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A quantitative analysis on the effect of firm and project characteristics in FHF funded R&D projects

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Understanding project success in a behavioral additionality perspective

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A quantitative analysis on the effect of firm and project characteristics in FHF funded R&D projects

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Abstract

Spending more than 200 million NOK annually on innovative research and development projects, FHF is a primary provider of funds for projects in the seafood industry. Being entirely financed through a tax levied on all Norwegian seafood exports, FHF has a responsibility to its stakeholders in ensuring return on investment in the projects it takes on.

«Fra virkemiddel til verdi, hvordan få mer verdiskapning ut av marin FoU? » is a primary study done on projects in FHF, providing us with data and projects to examine. Examining this secondary data and with theory as a basis, we have used quantitative analysis to answer two fundamental research questions concerning innovative FHF projects;
Can firm characteristics estimate project success in a behavioral additionality perspective?
Can project-related factors estimate project success in a behavioral additionality perspective?

Our findings are in line with the existing theory; we are unable to find indications that firm characteristics offer any insights into project success. However, project-related factors are highly significant and exact. If the project has a foundation anchored firmly in an industry tradition, it is much more successful.

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Preface

This journey marks the end, not only for our work with this thesis in particular, but it also marks the end of our current occupation. Being a student at the innovation specialization at the UiS business school has been a rewarding and challenging undertaking, and this thesis is an excellent way to end it.

We would like to thank our teachers, the staff, and our advisor for this thesis, Ragnar Tveterås. We are very grateful that he let us use his research as a base for our studies, and that he willingly shared his datasets and rich literature library with us.

Those closest to us deserve a medal. Without the continued support from our families, this would have been a much steeper mountain to climb.

Elisabeth Nakken Jon Gjerstad

Stavanger, 14/08/18

1.0 Introduction

In this thesis, we will explore our research problem – *"Understanding project success in a behavioral additionality perspective"* through two specific research questions:
Q1: Can firm characteristics estimate project success in a behavior additionality perspective?
Q2: Can project-related factors estimate project success in a behavioral additionality perspective?

While examining project success in this perspective, we divide success into success for the firm and success for the industry. We propose 13 propositions based on theory and previous literature relating to firm characteristics and to project-related factors to see if the theory applies to the data we have on FHF funded projects. These propositions with relating hypotheses are tested in a quantitative analysis.

Our main source of data is from a larger FHF project that was finished at the end of 2017. Our dataset consists of a web survey where participants of previous FHF projects report their satisfaction with the project and its execution. Furthermore, they rate the impact of participating in such projects using several parameters. A derivative from the primary goal of the project from which we received our data, was to propose measures based on new knowledge about the extent and ways in which public R&I instruments trigger growth in the knowledge base and knowledge networks in the private marine sectors. Being part of the concept of behavioral additionality. This is where we got our idea. However, we want to examine the success of the firm and the industry in a behavioral additionality perspective, by investigating the characteristics of the firm and project-related factors.

There is a long existing tendency that few private firms invest in R&D and innovation, explained by investments being viewed as a risky process with uncertain outcomes and benefits often belonging far into the future. These possible benefits again, usually provide more benefits for others, than the innovator itself. This follows the argument by Arrow (1962) about positive spillovers, non-appropriability, and uncertainty creating under-investment in R&D, comparing to the socially optimal level. The rationale for policy intervention has been a result of the market failure perspective. Examining investment in R&D for the marine sector in Norway, this is where FHF comes in.

FHF is short for the Norwegian Seafood Research Fund and has been a public administration body subject to the Ministry of Trade and Industry since the 1st of January 2014 (FHF, n. a). The support offered by FHF involves grants – providing financial support for a given project (Velvåg, 2005). Such support offers opportunities for projects to be carried out at a lower cost to the recipients than otherwise. What is unique about FHF as a research fund is that the industry itself fully finances it through an imposed R&D fee on all export of seafood. This makes FHF funding different from other public funding. We propose that the fee imposed on the industry lead to high expectations regarding the planning, running, execution of, and instruments employed by FHF projects. Due to these factors, we find it interesting to examine success in a behavioral additionality perspective for FHF projects, in specific.

The effects of behavioral additionality can be expected to last after the period of R&D and to be incorporated into the capabilities of firms (Georghiou, 2002; in Gök, 2006), making this an essential part of the funding. FHF invest over 200 million NOK in R&D investments, annually (IRIS, 2018). Such extensive use of resources means that the marine sector and society demand that marine R&D investments yield high returns in the form of increased value creation.

This thesis offers a new perspective on behavioral additionality by examining success relating to that of firm characteristics and project-related factors. Potentially, such knowledge can be used as an internal policy tool for FHF and provide useful for firms participating in FHF projects.

The structure of the remainder of the thesis is as follows: first, we give an overview of economic theory and the rationale for public funding of private R&D where we categorize FHF projects as collaborative research projects. In the third section, we briefly explain the system of public funding of R&D in Norway and puts it into context to FHF. Section four presents previous findings on behavior additionality and our methodology are explained in chapter five, where we explore such topics as research design, data collection, secondary data and present a critique of research approach and method. In chapter six we present our data, whereas our findings are highlighted in chapter seven. In chapter eight we discuss and analyze the results that are interesting and important while the limitations of our research are presented in chapter nine. In chapter ten we present further research, and the finishing chapter concludes.

1.1 The Norwegian Seafood industry and FHF

In 2015 the Norwegian seafood exports increased to a new record of 74.5 billion NOK (Tveterås, 2015). Due to a weak currency and an increasing demand for seafood in import markets. The most recent figures show investments of around 5 billion NOK in marine R&D in Norway, where FHF represents well over 200 million NOK in R&D investments (IRIS, 2018).

The challenges facing the seafood industry justify such substantial investments. For example, salmon farming has rising production costs driven by major biological struggles to increase production (Tveterås, 2015). Furthermore, Tveterås (2015) underlines that there are demanding customers in exports markets demanding distribution and products that the industry difficulties delivering.

Common to the challenges the industry is facing, is a requirement for new research-based knowledge which in turn firms would need to take the use of for innovating on production processes and products (Tveterås, 2015). The question, however, is whether the industry and the society will get a sufficient return on this R&D resource use. This question is investigated in the FHF project – *"Fra virkemiddel til Verdi- Hvordan få mer verdiskapning ut av marin FoU?"*.

A more detailed description of the industry and FHF is presented in chapter three.

1.2 The FHF project

The FHF project of concern is the project mentioned above: *"Fra virkemiddel til Verdi- Hvordan få mer verdiskapning ut av marin FoU?"*. We build our quantitative analyses on a dataset in which was provided by one of the web surveys conducted by the members of the research team of this project.

Professor Ragnar Tveterås led the project, and it lasted over two years, from the 1st of January 2016 to 31st of December 2017. The project had a total budget of 6 million NOK.

The work was carried out by the Innovation Center (UIS/IRIS) with a budget of 3.4 million NOK, Nofima (budget: 1.5 million NOK) and SINTEF Ocean (budget: 1.1 million NOK) (FHF-901190, n. a). The project was organized with UIS-IRIS as a leading research environment, and with Nofima and SINTEF Ocean as subcontractors of research (Tveterås, 2015).

The following researchers contributed to the project:
Professor and Center leader Ragnar Tveterås
From IRIS: Anne Marthe Harstad and Katja Maria Hyde
From IRIS-UIS: Ann Karin Tennås Holmen and professor Rune Dahl Fitjar
From Nofima: Geir Sogn-Grundvåg, Bent Dreyer, Gøril Voldnes and Audun Iversen,
From SINTEF Ocean: Tom Ståle Nordvedt and Signe Sønvisen

Furthermore, the project had a reference group consisting of Kjell Emil Naas (Research Council), Berit Anna Hanssen (FHF), Hans Petter Næs (FHF) Kristian Prytz (FHF), Petter Ustad (Innovation Norway).

The background of the project was a request by FHF to identify opportunities for securing and increasing, utilization and application in the field of marine research (IRIS, 2018). The primary goal of the project is to identify opportunities to increase the value added in the seafood industry of R&D through research-based knowledge to a greater extent by companies in their innovation process (Tveterås, 2015; FHF- 901190, n. a.). This would apply to FHF investments in particular, but also to other marine research (FHF- 901190, n. a.; IRIS, 2018; Tveterås, 2015).

According to Tveterås (2015), there has never been spent more money on research as today. To find the correct priorities for such a massive resource use is argued by Tveterås (2015) to be one of the most difficult issues that concern the industry. Because of this, he argues for an open discussion of the conditions that impede the ability to create value from research and believes that his project will provide a knowledge base that prevents discussions from being made up by just guessing. In such an event, it can help to bring us some steps towards the knowledge-based seafood industry, Tveterås presides (Tveterås, 2015).

