Product Development and Performance of Firms

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Abstract

The paper poses the question whether or not it - in a performance sense - is an advantage to be positioned on the technological frontier in terms of product development. Product diversification is a tool of competition and may give a firm a better outcome in the end. Hence we would expect firms that are oriented towards product development to do better in a performance sense. Using a 1996 questionnaire survey from the Danish DISKO project and some accounting data from Statistics Denmark the paper tests whether or not product innovating as well as product imitating firms do better in terms of revenue, number of employees and value added. As an additional feature the model controls for various effects (e.g. capital investment, educational standards and changes in market competition). The method used is basically regression analysis for firms divided into subtypes. It is expected that significant results will be found for some subtypes.

JEL classification:

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1 Introduction

In traditional micro economic perfect competition theory, product development is excluded as a means of achieving a high performance. Goods are homogeneous and firms are without saying in forming prices on the market. The term technical change limits itself to shifts in the production function. This type of technical change has been referred to as process innovations. It affect firm factor productivity and hence enables the firm either to produce the same quantity at a lower usage of production factors or to produce a higher quantity using the same amount of factors. Process innovation is often viewed as the main tool – in a innovation sense – to increase firm performance.

In the present paper we question the limits of the traditional micro economic framework. Technical change does not solely constitute changes in the way firms do things. Surely we must include changes in the products produced. We will test whether or not product innovation and product imitation are used as means of increasing the performance of the firm. In other words we will take a step towards explaining the performance of the firm by trying to link it to firm specific product development.

The relationship between firm performance and product development has not been analyzed extensively yet. The reasons are numerous. The most important is that it's not apparent that a firm will perform better if it gets an advantage in terms of the product 'quality'. As we shall see it depends on numerous factors. The relationship is fare from straight forward. Also when including product development into a framework you also accept the notion of heterogeneity. That products has different characteristics in terms of quality and usage. In a strictly theoretical view this acceptance causes the formalization to become more complex and less understandable. yet in an empirical we would not have any other way.

The idea that product development is correlated with the performance of an economy isn't new. Long wave theory suggest that it is the innovative behavior that determines the economic development and in doing so explains long term economic fluctuations(Freeman et al. 1982). Theoretically it has been shown that the positive correlation between product development and growth on the macro economic level depends on the substitutability between the new product and existing ones(Katsoulacos 1984). Also we may point to product innovations as the main 'tool' for escaping satiation(Pasinetti 1993, Andersen 2000). Keeping this in mind there are plenty of reasons why we should take product development serious and analyze its implications extensively. Not only on the macro economic level but also on the micro economic.

The paper also take differences between industries into account. It is important to acknowledge these differences. Not only in a product development sense, but also in a performance. It is apparent that some industries are more focused on product development than others. The Pavitt Taxonomy(Pavitt 1984) and the 'Life Cycle' model are examples of work that has put focus on this fact. Keeping the life cycle in mind we must acknowledge that some industries are in an expansion stage while others may be maturing. The consequence is that a firm may perform rather bad when compared to all the other firms in the economy, but may perform well when compared to the firms within the specific industry and *vice versa*. Given these considerations we find it to be important to somehow take industry specific characteristics into account.

in general the paper tries to explain the interdependency between firm performance and product development. Section 2 defines both product development and firm performance. Different measures are considered and the theoretical interrelatedness between the two variables is discussed. Industrial differences will be highlighted. Section 3 builds up the model to be tested. Section 4 describes the datasets used and presents the variables in a statistical sense. Section 5 presents the results of the regressions while section 6 concludes the paper.

2 Product Development and Economic Performance

The following section will clarify what is meant by product development. The notion of performance will be discussed and different measures are presented. Finally the section makes some clarifications concerning the relationship between the two variables.

2.1 Product Development

In the present context the term product development will be used describing those firms that makes some changes in their product portfolio. Whether it is introduction of bran new products or it is changes in existing products does not matter. The term includes both product innovation and product imitation.

