summary statistics for firms receiving multiple subsidies from SAERG and SEA 1997-2011

Table 17: Correlations matrix

	Support / C	Log of W/L	Log of gross inv.	Log of VA/l	Log of Profit	Skilled L	Log of K/L	Log of L	Log of Sales L
Support relative to capital stock	1								
Log of wage cost per employee	-0.00195**	1							
Log of gross investments	0.00277**	0.165***	1						
Log of value added per labor	-0.00923***	0.514***	0.341***	1					
Log of gross operating surplus	-0.0142***	-0.331***	0.200***	0.467***	1				
Share of high skilled labor	0.00252**	0.0528***	-0.00961***	0.0526***	0.00279***	1			
Log of Capital Stock per Employee	-0.00782***	0.214***	0.410***	0.547***	0.367***	0.0425***	1		
Log of employed	-0.00143	0.229***	0.532***	0.205***	0.00643***	-0.00883***	0.0971***	1	
Log of Sales per Employee	-0.0104***	0.357***	0.253***	0.585***	0.249***	0.00788***	0.546***	0.199***	1

Figure 2: Distribution of firms depending on subsidy



Firm industry classification depending on SNI-code.