In an interview with the managing director of FHF, Geir Andreassen, conducted by Sundnes (2016), he argues that the project will give a professional reason for how to best organize research so that business operators can use the results in their own business. He further states

that it is necessary to develop research deliveries that meet the company´s prerequisites for putting the knowledge into use, which he believes the project can provide.

Our focus is on the part of the project that concerns FHF only.

1.3 Research problem

The research problem of this thesis is stated as: *"Understanding project success in a behavioral additionality perspective."*

We are going to address this research problem by conducting a quantitative analysis based on FHF funded R&D projects. FHF projects are considered to be collaborative research projects. Therefore a behavioral additionality perspective based on these projects is appropriate. We want to test whether firm characteristics and project-related factors can estimate success in a behavioral additionality perspective. In light of this, our research questions are:

Q1: Can firm characteristics estimate project success in a behavior additionality perspective?

Q2: Can project-related factors estimate project success in a behavioral additionality perspective?

By available data and theory on behavioral additionality, we will construct a success factor that we will test against previous FHF projects to broaden our understanding of our research problem. Furthermore, we will divide such success into that of the firm and that of the industry, seeing as they have diverging goals. Our aim with this study is to provide new knowledge that can be of benefit to FHF, the seafood industry and to the firms in this sector.

1.4 Literature review

There has gradually been published a considerable amount of research literature on the effects of public policy to stimulate R&D and innovation in firms. Studies of various forms of collaboration stimulating R&D and innovation, including public R&D programs, is found in

such literature. For example, Cunningham and Gök (2012) provide a comprehensive study of research literature that analyzes effects of public policy use with a focus on enterprise´s own funding (input additionality), knowledge capital and knowledge network (behavioral additionality) and innovation (output additionality).

Other examples of research on publicly funded R&D projects include Aschhoff, Fier, and Löhlein (2006) conducting an empirical study on the impact of public R&D funding on firms in Germany with a focus on collaborative behavior. The researchers base their data on German CIS data and a supplemental telephone survey. The finding is that R&D is valuable regarding linking science into industry R&D partnerships. However, their bivariate probit analysis shows that newly initiated R&D collaborations are less likely to be continued after the funding has ended, in comparison to if the collaboration already existed before the funding.

Furthermore, Constantopoulos et al. (n. a.) examine the innovation effects and determinants of these effects on a project financed under the Fifth and Sixth Framework Program (FP) to the EU. The researchers estimate econometric models of 649 corporate observations, with product innovation and process innovation as dependent variables. They include as explanatory variables characteristics of the project and characteristics of participating firms. The finding is that companies participating in the projects have positive innovation effects, depending on the company´s capabilities and characteristics of the project. Our thesis alike makes the use of project and firm characteristics, however, in examining the effects, these have on project success in a behavioral additionality perspective both for the sake of the firm and for the industry.

Since Georghiou and colleagues invented a more explicit concept of behavioral additionally, in 1995, behavioral additionality has received a considerable amount of scholarly and policy attention (Pérez, 2016). The OECD project (2006) conducted studies to evaluate behavioral additionality in their programs, marking the growing importance of the concept (OECD, 2006; in Gök and Edler, 2012). Nevertheless, most empirical evaluations have focused on input and output additionality to a higher degree, in addition to the collaborative aspects being more or less overlooked due to public funding (Aschhoff et al., 2006).

Most of the existing literature on this topic, also referred to in Cunningham and Gök (2012) uses survey data in the assessment of behavioral additionality (see, e.g., Georghiou, 2004, 2007;

Clarysse et al., 2004; OECD, 2006; in Pérez, 2016). Fewer studies have used more detailed data on publicly funded R&D projects. However, interviews have been increasingly accepted amongst evaluators assessing behavioral additionality, see for example Clarysse, Bilsen, and Steurs, 2006; Malik, Georghiou and Cameron, 2006; in Perez, 2016).

Furthermore, Pérez (2016) proposes a methodology for evaluating behavioral additionality of a publicly supported policy instrument designed to obtain collaboration between firms and universities. He found ways in which the Case-Based Method and the Theory-Based Evaluation (TBE) each could be used as potential research designs for evaluating behavioral additionality effects, however in qualitative studies. This thesis builds on the survey data collected from projects that have received funding from FHF and takes a quantitative approach to the issue.

2.0 Collaborative R&D funding

This chapter starts by categorizing FHF projects as collaborative research projects, following up with theory belonging to collaborative research in order to create a better understanding of the rationales for collaborative R&D funding.

Included in this chapter is a presentation of the unique characteristics of R&D and theory regarding the financing of it. In the presentation, we touch on the terms market failure and absorptive capacity, in which spillovers are shown to be particularly critical. We aim to explain why R&D collaboration is important and the advantages of it, while also presenting some of the risks included with the process. Theory on public funding and collaborative research projects, along with universities and collaborative research, ends the chapter.

2.1 FHF as collaborative research projects

FHF projects of concern to this study are collaborative research projects. Hagedoorn, Link, and Vonortas (2000) define research partnership as innovation-based relationships that involve efforts in R&D. This definition follows from the Council on Competitiveness (1996) that defines partnerships as cooperative arrangements engaging firms, universities, government agencies, and laboratories to combine resources in pursuit of a shared R&D objective (Hagedoorn et al., 2000). Such projects typically involve one or more business partners with one or more public research institutions that are involved in a specific R&D project of intrinsic commercial value (Cunningham and Gök, 2012). FHF can be regarded as the public research institution in this case, while the business partners are the participating firms and institutions in specific projects. Collaborative research projects are usually co-financed by public grants of three to five year´s duration, which often covers the cost of the public research institute or the university, while the private firms tend to pay for their costs (Cunningham and Gök, 2012). Such description has similarities to the projects funded by FHF. For additional explanation see chapter three.

2.2 Characteristics of R&D

A widely held view is that financing R&D and innovative activities are challenging in a freely competitive market. Support for this possibly begins with the classic articles by Nelson (1959) and Arrow (1962), although the idea itself came from Schumpeter (1942). The idea is that the prime output of resources devoted to R&D is the knowledge of making new goods and new services (Hall and Lerner, 2010). Knowledge has characteristics typical of a public good as knowledge is nonrival; meaning that the use by one firm does not exclude someone else using it (Hall and Lerner, 2010; Spanos, Vonortas, and Voudouris, 2014). These traits make R&D different from any "ordinary" investments, e.g., in physical assets.

There has been empirical support for the point made by Arrow about positive externalities created by research, where most studies document social returns to R&D that is higher than the private level (Griliches, 1992; Hall, 1996; in Hall and Lerner, 2010). Economists recognize that the firm investing in knowledge cannot fully appropriate the returns on the investment to the extent that secrecy protects the knowledge. Overall this leads to an under-provision of R&D investment in the economy (Hall and Lerner, 2010). According to Aschhoff et al. (2006), a leakage of knowledge will increase social returns; however, this will reduce the private returns and prevent R&D activity in the long run.

Furthermore, in the event that R&D could create high social returns without covering the private costs, market failure occurs, while the level of R&D activities in the economy will be lower than what is desirable on a social level (see Levin et al., 1987; Adams and Jaffe, 1996; Mathews, 1996; in Aschhoff et al., 2006). Implying that firms have limited incentives to invest in R&D due to the public-good characteristics of knowledge (externalities), while potential external investors can be hesitant to finance R&D projects because they have less information about the expected returns than the firms (asymmetric information). Such impacts suggest a market failure.

2.2.1 Market failure

The most common and essential market failures hampering R&D investments are externalities and information asymmetries (Hall and Lerner, 2010). Externalities occur whenever the activity

of one economic actor affect the activities of another in ways not reflected in market transactions (Hall and Lerner, 2010). While asymmetric information explains a situation in which the inventor has more information than the investor, leading to an imbalance in power, and can take the form of adverse selection and moral hazards problems (Hall and Lerner, 2010; Akerlof, 1970).

Adverse selection creates what is called a Lemons Market. In such situations, there is an increase in the cost of capital, and in the worst-case markets will be missed (Hall and Lerner, 2010; Akerlof, 1970). Furthermore, moral hazards problems imply a principle-agent problem where there are conflicting interests between, for example, the owners and the management of a firm. In such events, the shareholders may spend on activities that will benefit themselves, while reluctant risk-averse managers are unwilling to invest in uncertain R&D projects (Hall and Lerner, 2010).