Product development may be incremental or radical[1]. Incremental change involves introduction of improved versions of existing products. The idea of involving the firm in incremental improvements is to have a product that is more highly valued by consumers and therefore at a unchanged price would attract sales away from rivals.

While incremental versions happens and operates in existing markets, radical product developments may very well create whole new markets. Implications from radical changes may be more widespread and cause whole restructuring of the companies. Firms engaged in radical innovation may enjoy first mover advantages. In the present paper it has not been possible to distinguish between incremental and radical innovations directly. But we should keep in mind, that product developments are heterogeneous.

When discussing product development, reasons for its existence and the implications of technical change, *Cumulativeness of Technical Progress*, *Technological Opportunity* and *Private Appropriability* becomes key terms with high degree of importance. Cumulativeness relates to the fact that the economic environment is path dependent. The possibilities you are presented with today are a result of the actions you have taken in the past. In case of product development introducing a new state of the art product in the present period gives you an advantage in the further product development race. The firm is keeping itself on the knowledge frontier concerning the product in question. The product innovating firm have minimized the risk of falling behind and secured the ability to follow the immediate future changes in the specific industry.

Opportunity give rise to a distinction between industries. There may be

[1]The term 'radical' have been substituted with 'fundamental' in some writings.

higher technological opportunities in one industry compared to another[2]. Technological opportunities are industry specific(Mohnen and Dagenais 2000). As a result we must take differences in technological opportunity into account by including an industry specific perspective. One may argue that firms located in industries in which the technological opportunities are limited will put their efforts into other means of getting a higher performance. As a result technical change may be used as a means of achieving a higher performance in some industries while it isn't in others. Within the heading of technological opportunity we may question the speed of technical change. In industries with a high degree of technological opportunity there also seems to be a high frequency of innovation. Industries in which the technological frontier moves continuously we may expect that the advantage in an economic performance sense is limited. In industries with a high speed of technical change the innovative activity is a necessity to survive in the market and not as much a means of getting a higher performance *per see*.

Private Appropriability refers to the possibility of a firm to protect its interests. You may say that the term appropriability refers to the degree to which firms can obtain economic returns to various kinds of innovations (*the degree of appropriability*)(Dosi 1988). Appropriability are a key term in this paper. If there are no appropriability by introducing a new product, the incentives of taking on R&D will fall. One way a firm can ensure some degree of appropriability, or at least increase the probability of private appropriability, is by taking a patent on its innovations. Obviously it is necessary to assume that there are some degree of appropriability. Otherwise the firm would not be able to get the economic advantage from conducting innovative activity. However, its not accustomed in all industries to take patents on the innovations. In some industries the the technological frontier moves at a speed – the technological opportunity is extremely high – that makes patenting unprofitable. It may not be an economic advantage to patent the innovation in such industries. All in all it is extremely important to be aware of the heterogeneity of industries.

2.2 Measures of Performance

As indicated above it is quit ambiguous to which performance measures product development should be related. Given the market structure, the stage of the 'product life cycle', strategy of the firms and the industry in question one may argue for a specific measure. But unfortunately we cannot force all firms into a specific template. Therefore we should analyze product development in relation to a range of performance measures.

Performance measures may be divided into three different categories(Hayes et al. 1988):

- Process Management Measures
- Business Management Measures
- External Reporting Measures

[2] As Dosi(1984) argues there are a considerable differences between electronics industry and clothing.

Process Management Measures concerns such conditions as how long it will take to produce and deliver a specific good or service, measures of materials used in the production process and amount of production factors used. Business Management measures on the other hand handles questions like which products firms must be developing, what prices firms should be claiming for its product and whether or not a specific product should be dropped from the specific firm's product line.

These two measures are firm internal measures. What we are interested in are rather the external performance of the firm. It is the performance of the firm relatively to other firms in the market we should be analyzing. Therefore we will be focused upon the last group of measures – namely external reporting measures. Profits, capital values, revenues, values of partly finished goods are all examples of measures that may be categorized in this group of measures. We will focus all attention on measures that indicate firm size. Hence it is measures within the last group we will put our focus.

2.3 Product Development, High Performance and Interdependency

A company in the capitalist economy would not undertake any innovative activities unless its economic benefits were threatened from another 'player', there were some expectations of returns related to the innovative behavior or both of these incentives were present. At the same time you may argue that a firm must have a high performance in order to be able to release resources for product development. This is the general realization that cause us to go into the analysis of the relationship between innovative behavior and the resulting pay-off and *vice versa*.

Just thinking about the complexity of the innovation system cause us to pose the question of the paper. The Chain-Link model(Kline and Rosenberg 1986) is a good example of the different forces surrounding the innovation process. Feedback loops, linkages, flow paths and so on gives you the feeling that product development is a costly affair. As if the costs of doing innovation wasn't intimidating enough Kline and Rosenberg(1986) emphasize that *innovation implies creating the new, and the new contains elements that we do not comprehend about the beginning and about which we are uncertain.* Not only may it be costly to do innovation but the outcome of the innovation may be very uncertain. But there must be some incentives of doing innovation. Especially when the innovation process is so complex, costly and uncertain.

Relating the product development to firm performance causes us to distinguish between three sources from which for example the extra revenue comes from when discussing product competition(Kerin et al. 1978):

- New consumers who were not previously buyers of the product type.
- Consumers of competitive brands.
- Consumers of an existing company brand who switch to the new or reformulated brand or product (Cannibalism).

By a yardstick it is more effective for the firm as such to capture consumers from the first and second sources. The third may not have a significant effect on

the firm specific data. It stands as a redistribution of income from one product to another. Even so, the third source may very well be coupled with a high performance. In the case of revenues it depends on the differences in prices relative to demand.

Introducing a new product may influence both demand and prices. As Dosi(1984) states analyzing the relationship between product development and economic performance at the microeconomic level demands some attention on the effect of product development on prices and margins. Introducing a new product on a market may result in a temporary monopoly-like position. One may argue that the demand function for the 'new' product is defined by its technological features. How long the firm enjoys this monopoly like position depends on the specific industry to which the firm is associated. Hence the technological set-up as such. When the firm has introduced a 'new' product on the market it faces three alternative strategies(Dosi 1984):

- At the beginning charge a monopolistic price and later on lower the price to a 'limit-pricing'[3] at the end of the lag interval with respect to imitators.
- Charge a 'penetration price' below the entry deterring level in order to pre-empt the market, 'go down the learning curve', and increase the margins only later when this strategy has built up additional entry barriers
- Charge the 'limit price' from the very start

How the firm performance changes after the introduction of a new product depends on which of the three strategies it chooses. The first strategy may increase revenues through the higher price while the second may increase the revenues as well as the level of employment through a higher demand and hence a higher production. Assuming that the last option will raise the demand it will have the same effects as the second. Not to the same degree though.

Considering the effects of the different strategies, substitutability between the 'new' product and already existing ones, plays a decisive role. It concerns how monopoly-like the firm power is after the introduction of the new product. Therefore it may prove important to distinguish between innovation and imitation. The argument is that innovations aren't that substitutable while an imitation has a rather close substitute on the market. An imitator does not enjoy the same monopoly-like position as the innovator do. Hence we would expect innovators to do better than imitators when looking at the problem in a price/profit relation.

Trying to link the performance of the firm to its product development is a rather risky analysis. The time where firms were small businesses with a single product on the market is over. Today many firms may be termed multi product firms. These firms are large corporations that has more than one product on the market. They have a whole portfolio of products competing on the market. The result is that the product in which they have been innovating may be of small importance compared to the many activities of the firm. The effect of the product development may drown in the performance of one of the many other activities the firm has. Having noted this we must also remember that the larger firm with the handful of products has spread its risk to a degree that enables

[3]The limit price is a the price just below the cost plus a minimum profit for the potential entrant.

them to find external funding for risky projects. Small single-product firms may have a disadvantage in this respect(Sutton 1998). Hence we would expect larger firms with more than one product to have a higher product development rate and therefore also do better in a performance sense.