Moreover, one can argue that market failure can characterize all aspects of knowledge creation and learning, not only those belonging to R&D investments. Tacit knowledge is primarily affected by market failure, but it also applies codified knowledge (Ernst, 2002). To commercialize an innovation profitably, a considerable amount of knowledge from industry players, customers, scientists, etcetera, must be gathered and understood. This task is believed to be more comfortable the more codified the information (Chesbrough and Teece, 1996).

Because of the more relaxed trade regimes and improvements in information and communication technologies, of the environment today, codified knowledge may travel the world with less friction (Bathelt, Malmberg and Maskell, 2004). This reduction in friction has sometimes led to the assumption that codified knowledge is almost instantly open to all firms at zero cost, regardless of location. In reality, however, codified knowledge is difficult to trade in a market because when information is imperfect, "externalities" diffuse and markets incomplete, free markets cannot in principle meet the strict requirements of optimal resource allocation (Stiglitz, 1998; in Ernst 2002).

Tacit knowledge, on the other hand, cannot be traded in the market and is argued to be a clear market failure (Lundvall and Borras, 1997; in Ernst, 2002). More diffuse and tacit forms of knowledge are claimed to be dependent on spatial proximity between actors involved (Bathelt et al., 2004). Moreover, since much of R&D spending goes to the knowledge base of a firm,

and to the extent that this knowledge is tacit, it will be embedded in the human capital of the employees (Hall and Lerner, 2010). Because of this, firms tend to smooth their R&D spending over time, to avoid having to lay off knowledge workers, since the firm will lose the knowledge created through R&D if they fire the employees, or if they leave the firm. Smoothing R&D spending over time implies that R&D spending often will behave as though it has high adjustment costs (Hall, Griliches, and Hausman, 1986; Lach and Schankerman, 1988; in Hall and Lerner, 2010). Companies, however, can be strategic about what and when they disclose, as they can protect their tacit knowledge by choosing to share the codified information only (Chesborough and Teece, 1996).

Policymakers have used matters of market failure to justify interventions like the intellectual property system, government support of R&D, R&D tax incentives, R&D grants, low-interest loans, and the encouragement of different types of research partnerships (Hall and Lerner, 2010; Czarnitzki, Ebersberger, Fier, 2007). The behavioral additionality concept, however, goes beyond the market failure rationale. Policies for behavioral additionality is viewed as a success only if it increases the capacities of participants that are necessary for innovation and performance, for example cognitive, networking, etcetera, that leads to determined effects (Gök and Edler, 2012).

2.2.2 Absorptive capacity and R&D investment

R&D does not only generate new knowledge but also contribute to a firm´s absorptive capacity (Cohen and Levinthal, 1989). Absorptive capacity represents the ability to recognize the value of new, external information, to assimilate the information and then apply the information to commercial ends (Cohen and Levinthal, 1989). It can act as a mediating variable between the environment of the firm and its organizational adaption (Bathelt et al. 2004).

For an organization to assimilate and use the new knowledge, it requires prior related knowledge (Cohen and Levinthal, 1989), explained by the more knowledge existing in a firm, the higher the incentive to learn. Such prior knowledge can be necessary skills or a shared language, or possibly the knowledge of the recent technical or scientific development in a given field. Hiring new workers, job rotation, or similar endeavors help achieve such diversity, which is critical (Cohen and Levinthal, 1989). Finally, the prior expertise of firms in particular areas

of knowledge will be an essential determinant of its absorptive capacity because this is critical for creating know-how (Mowery et al., 1996; Simonin, 1997; in Pérez, 2016).

Furthermore, if prior knowledge is a requisite for the field, the more critical R&D investments are. From this point of reasoning, collaborations will play a vital role because it opens up for firms to approach other firm´s capabilities. Furthermore, collaboration will spread the costs and risk of innovation (Mowery, Oxley and Silverman, 1996; in Pérez, 2016).

2.3 R&D collaboration and spillovers

The reasons to how and why firms engage in R&D collaborations and how the effects are on welfare have been questioned since the 1980s in economic literature (Czarnitzki et al., 2007). R&D is of great importance for firms; thus, they have to overcome, or at least try to mitigate the obstacles related to R&D. Going into R&D collaborations is one possible solution. According to Hagedoorn (2002), R&D partnerships have increased considerably since the 1980s and organizing R&D as collaboration is widely used today (Aschhoff et al., 2006).

The reasons as to why private firms are participating in research partnerships, following current theory and empirical evidence are, however, many. A common objective for firms partaking in such collaborations is to internalize positive spillovers among the collaborating firms and to improve the appropriability of the research results within the consortium. (Hagedoorn et al., 2000; Czarnitzki et al., 2007; Cunningham and Gök, 2012). There are two kinds of spillovers we can distinguish between: rent spillovers and knowledge spillovers (Griliches, 1992; in Hall and Lerner, 2010). Rent spillovers occur when purchasing an R&D-incorporated good or service at prices that fail to reflect their value. Such spillovers can transpire if there is imperfect price discrimination due to asymmetric information and cost of transactions, imperfect appropriability and imitation, or if there are mismeasurements of the real value of transactions because of a lack of hedonic prices (Hall and Lerner, 2010).

Knowledge spillovers, on the other hand, can occur when an R&D project creates knowledge that other firms will find useful when doing its research (Hall and Lerner, 2010). Some knowledge and benefits from R&D are not always kept within the firm because patent protection can be weak or incomplete, there can be the inability to keep innovation secret, and

issues related to reverse engineering and imitation (Hall and Lerner, 2010). An increase in knowledge spillovers is typical the more codified the knowledge is, and the higher the absorptive capacity of participating firms are. On the other hand, knowledge spillovers lay the foundation for additional knowledge creation and diffusion, and therefore the concept is very relevant for growth and development (Hall and Lerner, 2010).

An essential point about R&D collaboration is that participating firms will determine the degree of voluntary knowledge that is spread through the cooperating partners since they can agree on how much knowledge they exchange. As a result, firms succeed in obtaining a high level of knowledge flow into the firm and still manage to protect internal knowledge from leaking (Aschhoff et al., 2006), which is the kind of spillovers firms seek in collaboration.
The topic of social returns to R&D is closely related to R&D spillovers. Because from the perspective of the firm, spillovers can come from for example; R&D done by other firms in the sector, by firms in other industries, by public research laboratories and universities, laboratories, and governments in other countries (Hall and Lerner, 2010).

The idea about a division of labor being a device for developing knowledge created the foundation for Adam Smith´s theory of economic growth (Smith 1776; in Bathelt et al., 2004). Smith´s (1776) theory is that knowledge becomes more specialized as it develops, and this will lead to an apprehension of individual differences that quickly would be overlooked and thus contribute to an acceleration of the growth of knowledge. The idea is that a group of firms would be able to develop knowledge far beyond the reach of any single member of that group, as long as an appropriate differentiation is formed (Young, 1928; in Bathelt et al., 2004). For learning processes to take place, this means that the knowledge-bases of firms must be sufficiently different. At the same time, however, the cognitive distance should not become too vast, or the knowledge too dissimilar, because then interfirm learning tends to cease (Nooteboom, 2000; in Bathelt et al., 2004).

Moreover, Aschhoff et al. (2006) categorize other factors related to why firms cooperate, besides the motives related to knowledge spillovers, into two groups. The first is to overcome constraints related to own resources, for example, financial constraints that can hinder firms from undertaking innovation projects on their own. In such events, we can say that firms collaborate with each other to save transaction costs and to attain economies of scale and scope. Moreover, it can be to increase efficiency, synergy, and power through a formation of networks,

and to access external complementary resources and capabilities to exploit existing resources better and develop a competitive advantage. Also, it can be in order to create new investment options in a high opportunity, high-risk activity, and sharing the cost of R&D by pooling risk and co-opting competition (Hagedoorn et al., 2000; Czarnitzki et al., 2007; Cunningham and Gök, 2012). The second relates to characteristics of firms. For example, how is the firm structured, and in which industry does it operate. A common finding by studies is that the likelihood of collaboration increases with firm size (see Constantopoulos et al., n. d.).

2.4 Advantages of research collaboration

Advantages related to research collaboration emerge from different theories. There are mainly three perspectives that prevail in modern theoretical evaluations (Aschhoff et al., 2006). Following Aschhoff et al. (2006) we have the transaction cost theory, the strategic management theory, and the industrial organization theory.

In transaction cost theory firms choose to go into research collaborations with third-party users when it comes to their research results. These partnerships exist because of firms wishing to internalize the effects of positive external spillovers due to a lacking appropriability of R&D, describing such R&D collaborations as a hybrid form of organization between a market and a hierarchy for facilitating technological knowledge (Aschhoff et al., 2006).