Also we must acknowledge that there are many other conditions internal as well as external to the firm that has a significant effect on its performance. As John Sutton(1998) writes *two firms with rivals products of equal clinical performance may achieve widely different results in terms of sales and profitability if they differs greatly in the size of their sales networks.* This is only one example of a range of conditions that may have a significant effect on the empirical tests of section 5.

Yet another perspective that may seem important is the market structure. A firm facing a highly concentrated market would not have the same incentive in a consolidation sense as a firm operating in a market with a high degree of competition. In order to survive in a competitive market a firm must participate in the innovative process (Schumpeter MARK I). On the other hand you might argue a monopoly would innovate as a way of keeping the entry barriers high. As technological progress is cumulative the technological barrier becomes a weapon of market consolidation. Also the monopoly has accumulated resources so it is able to innovate (Schumpeter MARK II).

It may not be product development that influences the performance of the firm. It may be argued that firms with a high performance also has the resources to conduct innovative activity and hence has developed their products. It is more probable that the causation goes both ways. That the variables are interdependent. We will pursue this way of thinking in our statistical analysis.

In order to make sure the firms are treated fairly we will have to distinguish between industries. Industries has different characteristics and follow different growth paths. If a firm are associated with a industry that are in a boom it will for certain look good compared to firms associated with an industry in a recession. Also industries differs in relation to the normality of doing product development. In some industries product development is a common feature while in others it is quite unheard of. As a consequence we most take industrial differences into account.

There are many ways of taking industry differences into account. One way of doing it may be to use the Pavitt Taxonomy. Pavitt(1984) divided all manufacturing firms into four different categories - Supplier Dominated, Scale Intensive, Specialized Suppliers and Science Based. While Supplier Dominated and Scale Intensive firms are oriented in process innovation, specialized suppliers primarily concentrate their innovative efforts in product development. The Science Based firms combine their innovative activity to both conducting process and product innovations. Furthermore it is emphasized that it is the smaller firms that are innovative in the supplier dominated and the specialized supplier industries, while it foremost are larger firms that innovative in scale intensive and science based industries. This may prove to result in a negative correlation for some industries while positive for others.

Another way of looking at industrial patterns is by considering the *product life-Cycle model.* Some industries may be grouped into the *Early* cycle phase while others may be characterized as being part of either the *Growth* or *Mature* cycle phase. One of the intriguing features that may prove important in a paper handling product development and economic growth in a microeconomic per-

spective is the difference in the speed of technological change. Industries in the early phase are characterized by rapidly changing technology while there are few innovations of importance in industries which may be grouped into the mature phase. The Product Life Cycle theory is also relevant in the present context due to the implications of market structures and price elasticities(Freeman and Soete 1997). It is, however, problematic to categorize the industries into the cycle phases. it demands a highly disaggregate level of analysis and some fairly complex calculations[4]. Unfortunately the database used does not consists of a disaggregated level of industry codes that justifies categorizing the firms into the cycle phases.

3 The Model

Acknowledging that there are an interdependence between product development and the firm performance exclude the traditional OLS regression technique. In order to use OLS we must make sure that the error term and each explanatory variable are independent of each other. If such a correlation exists the OLS regression estimation program is likely to attribute the particular explanatory variable any variation in the dependent variable that are actually being caused by variation in the error term. This problem causes a bias in the estimates. To solve this problem we apply the variables into a simultaneous equations system and apply a OLS method that helps mitigate the bias of the estimates. Three-Stage Least Squares are such a OLS method.

We apply the methods to the following equations system:

$$P = \alpha_0 + \alpha_2 PD + \alpha_j \overline{X}_j \tag{1}$$

and,

$$PD = \beta_0 + \beta_2 P + \beta_i \overline{Z}_0 i \tag{2}$$

PD denote the product development of the firm while P denotes firm performance. $\overline{X}_j$ and $\overline{Z}_i$ are explanatory variables for each of the regression equations arranged in vectors. The regression analysis for the two variables are simple linear regressions.