In strategic management theory, when forming research partnerships, competitive reasoning is used. It focuses on defending a market position against competitors, together. Defending a market position can be done by strategic networking, where the terms economies of scale and scope apply, or by using a resource-based view of the firm to exploit capabilities that are of unique scale. Another possibility is using dynamic capabilities to combine the firms´ capabilities, or by forming a specific strategy for resources of new technologies for future performance (Aschhoff et al., 2006).

In the theory of industrial organization, researchers such as Katz (1986), Beath, Katsoulacos and Ulph (1988), De Bondt and Veugelers (1991), Kamien, Muller and Zang (1992), Motta, (1992), Suzumura (1992), Venortas (1994) and, Leahy and Neary (1997) relate decisions about whether to collaborative in R&D to spillover effects, and the effects on market performance in

relation to profits (Czarnitzki et al., 2007). The models rely on the fact that returns from R&D are not fully appropriable by firms, and that knowledge will leak out to competitors so that the social benefit is higher than the private return. Again, this leads to underinvestment of innovative activity, as mentioned earlier. Going into R&D collaborations is one solution to internalize such knowledge spillovers and thus increase the appropriability of returns within the research consortia (Czarnitzki et al., 2007).

In general, advantages following researchers and firms being brought together on a project are that they will easier overcome the division caused by distance and a smaller resource base, because different perspectives, experiences, skills and knowledge are brought together (O´Kane, 2008; in Cunningham and Gök, 2012). Observations in FHF projects where different firms and institutions collaborate with the aim of obtaining research and development highlight this. Furthermore, "specialist silos" and restrictive organizational boundaries will be broken down, and there will be a fostering of cross-disciplinary interactions. Such engagements will encourage knowledge transfer and is a preferred way of managing risks, according to O´Kane (2008), (in Cunningham and Gök, 2012).

2.5 Risks of research collaboration

Research collaborations inherently involve risks. O´Kane (2008) note that some risks of concern are that the outcomes of collaboration projects may not justify the time and the resources invested in them, while the number of resources that are required can be under-estimated or under-provided which will leave the collaboration to consume more than provisioned for (Cunningham and Gök, 2012). Furthermore, the collaboration can drift away from its original mission or purpose, and O´Kane (2008) argues that there is a reduction in flexibility rather than an increase, because the means for collaboration takes its own set of processes and procedures. Besides, since the nature of the collaboration is to work on something new, there can be a lack of experience in dealing with problems along the way.
Other models suggest three main issues concerning cooperative R&D; coordination, fee-riding and information sharing (Czarnitzki et al., 2007).

When firms coordinate, investment in R&D increases with the level of spillover effects, typically described through joint profit maximization models. Another result states that if the

spillovers are high enough, (above a critical level), cooperating in R&D will result in higher investments compared to if there were no collaboration (De Bondt and Veugelers, 1991; in Czarnitzki et al., 2007). The conclusion is that when firms are cooperating in R&D, the profitability of the firms will always increase. Furthermore, as a consequence, assuming spillovers are high enough, firms will have an increasing incentive to collaborate in R&D, which again should enhance welfare. In such models, however, the costs of coordination are usually not taken into account (Czarnitzki et al., 2007).

Furthermore, the issue of free-riding in collaborations may distort the stability of the cooperation. In such event, partners may choose to free-ride to obtain knowledge from their partners, while they are concealing their own (see, e.g., Shapiro and Willing, 1990; Baumol, 1993; Kesteloot and Veugelers, 1994; in Czarnitzki et al., 2007). In such cases, models find that for cooperative arrangements to be profitable and stable, it requires that involuntary spillovers not be too high. This finding is in contrast with the theory on coordination, where the profits increase the more significant the spillovers are. In this case, however, the profitability of collaboration will increase with the firm´s ability to manage the outgoing spillovers to protect against partner´s free-riding (Czarnitzki et al., 2007).

Lastly, by information sharing among partners the matter of managing spillovers is of concern (see, e.g., Kamien et al., 1992; Katsoulacos and Ulph, 1998; in Czarnitzki et al., 2007). Katsoulacos and Ulph (1998) find that research joint ventures will share at least as much information as non-cooperating firms because research joint ventures will maximize joint profits. Furthermore, absorptive capacity is also an issue for managing spillovers. Here, Cohen and Levinthal (1989) point out that incoming spillovers will be used more efficiently in reducing own cost if the firm is engaged in own R&D. Engaging in own R&D will build absorptive capacity, which as mentioned above is the ability of a firm to benefit from knowledge from others, created through R&D activity. Kamien and Zang (2000) have taken this into account and find ambiguous results for R&D investments (Cohen and Levinthal, 1989). However, collaboration is still argued to be the most profitable way to undertake this endeavor.

2.6 Public funding and collaborative research projects

To overcome market failures relating to R&D investments of firms, governments also, take action. Governments support and promotes research partnerships because of the benefits following economies of scope and scale and to internalize knowledge spillovers (Cunningham and Gök, 2012). The support is given to correct for market failures and to increase technological information exchange between firms, universities and public research institutes (Hagedoorn et al., 2000). In other words, governments choose to fund R&D because of the firm´s limited incentives to invest in the socially optimal amount of R&D (Hall and Lerner, 2010; Spanos et al., 2014). Their primary task is to lower information asymmetry and consequently increase social efficiency (Salmenkaita and Salo, 2002; in Pérez, 2016). Furthermore, governments have realized that collaborative projects can be too complex for a single actor and there is a need for providing a medium for the transfer of knowledge, following Cunningham and Gök (2012). According to Czarnitzki et al., (2007) direct subsidies for collaborative research have become a favored incentive scheme in European countries.

In the literature, there are reported three different behavioral additionality effects as a result of government intervention. According to Pérez (2016), these are; i) interventions generate what is called project additionality (see, e.g., Roessner, 2000; Ruegg and Feller, 2003; Shipp, Chang, and Wisniewski, 2005; OECD 2006). Subsidies impacting the characteristics of participating projects by changing their scale, scope or speed generate such project additionality, ii) subsidized firms experience an increase in cooperation as a result of public funding (see e.g. Arvanitis, Hollenstein, and Lenz, 2002; Hyvärinen, 2006; OECD, 2006; Hyvärinen and Rautianien, 2007; in Pérez,2016), and iii) effects on the risks related to conducting R&D (see OECD, 2006; in Pérez, 2016).

2.7 Universities and Collaborative research projects

Firms collaborate with universities in a desire to obtain leading-edge knowledge, infrastructure or services gathered by research. Such collaborations are undertaken to promote organizational learning and develop core competencies and capabilities, and therefore enhance competitiveness (Hagedoorn et al., 2000; Cunningham and Gök, 2012). In such events, firms can also identify potential future employees (Cunningham and Gök, 2012).

Citing research conducted by the Imperial College, Wilson (2012) argues that firms collaborating with universities may not advance the collaboration past the initial deliberations. The reasoning is that the needs of the firms fail to align with the mission or strategy of the university, and potentially a mismatch of time scale and capacity; the university will already have committed its resources and will not have the free capacity to match the needs of the businesses (Cunningham and Gök, 2012). There might also be a capability mismatch, as an HEI (higher education institution) may not possess the facilities, nor the skill sets to meet the needs of the businesses. Furthermore, there are financial constraints on the collaboration; since universities are unable to provide the services required at the price the company is willing to pay (Cunningham and Gök, 2012).

3.0 Understanding the Norwegian Seafood Research Fund (FHF)

This chapter starts with providing some statistics about the Norwegian expenditures on R&D, after that a brief explanation of the research and innovation system in Norway is presented to create an understanding about the system and how FHF fits in. This is further described while presenting the history of FHF in a following sub-chapter, which is part of explaining why FHF operate the way it does and the reasons behind its foundation. In the sub-chapter called *"Marine R&D and FHF"* further explanations of how the Fund (FHF) operates, its purpose and the organization of it, is presented.