In this paper we will define the vectors, hence the exogenous variables, as:

$$\overline{X}_j = [Cap.Inv.] \tag{3}$$

and,

$$\overline{Z}_i = [Mark.Comp., Educ.] \tag{4}$$

We have 3 different exogenous variables which amounts to 5 parameter estimates all in all (two α and three β parameters). Concerning the exogenous

[4]To see an example of categorization of industries into the cycle phases see e.g. Dijk(2000)

variables used in equation 1 - $\overline{X}_j$ - we have chosen to control for firm capital investments.

Concerning the vector $\overline{Z}_i$, the exogenous variables related to equation 2, we have chosen to control for changes in market competition as well as the degree to which the employees in the firm have a high education.

By including these control variables in equation 1 and 2 we limit the chance of the significance between the two variables of interest to be artificial. Hence we increase the probability that the regression statistics of the main variables are valid. Also by using a equations system to handle the relationship between the two variables we are able to test whether or not the relationship is interdependent as suggested.

4 The Data

Three datasets has been combined in order to do the computations. First Accounting Statistics provided by the Danish Statistical Bureau has been used. This has been combined with a dataset formed on the basis of a questionnaire send out to 4000 firms of which 1901 answered back. The questionnaire survey was part of the Danish DISKO project[5]. The Statistics has been updated which has resulted in a decline in the number of observations. Due to exits, mergers and acquisitions the number of observations has dropped to 1544 firms. The last database used are the IDA database which consists of labor market data. It's the level of education of the employees of the firm that demands this database to be included.

The questions used from the DISKO survey concerns whether or not the firms have introduced new products or services during the period 1993-95[6]. It is emphasized that smaller improvements of the existing products does not count. If the firm has acknowledged that it has introduced a new product or service during the period, the follow up question concerns whether or not there is a similar product on the international or the Danish market[7].

These questions are the foundation of making a variable describing the product development behavior of the firms analyzed. If a firm has answered 'No' concerning product development the firm is characterized as Static. If the firm confirms it has been product innovative and acknowledges that there are a similar product on either the international market or the domestic market we will refer to the firm as an Imitator. Last but not least we will call the group of firms that has introduced a bran new product both on the international and Danish market Innovators.

Three sorts of firm performance measures are discussed.

- Firm Revenue
- Number of Employees in the Firm

[5]For a copy of the questionnaire look in the Appendix of the paper by Allan Ns Gjerding and Reinhard Lund(December, 1996). The paper may be downloaded from the DRUID homepage: http://www.business.auc.dk/druid

[6]Such a survey refers to technological outputs. It refers to the direct outcome of a possible R&D process. You may postulate that this way of measuring the innovativeness of firms are faulty. But nevertheless it is a fact that there are a correlation between the inputs and outputs of innovation when it comes to the manufacturing sector(McLean and Round 1978)

[7]The question are label 20 and 21 in the questionnaire

- Firm Value Added

Each of them tells different things about the company in question in a performance sense. But together they bring fourth a rather complete picture of the firm performance in a general sense.

As may be seen from table 1, 575 of the firms in the DISKO survey may be attributed to the Manufacturing industries. The observations are rather evenly distributed between the Pavitt industries. The smallest industry is the Science Based with about 18% of the observation, while the Supplier Dominated and the Scale Intensive industry accounts for about 28% each.

Looking at Product Development we can see that only 10.0% of the firms may be categorized as Innovative, while 54.2% may be described as Imitative. This leaves 35.7% as being either. Considerable differences exists between industries. Relatively speaking it is especially Scale Intensive firms that has proven Innovative with nearly 20% of the firms. But Specialized Supplier firms are second with 13.5% of the firms. This confirms the Pavitt taxonomy which proclaims that it is the industries categorized as Specialized Suppliers or Science Based that commits themselves to product development. Also it may be argued that the highest rate of technical change in general are done within the Science Based industries which is confirmed by table 1 indicating that only 25% of the Science Based firms may be categorized as not Innovative. On thing that may look a bit surprising is the fact that only 35.7% of the firms in industries that are categorized as Supplier Dominated are not Innovative. We would expect this industry to be the least innovative of the four pavitt industries.