3.1 Public funding of R&D in Norway

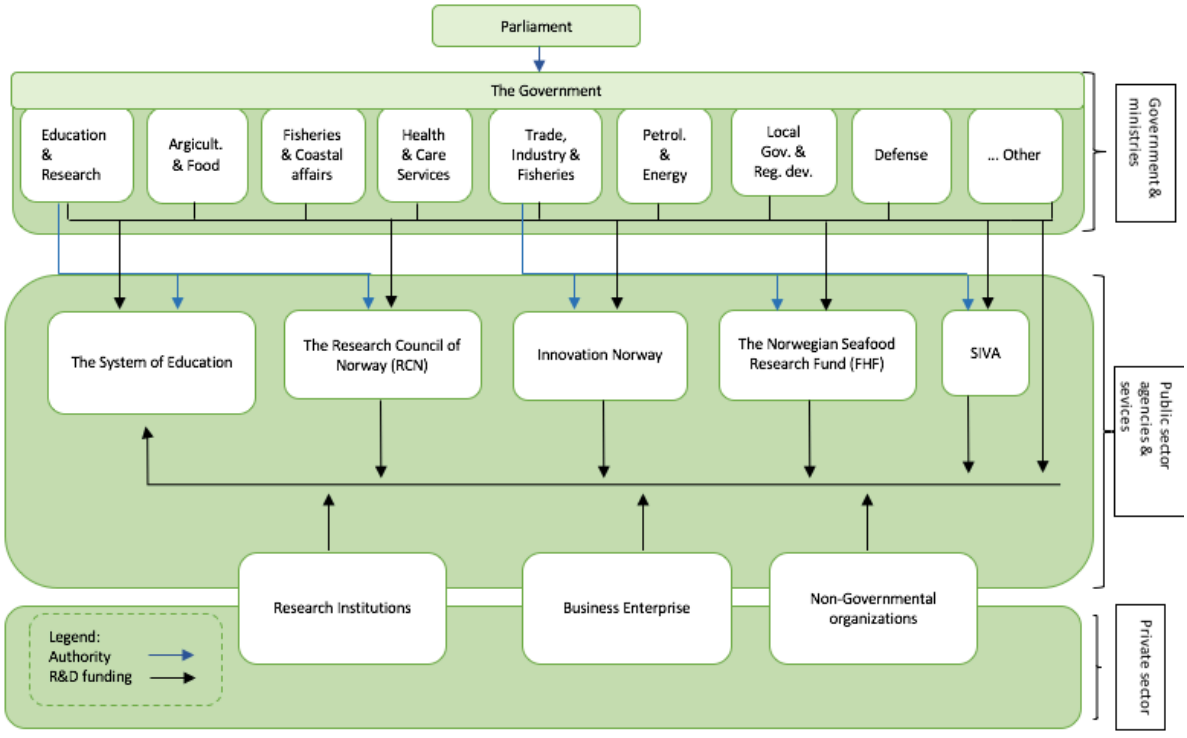

Figure 1 (NIFU, n. a.: in Fondevik et al., 2013) plus modified to include FHF

In 2016, the preliminary figures for the Norwegian expenditure on R&D were more than 63.5 billion NOK (NIFU, 2017). This sum represents an increase in R&D expenditure of about 3.3 billion in NOK from 2015, giving a real growth of 5.5 percent (NIFU, 2017), and a rise of 18 billion NOK from 2011 (Fondevik et al., 2013). The industrial sector represents almost half of

all R&D expenditures. However, such research is small compared to in other countries (Fondevik et al., 2013).

The research and innovation systems in Norway represents a large number of institutions holding different roles. It is normal to separate these into the political, the strategic and the executive level. Figure 1 represents some of the key players, in which we have included FHF to the original illustration made by NIFU. The figure is limited to include only those involved in research and research-based innovation. At the strategic level, there are fewer actors and greater coordination. According to Fondevik et al. (2013), a United Research Council is unique in an international context, and Innovation Norway also fills functions which other countries separate among several actors. At the operational level, on the other hand, there are a great diversity of higher education institutions and research institutes (Fondevik et al., 2013). While at the political level, the Ministry of Education and Research is the largest funder (Fondevik et al., 2013). This ministry is responsible for all education at college and university levels as well as basic research, both as grants to universities and as research programs in the Research Council of Norway (Velvåg, 2005). However, the government's responsibility and organization of applied, industry-oriented research follows a sector principle, in which each ministry must fund research within and for its sector (Fondevik et al., 2013; Velvåg, 2005). E.g., at the Ministry of Fisheries (supporting FHF) the focus is on fishery-and aquaculture-related research.

To acquire financial support for R&D from the government in Norway, and most European countries, a general condition applies; a firm or a group of firms shall be in charge of the project, and they must cover a cut of the total costs, typically 50 percent (Velvåg, 2005).
By providing access to equipment and premises, engaging test materials or committing person-hours and operational services to the project, the firms can cover all or parts of the cut.

3.2 The history of FHF

FHF became an administrative body under the support of the Ministry of Trade, Industry and Fisheries in 2014 (FHF, n. a), but was established already in 2001 (Velvåg, 2005). The history of FHF goes back to the mid-1990s. An agreement was reached between all branches of fisheries, the aquaculture industry, and the political authority in Norway that a strengthening of the national R&D efforts was needed (Velvåg, 2005). At this point, the industry demanded an

increase of the grant provided by the government in the National Budget, whereas the government statement was that the industry itself had to match additional grants by equity capital and own efforts.

The seafood processing industry in Norway comprises many small and medium-sized plants, and a majority of companies have less than 25 employees (Velvåg, 2005). A firm of such size typically has neither the economic capability nor the human capital to conduct projects by themselves. Therefore, it was not realistic for the industry itself to finance growth in R&D sufficient for the future need to maintain or strengthen industry competitive advantage (Velvåg, 2005). Instead, a levy of 0.3 percent of all seafood exports from Norway was introduced to be of benefit to all branches of the industry.

The conditions for approving such a levy were as following:

> *"The levy should be considered as the industry´s own money.*
> *Consequently, the levy should not be incorporated in the National Budget.*
> *The industry itself, through its federations and labor unions, should have the absolute right to decide on the use of money collected.*
> *The right to collect (and duty to pay) the levy should be regulated by law."* (Velvåg, 2005).

These conditions were something the Norwegian Seafood Federation (NSF), together with the Norwegian Fishermen´s Association and the Norwegian Fish Farmers Association put forward. Furthermore, it was important that this levy would not reduce any future grants from the government. The governmental funding of fishery research should, on the other hand, increase equally with the yearly sum of money gathered by the levy. Based on the agreed-upon framework, the law became effective on January the 1st, 2001 (Velvåg, 2005).

One of the earliest projects of the Fund proved to be very important for the Fund´s existence today. This project was about automation of the pin bone detection process in the filleting industry (Velvåg, 2005). The project started as a cooperative venture including three Norwegian research institutes, the Icelandic equipment company Marel, and Marel´s Danish subsidiary, Camitech, in addition to the filleting industry having a network called the "Fillet Forum" (Velvåg, 2005). Without funding from FHF, there would not have been any automation process, and without the research levies on exports, FHF would not have existed (Velvåg, 2005).

Furthermore, the work and collaboration in the established networks, under NFS, is said to be the reason as to why there existed levies on export under FHF (Velvåg, 2005).

3.3 Marine R&D and FHF

Marine R&D is regarded as "big business" in Norway. In 2015 the marine expenditure was 4.9 billion NOK (Tveterås, 2017). The costs for R&D in the marine sector has increased considerably more than the R&D expenditures for Norway in general. From 2005 to 2015 the marine R&D expenditure increased by 117.3 percent, while the increase in expenditures for R&D in mainland Norway was 68.2 percent, not considering the marine sector (Tveterås, 2017). Marine R&D is financed 55 percent by the public, while the firms themselves finance one third. Annually, there are investments of approximately 3.5 billion NOK in marine R&D in Norway (Tveterås, 2015). The most recent figures show an R&D expenditure of 5 billion NOK in marine R&D of which FHF accounts for 200 million NOK a year (IRIS, 2018). Furthermore, aquaculture represents one-third of the R&D expenditures, out of which the firms contribute considerably, according to Tveterås (2017).

Since January the 1st 2014, FHF has been a government agency under the Ministry of Trade and Industry (FHF, n. a). The Fund is financed in whole by the seafood industry through an R&D levy of 0.3 percent on all seafood export (FHF, n. a.). The research activity undertaken by FHF is pervasive and takes place in the public sector, in the instrumentation, and the business sector (FHF, n. a). The most common instrument for the FHF (and the RCN) are R&D projects conducted by research institutes, HEIs and private enterprises (Tveterås, 2015). Such R&D projects are in principle means to contribute to the production of new research-based knowledge that firms can use in innovation processes (Tveterås and Asheim, 2015).

The purpose of the Fund is *"to create added value for the seafood industry through industry-oriented research and development"* (FHF, 2017). In other words, the task of FHF is to make investments in industry-oriented R&D to endorse sustainable and cost-effective development in the seafood industry. The Fund works closely with the industry to make R&D strategies, establish and fund R&D projects, and to actively communicate results of the research (RCN, n. a). The benefits of the funding offered by FHF shall go either to the entire, or parts of the

industry (Velvåg, 2015). To achieve these goals, the funding is distributed as grants to research programs and large projects.

Furthermore, results which are in whole or partly financed by FHF shall be made available according to the rules that relate to projects receiving government support (Velvåg, 2015). Part of this occurs with the help of the Research Council of Norway (RCN, n. a). Moreover, to ensure strategic and operational coordination, and division of labor regarding funding, it is established in the by-laws of FHF that they must agree with the RCN (Velvåg, 2015). It is, however, FHF that evaluate the relevance of grant proposals for the industry and take the final decision about grant allocations. It is also FHF´s responsibility to follow up on the projects receiving funding (RCN, n. a).

The initiation of projects to FHF primarily occur in two ways. Either they are Action Plan Anchored, or they appear as suggestions (FHF, n. a.). FHF have action plans that are well-rooted in the industry, and most activities are sufficiently defined in the plans. The projects and facilities within these action plans are discussed in subject groups and in professional and other forums to ensure business anchorage. While the suggestions usually come from R&D institutions, from industry actors, from the supplier industry, or from another panel. One person never processes the input to FHF. First it is reviewed in an internal forum for assessment, and if the input is within specific objectives and strategy, it will be discussed further in the subject groups, before a final project is defined (FHF, n. a). In the vast majority of projects, a focus group consisting of industry actors is established to ensure the highest possible utility and implementation in the industry. When it comes to the choice of R&D institutions tenders are often used for finding the most suitable option. Furthermore, FHF has one goal when it comes to the selection of institution: professional weight, legitimacy, and cost/benefit evaluations offering the most significant possible benefit to the industry (FHF, n. a).

The organization of the Fund consists of a board of seven members and three advisory professions, while the activities and priorities of FHF are founded in law and regulations, overall strategies, and action plans (FHF, n. a.; Velvåg, 2005). The members of the board are appointed by the Ministry of Fisheries and Coastal Affairs, and consists of representatives from the industry (FHF, n. a). According to Velvåg (2005), the Norwegian Seafood Federation, representing the fishing industry, the fish farmers, and the seafood exporters, shall have three members. Furthermore, the Norwegian Fishermen´s Association shall have two, while two

members are appointed by recommendations from the Norwegian Confederation of Trade Unions. Moreover, such industry presentment is increased by three advisory professions comprising working actors in the industry (FHF, n. a).

4.0 Behavioral additionality

There are many different dimensions relating to the concept of behavioral additionality. Those dimensions that come naturally for this study are behavioral additionality as collaboration, as a modification of specific individual traits or personal attitudes, related to innovation, and as project additionality. These are three out of five dimensions that Pérez (2016) managed to reduce down to when examining reports on behavioral additionality.

Since the projects funded by FHF are R&D projects and falls underneath the term collaborative research projects, we want to examine what makes up the projects that are most successful in a behavioral additionality perspective. This success factor will be split into success for the firm and success for the industry and is made up by how firms rate themselves regarding increased knowledge, speed/ acceleration and how they view the collaboration between the participating actors in the project.

This chapter starts by providing theories explaining the concept of behavioral additionality, whereas the next step offers some previous findings belonging to the three groups of behavioral additionalities mentioned above. Following this, we present our research questions and propositions.

4.1 Understanding behavioral additionality

Input- and output additionality have for a long time been the conventional theories applicable to assessing the success of a policy. Buisseret, Cameron, and Georghiou (1995), however, invented the concept of behavioral additionality in 1995 to complement these two terms (Cunningham and Gök, 2012). Buisseret et al. (1995), reasoned that whether a firm is spending more on R&D as a result of public R&D grants (i.e., input additionality) or examining the number of outputs it created with the help of such support (i.e., output additionality) did not fully display whether a policy would succeed (Cunningham and Gök, 2012). The concept of behavioral additionality was introduced to help visualize the effects that were not captured, such as the effects generated when companies collaborate, or those related to R&D (Pérez, 2016).

The most general understanding of behavioral additionality defines it as the change in the persistent behavior related to R&D and innovation activities, meaning the change in what the target group of the intervention is doing and how they are doing it (Cunningham and Gök, 2012; Gök and Edler, 2012). Public R&D grants might, for example, induce changes in a firm´s strategy for R&D. According to Gök (2010) and others, the definition and the theorization of behavioral additionality need more work despite the increasing application of the concept in innovation policy evaluation and innovation policy design (Gök and Edler, 2012). The argument is that behavioral additionality is not yet fully matured while presenting different and sometimes conflicting perspectives of the concept in the literature (Gök and Edler, 2012).

Following the argument by Gök and Edler (2012), it continues to be a lack of theoretical basis and an accepted operationalization of the concept. According to an analysis by INNO-Appraisal, however, shows that when designing policy measures that foster networking and technology transfer, behavioral additionality is often used (Gök and Edler, 2012). This finding is consistent with firms´ needs for learning, networking, and cooperation, which is highlighted in this thesis. Out of 216 reports in the INNO-Appraisal analysis, 50% of the reports employ behavioral additionality, explicitly or implicitly.

4.2 Variables representing behavioral additionality

Reports explored by Pérez (2016) includes at least twenty-seven different variables that represent behavioral additionality. Pérez (2016) managed to categorize these into five groups that represented behavior:

1. Collaboration
2. Modification of specific individual traits or personal attitudes, related to innovation
3. Organizational changes at the micro level
4. As inputs and outputs
5. Project additionality

As mentioned when introducing this chapter, we choose to focus on what determines successful FHF projects by linking it to increased knowledge, speed and the links of collaboration between participants – making up what we call success in a behavioral additionality perspective. The

behaviors complementing these are collaboration, modification of specific individual traits or personal attitudes, related to innovation, and on project additionality. The following presents some previous findings belonging to these three groups.

4.3 Behavioral additionality as a collaboration

The focus of the majority of evaluations and scholarly studies about behavioral additionally have used collaboration as one of the critical behaviors (Cunningham and Gök, 2012). For instance, Georghiou and Clarysse (2006) define "network additionality" as a dimension of behavioral additionality. Here the authors investigated whether a project would, in the absence of support, be less collaborative (Cunningham and Gök, 2012). The result was that eight out of nine studies showed that between 42% and 70% of the projects led to more collaboration because of the support they received (OECD, 2006; in Cunningham and Gök, 2012).

Using collaboration as an indicator of behavioral change has led to different conclusions. Aschhoff et al. (2006) for example, have found that after receiving funding, some firms tended to change the type of cooperation arrangements they had. This change depended on what type of prior collaboration arrangements they had, and not by the funding itself (Pérez, 2016). Busom and Fernández-Ribas (2008), IDEA Consult (2009) and Tierlinck and Spithoven (2010), reach a similar conclusion (in Pérez, 2016).

Furthermore, Aschhoff et al., (2006) found that cooperation tended to last after the period of funding ended. This finding led the researchers to conclude that the decision was independent of the size of the firm and in which sector they operated. This conclusion is in contrast with Hsu, Horng and Hsueh (2009) who found that the size and sector of Taiwanese firms, in fact, did play an essential role in deciding whether or not to continue collaborating (Pérez, 2016).

4.4 Behavioral additionality as a modification of specific individual traits or personal attitudes, related to innovation

Individual traits and individual performance are topics that correlate with behavioral psychology and behavioral economics (Pérez, 2016). Earlier reports within this theme have focused on three different concepts. Namely; *"the influence of the subsidies on a set of firm*

skills and individual traits, behavioral additionality as a legitimization process for the formalization of R&D or innovative activities, and improvement of the manager´s (cognitive) capabilities" (Pérez, 2016).

4.4.1 The influence of the subsidies on a set of firm skills or individual traits

Kim and Song (2007) have proposed that personal characteristics like age, gender, and education of the leader of the research will determine the success of a subsidy (Pérez, 2016). Furthermore, several reports have documented a positive relationship between government subsidies and the set of skills that firms contribute. An example in Pérez (2016) show an increase in skilled labor to handle R&D, which is a result of many reports (see PACEC, 2001, 2003, 2009, 2011; Rhodes, 2003; Knockaert and Spithoven, 2009; Marino and Parrotta, 2010; Regeneris Consulting, 2010 and Antonioli, Marzucchi and Montresor, 2014).

Confirmation that complements this is found by Albors-Garrigos and Rodriquez Barrera (2011) who established that firms with prior skills in exploiting external sources and with previous cooperation linkages would perform better when it comes to innovation (Pérez, 2016). They conclude that behavioral responses are more reliant on the firm´s prior innovative behavior and less reliant on size.

4.4.2 Behavioral additionality as a legitimization process for the formalization of R&D or innovative activities

It was Buisseret et al. (1995) who were the first to recognize such an effect, which the researchers observed as an unintended but positive result of subsidies (Pérez, 2016). One component relating to the legitimization effect is that subsidies helped firms in formalizing their innovative activity. This formalization happens because of systematization of the R&D process (see, e.g., KOF, 2004; Regeneris Consulting, 2010; in Pérez, 2016).