Concerning the question about competition we may conclude that most of the firms have experienced an increase in competitiveness. 82% of the firms has confirmed a higher degree of competition in their own market. Looking at the differences across industries it is the Specialized Suppliers that differs from the others. About 76% of the firms has found competition to have increased during the period in question. In the other industries it is between 82% and 86%.

One thing we should be aware of is the number of observations in each category of variables. Especially the observations concerning the competition variable has a fairly alarming distribution. This could lead to a problematic basis for conclusions.

5 Results

Viewing the regression results in table 2 gives rise to considerable reflections concerning the theories used. Not a single one of the results gives a significant estimation of the Product development parameter. Two things may be concluded from this. Firstly we may conclude that Product development has no effect on the performance of the firm. This is directly opposite the theoretical considerations. Secondly we may conclude that the correlation between product development and firm performance isn't strong enough to carry the interrelatedness. We can see that the performance parameter estimate is highly significant. Especially when all observations are used in the regressions. This might indicate that the correlation foremost is from performance to product development rather than the other way around. This is not to say that the causation from product development to performance does not exists. It would be

Table 1: Key Industrial Data Values (Preliminary)

	All	Sup. Dom.	Sca. Int.	Spe. Sup.	Sci. Bas.	Missing
General						
Number of firms	575	159	160	141	103	12
Percentage	100%	28.24%	28.42%	25.04%	18.29%	2.09%
Product Development						12
None	201	65	66	44	26	
Percentage	35.7%	40.9%	41.3%	31.2%	25.2%	
Imitation	305	84	77	78	66	
Percentage	54.2%	52.8%	48.1%	55.3%	64.0%	
Innovation	57	10	17	19	11	
Percentage	10.1%	6.3%	10.6%	13.5%	19.3%	
Competition						24
Decreased	8	3	2	2	1	
Percentage	1.5%	2.0%	1.3%	1.4%	1.0%	
Not Changed	90	23	22	32	13	
Percentage	16.3%	15.1%	14.0%	22.4%	13.1%	
Increased	453	126	133	109	85	
Percentage	82.2%	82.9%	84.7%	76.2%	85.9%	
Performance(Revenue)						5
Number of Observations	570					
Mean	354998					
Standard Deviation	1539663					
Performance(Employees)						5
Number of Observations	570					
Mean	265.5					
Standard Deviation	699.8					
Performance(Value Added)						5
Number of Observations	570					
Mean	137357					
Standard Deviation	420142					
Educational Level						
Number of Observations						
Mean						
Standard Deviation						
Capital Investment						
Number of Observations						
Mean						
Standard Deviation						

nice if we could just attribute the lack of significance in relation to the product development estimates to a high speed of technological change. But this would probably only be valid if this result was restricted to the firms in Science based Industries.

With respect to the education variable the significance seems to be rather limited. Analyzing employment as a performance it is only in the Supplier Dominated industries some significance exists. This correlation if positive. Concentrating on either value added or revenue as performance measures it is only in the Scale Intensive industries the educational variable becomes significant. This time the correlation is negative. A result that seems a bit odd.

Another result that seems quite interesting is the capital investment results. All parameter estimates of the capital investment variable seems to be highly significant. Only the firms in industries categorized as Supplier Dominated seems to exhibit insignificant values. And that is only when analyzing revenue and value added as performance measures. When looking over all the estimates of capital investment, it is most significant when regressed on employment as a performance indicator. This might indicate that it is necessary to combine new capital with new labor or the other way around.

The competition variable indicates that there in general seems to be a positive correlation between the degree of competition and product development. The more competition, the more product development. The industry specific estimation indicates something else though. It is only in the Specialized Supplier industries we find a significant positive causality. in the other industries the estimate does not even come near anything significant. Looking back at table 1 this may be attributed to the skewed distribution of the observations concerning the experience of competition.