On the other hand, this formalization has also occurred as either the product of an increase in the level of trust or because it helps with risk minimization associated with R&D (see, e.g., Hyvärinen, 2006; Madsen and Brastad, 2006; Hsu et al., 2009; in Pérez, 2016).

4.4.3 Improvement of the manager´s (cognitive) capabilities

A positive relationship between the changes in a manager´s attitude after receiving a subsidy and his/her innovative performance is observed by many (see Georghiou et al., 1995; Davenport, Grimes and Davies, 1998; PACEC, 2003; Clarysse, Wright and Mustar, 2009; Kolbenstvedt, 2007; Borgar, Karlsson and Godø, 2005; Steyer, 2006; Magro, Aranguren and Navarro, 2010; Radas and Anić, 2013; in Pérez, 2016). Such observation is linked to an increase in the companies' skill levels (see Regeneris Consulting, 2010; Marzucchi, Antonioli and Montresor, 2013; in Pérez, 2016).

Most reports conducted on this subject concludes that firms offered subsidy will increase the management´s awareness of innovation opportunities which will be represented in an increase of profitability to accumulate experience and learning (Aerts and Schmidt, 2008; Hall and Maffioli, 2008; Clarysse et al., 2009; Afcha-Chavez, 2012; Marzucchi et al., 2013; in Pérez, 2016).

4.5 Behavioral additionality as project additionality

Understanding project additionality as a representation of behavioral additionality, it is commonly viewed as three separate components of the project (Pérez, 2016). These are the project´s scale, scope, and speed. When Georghiou et al., (1995) and Davenport et al., (1998) first discussed the behavioral additionality impact they assessed changes as effects at the level of R&D projects (Pérez, 2016). In such an event taking the size, quantity, and length of projects into account. Later, project additionality was expanded to also include the absorptive capacity of firms, their business strategy, and related knowledge (Georghiou et al. 2004; in Pérez, 2016).

Empirical evidence of project additionality includes Falk (2007) who found that without any subsidy, 36 to 46% of Austrian firms would have postponed their projects, while 65% would have reduced the aspiration of the objectives of the project (Pérez, 2016). Furthermore, Bergman et al., (2009) found that small firms tended to have stronger levels of acceleration compared to larger firms (Pérez, 2016). Another finding is that larger firms have a tendency to

use their subsidies better, this is according to Clarysse et al., (2009), however, this finding contradicts an earlier finding by Clarysse et al., (2004) where the conclusion was that size does not matter for behavioral additionality (Pérez, 2016).

4. 6 Presenting research questions and propositions

In our analysis, we want to examine what makes up a successful FHF project from a behavioral additionality perspective. Such success is examined for the sake of the firm and also in an industry perspective since the primary goal of FHF is to create added value for the seafood industry as a whole. Our following research questions are:

> **Research Question 1:** Can firm characteristics estimate project success in a behavioral additionality perspective?
> **Research Question 2:** Can project related factors estimate project success in a behavioral additionality perspective?

The success factor is made up by how the firm self-evaluate an increased level of knowledge as a result of the project, the period in which the project lasts- measuring speed, and how well the firm self-evaluate the success of collaboration as a result of being part of the FHF project (see Figure 2 and chapter 6 for more detail). We choose these three determinants in making the success factor because we view these traits as the most important when examining behavioral additionality, following the already presented theory. The success factor is tested against firm characteristics and project related factors (see Figure 2, and chapter 6) in order to answer our research questions. We will also examine what types of projects typically score high in a behavioral additionality perspective, and why, based on propositions. We make our propositions based on available theory and previous findings to check if it applies to the data we have on FHF projects. Furthermore, for each of the following propositions, we will do a hypotheses test.

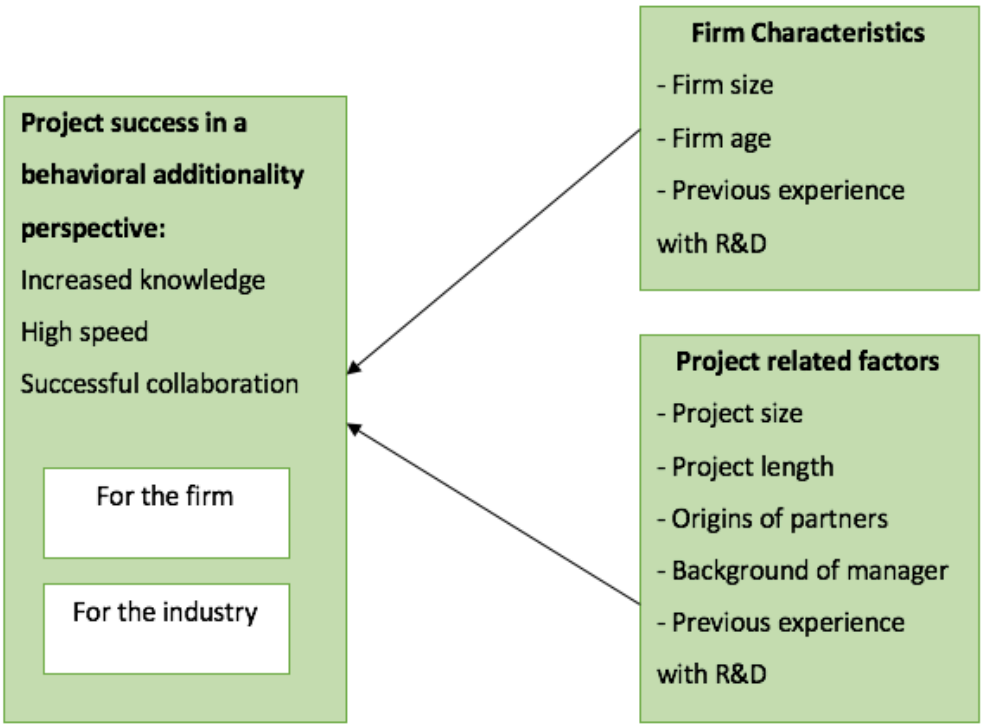

Figure 2 Project success in a behavioral additionality perspective

4.7 Propositions based on firm characteristics

Firm-related factors have on a large scale been emphasized to be a critical factor in explaining firms´ capacities to develop innovation and exploit the result of R&D, either in-house or in collaboration (e.g. Ahuja and Katila, 2004; Damanpour, 1991; Leonard-Barton, 1992; in Constantopoulos et al., n. a.). Firm characteristic refers to internal features like innovation-related capabilities and experiences that can enable a firm to benefit from cooperative R&D (Spanos et al., 2014). We will look into firm age, firm size and its previous experience with R&D and relate this to collaboration, being as FHF projects are collaborative research projects.

4.7.1 Firm age

According to Cohen and Levinthal (1990) new firms tend to go into collaborations since they generally lack necessary knowledge for in-house innovation, while Katila and Shane (2005)

along with Teece (1986) argue that it is because of lack experience, financial and other types of resources (in Constantopoulos et al., n. d.). Established firms, in contrast, may have gathered such experience in collaborative R&D and may have a better understanding of the market and a higher market share (Zaheer and Bell, 2005), more products in development (Rothaermel and Deeds, 2004), wealthy financial resources and a record of partnerships (Sorensen and Stuart, 2000; in Constantopoulos et al., n. d.). Based on this theory we make proposition 1 and 2 where relatively new firms are considered those firms five years or younger at project start, while well-established firms display the remaining.

Proposition 1: Most of the projects funded by FHF belongs to young firms with a low degree of network

Proposition 2: Well-established firms are more successful in collaboration

4.7.2 Firm size

The size of a firm can be viewed through its human, financial or physical resources. We will examine size by looking at the number of employees, the results before taxes and revenue, as this is the data available. An element that will affect a firm's collaboration and project success is slack resources and tolerance to potential losses, which there is evidence that large firms hold. This is according to research from Europe, i.e., Huiban and Bouhsina (1998a and 1998b), Premkumar and Ramamurthy (1997), Thong and Yap (1995), Ventura and Marbella (1997), from India, i.e., Lal (1999), and from the US i.e. Premkumar and Roberts (1999) (Constantopoulos et al., n. d.). Furthermore, Fitjar and Rodríguez-Pose (2011) find that company size has significant positive impacts on all forms of innovation and that size will affect the capacity of firms to develop networks and collaborate. Interestingly, Clarysse et al., (2009) find that larger firms tend to use their subsidies better. However this contradicts the finding by Clarysse et al., (2004) where the conclusion was that size does not matter. In accordance with this theory, we make proposition 3.