6 Discussion

The method of simultaneous regression analysis did not give us the results we had expected. The interrelatedness between firm performance and product development didn't show up in the estimates. While the performance measure was highly significant in explaining product development, the reversed causation was far from existing. We must be somewhat careful to conclude this is to say it doesn't exist. We may argue that the high degree of significance in the first equation has some saying concerning the lack of significance in the second. It goes to show that the interrelatedness isn't as strong as one might think.

Concerning industrial differences we did find some results that supported the Pavitt taxonomy. It seemed that it was firms associated with Science Based industries that was the most innovative all in all. Also we could confirm that it was the firms from the Science based and Specialized Supplier industries that relatively had the highest number of product innovating firms. Regression wise the results for the industries was somewhat different. Firms located in Supplier Dominated industries seemed to be the ones that fitted the model the least. Another industry specific interesting result was that the firms in the Specialized Supplier industries was the only ones showing a significant result concerning the degree of competition in relation to product development. We did highlight that this could be explained by the less skewness in the distribution of the observations.

Table 2: Regression Results (Preliminary)

	All	Sup. Dom.	Sca. Int.	Spe. Sup.	Sci. Bas.
Performance=Revenue					
Number of Observations Used	232	76	68	51	37
Intercept1	-1081974	-13334635	76947.96	-168262	-672038
Intercept2	⋆⋆⋆1.06	⋆⋆1.42	0.59	0.40	⋆⋆⋆1.57
Product Development	776908	8325125	14592	127488	422629
Performance	⋆⋆⋆2E-7	7E-8	⋆⋆1.6E-6	⋆1.8E-7	6.8E-7
Educational Level	0.65	1.86	⋆-7.58	4.12	-0.82
Capital Investment	⋆⋆⋆16.71	19.10	⋆⋆⋆17.13	⋆⋆⋆13.62	⋆14.90
Competition	⋆0.21	0.06	0.30	⋆⋆0.47	0.07
Performance=Employment					
Number of Observations Used	232	76	68	51	37
Intercept1	-250	-3136.55	193.83	37.07	-321.68
Intercept2	⋆⋆⋆1.00	⋆⋆⋆1.29	0.39	0.35	⋆⋆⋆1.51
Product Development	205.18	1975.07	-41.53	4.48	231.14
Performance	⋆⋆⋆0.0001	0.0001	⋆⋆0.0022	⋆0.0001	⋆⋆0.0007
Educational Level	0.44	⋆⋆5.01	-8.51	3.50	-0.92
Capital Investment	⋆⋆⋆0.02	⋆⋆⋆0.02	⋆⋆⋆0.01	⋆⋆⋆0.02	⋆⋆0.015
Competition	⋆⋆0.24	0.10	0.34	⋆⋆0.49	0.09
Performance=Value Added					
Number of Observations Used	232	76	68	51	37
Intercept1	-270401	-2754411	117990	-53466	-64491
Intercept2	⋆⋆⋆1.03	⋆⋆⋆1.34	0.40	0.38	⋆⋆1.41
Product Development	196286	1720058	-40908.17	45157	60554
Performance	⋆⋆⋆4E-7	2.30	⋆⋆4.2E-6	⋆3.3E-7	⋆⋆1.6E-6
Educational Level	0.76	3.91	⋆⋆-9.32	3.85	-0.93
Capital Investment	⋆⋆⋆8.23	9.54	⋆⋆⋆7.86	⋆⋆⋆7.62	⋆⋆⋆7.58
Competition	⋆⋆0.23	0.08	0.35	⋆⋆ 0.48	0.12

⋆: Significant at a 10% level.
⋆⋆: Significant at a 5% level.
⋆⋆⋆: Significant at a 1% level.

In terms of the different measures of performance the results did look a lot alike. The employment data did however show the best results in a general sense. This was most noticeable in the regressions of the firms in Supplier Dominated Industries. Finally it should be emphasized that capital investment seemed to be high correlated with all the performance variables. For the Supplier Dominated only the employment performance measure were correlated. We attributed this to the possibility that an increase in the capital stock demands some extra employees. Said in another way we may conclude that capital equipment and employees are seen as compliments.

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