Proposition 3: The larger the firm size, the more successful, and the more extensive is the collaboration

Other findings concerning the size of the firm include Bergman et al., (2009). The finding was that smaller firms tend to have a stronger level of scale and acceleration in comparison to large firms, as mentioned previously (Pérez, 2016). Based on this, we make proposition 4.

Proposition 4: The smaller the firm size, the higher level of speed/ acceleration of projects

4.7.3 Previous experience with R&D

According to Constantopoulos et al., (n. a.) previous participation in R&D activities makes firms better off in collaborative R&D activities as they will be able to contribute more, to develop synergies with their partners and be part in collaborative learning. In such event, the risk following R&D collaborations will arguably be lowered even if there is something entirely new being worked on.

Previous experience with R&D can be viewed as a reflection of firms´ continuous participation in FHF projects. The importance of such previous experience lays in the ability of a firm to assimilate and further develop from collaborative R&D into innovations to its advantage. According to Cohen and Levinthal (1990), this is a function of its absorptive capacity. The argument is that even if a new technology is developed, this technology will usually be one part of the knowledge and must be complemented with other developments like components, sub-systems, process innovation etcetera. Furthermore, if a firm does not have enough absorptive capacity to do so, the new knowledge developed is not likely to be beneficial (Spanos et al., 2014). With this line of reasoning, the firms´ history of innovation-related activities reflected in prior R&D activities will in principle impact their capacity to derive positive effects from collaborative R&D projects (Kleinknecht and Reijen, 1992; Colombo and Garrone, 1996; in Spanos et al., 2014).

Furthermore, it follows from Constantopoulos et al. (n. a) that firms having engaged in R&D activities previously will have developed particular experience in performing such activities. This is because they will likely have developed the necessary resources, skills, and knowledge. Confirmation that complements this is found by Albors-Garrigos and Rodriquez Barrera (2011) who established that firms with prior skills in exploiting external sources and with previous cooperation linkages would perform better when it comes to innovation (Pérez, 2016). They

conclude that behavioral responses are more reliant on the firm´s prior innovative behavior and less reliant on size. Based on this theory, we make proposition 5 and 6.

Proposition 5: A firm that has previously been involved with R&D projects will be more successful in collaborations

Proposition 6: A firm that has previously been involved with R&D projects will be more successful (in general)

4.8 Propositions based on project related factors

Project related factors can be explained by the thematic area into which a project belongs to, the size of the consortium that has undertaken the research work, the management aspects of the project, and the duration (Constantopoulos et al., n. a.). We will look into project length and size, the origins of participating partners and the background of the project manager, in which we further examine "ownership of project" in relation to the theory presented about who is part of a project. Furthermore, we will also examine the partners´ previous experience with R&D.

4.8.1 Project length

Gibson (1999), Hoang and Rothaermel (2005), and Katz (1982) argue for project performance being positively related to the length of the time span for which project members have worked together, and shared experiences. They explain it by the length positively affecting communication (in Constantopoulos et al., n. a.). Furthermore, according to Parkhe (1991), learning may become more effective as the project duration increase, and according to Katz (1982) a standard for work patterns emerge contributing to trust and cohesion, which in turn positively affects project performance and success (Constantopoulos et al., n. a.). Based on this theory we make proposition 7.

Proposition 7: The longer the duration of a project, the more successful it is

4.8.2 Project size

We define project size as the number of participants in a consortium. According to Ancona and Caldwell (1992b), Jehn (1995), and Smith and Lipsky (1994b) a large consortium will in principle affect the project team dynamics and is strongly associated with performance (Constantopoulos et al., n. a.). Size is positively related to success (Schilling, 2005) since the effort and expertise of several partners in an R&D project will foster problem-solving (Constantopoulos et al., n. a). However, this is only up to a certain point because an excessive number of participants may contribute to a higher likelihood of free riding and thus decreasing the extent of learning taking place (Gibson and Vermeulen, 2003; Wong, 2004; Constantopoulos et al., n. a.). Based on this theory we make proposition 8.

Proposition 8: A more substantial number of participants in a project will lead to a more successful result

4.8.3 Origins of the participating partners

Constantopoulos et al., (n. a.) argues that firms in an industry are likely to have knowledge production as a motivation since it can serve as a stepping stone for further development, e.g., prototypes and models, which will be positive for a firm´s level of absorptive capacity (Cohen and Levinthal, 1989). Partners coming from the research community, on the other hand, are typically more interested in abstract forms of knowledge, leading to research publications. This is in line with the theory by Wilson (2012) about firms collaborating with universities and not progressing beyond the stage of initial discussion, as described previously. Relating to these points, we believe that projects consisting of most partners from the industry will be more successful and this is what makes up Proposition 9.

Proposition 9: Projects with a majority of partners from the industry will be more successful

4.8.4 The Background of the project manager

Spanos et al., (2014) argue that if the leader of the R&D project comes from the industry, it is reasonable to expect greater motivation and efforts towards commercialized or at least

potentially commercialize outcomes. This is similar arguments as to those above relating to participants coming from the industry. Based on this we build proposition 10.

Proposition 10: If the project manager of the FHF project comes from the industry, the project is more successful.

4.8.5 Ownership of the project

In accordance with the theory about whether most participants of the project are from the industry and whether the leader is from the industry, more propositions transpire. We believe that having ownership of the idea and being part of the project description will also deliver a higher success score. As a result of this, we make proposition 11 and 12.

Proposition 11: If the respondent of the questionnaire were part of the project description (its goals, activities, deliveries) the project will be more successful

Proposition 12: If the idea came from the industry or firm the project is more successful.

4.8.6 The partners´ previous experience with R&D projects

Research has suggested that one of the most important factors for the success of R&D consortia is the previous experience partners have with R&D (Child and Yan, 1999; Fiol and Lyles; 1985; in Constantopoulos et al., n. a.). The assumption is that the learning effect enables a firm to develop a relational capability which is useful for managing inter-organizational relationships (Dyer and Singh, 1998; Constantopoulos et al., n. a.). Taken organization´s heterogeneity and the difference in prior R&D experience into account, one would expect that some members of the project will develop superior capabilities at managing such consortia (Constantopoulos et al., n. a.). Anand and Khanna (2000) have in support of this, found that firms with greater prior R&D consortia experience have a significantly greater project performance (Constantopoulos et al., n. a.). Based on this theory we make proposition 13.

Proposition 13: The project is more likely to succeed if the partners have prior experience in R&D projects

5.0 Methodology

This chapter presents explanations and justifications of our choice of methods. It includes an explanation of our research design and our process of collecting data. The chapter ends with a discussion and criticism of our research method, ensuring our credibility.

5.1 Research design

As mentioned in the introduction, this thesis is built on a larger research project initiated by FHF and led by professor Ragnar Tveterås. The objectives of the project meant that both a quantitative and qualitative method was required. The project resulted in over 200 respondents on their web survey on businesses and innovation processes, 120 respondents on a web survey on FHF funded projects specifically, and fifty qualitative interviews, including individual and focus groups.

Our focus is on the part consisting of projects funded by FHF, and we use the records from the web survey on the 120 employees as our source of data. This dataset includes all phases of such projects, from the idea through the implementation to the results. In contrast to a research question approach, we used a data-driven approach in analyzing this already existing data.

According to Kumar (2011) a research design serves two functions, the first shall identify the procedures and logistics required to conduct a study, and the second shall ensure the quality of the chosen procedures.

5.1.1 The quantitative research and design

The data which forms the bases of this study was provided by Tveterås and was collected for the project: *"Fra virkemiddel til Verdi- Hvordan få mer verdiskapning ut av marin FoU?"*. We decided to conduct a study on the data of FHF only, and therefore our data set consists of a web survey with 120 respondents.

A web survey of this kind applies to quantitative research where the focus is on gathering numerical data and statistics to examine the relationship between groups of variables to explain

and analyze findings (Babbie, 2010). Given that this data is our main source for answering our research questions with including propositions and hypotheses, we too would have a quantitative approach to our research.

According to Babbie (2012), quantitative research seeks to look at objective measures and numerical examination of data gathered through for example questionnaires, or by manipulating already existing statistical data by the use of computational techniques. To use this method, we have to justify why we are using it. Perumal (2014) states that a quantitative method usually is associated with collecting data to support or reject hypotheses or theory. This is precisely what we are doing in this study. The research questions this thesis aims to answer are:

Research Question 1: Can firm characteristics estimate project success in a behavioral additionality perspective?
Research Question 2: Can project related factors estimate project success in a behavioral additionality perspective?

In order to find the answer to these questions we propose 13 propositions based on theory with underlining hypotheses that test the theory against our data set. The propositions are presented in chapter four, while hypotheses are described in more detail in chapter six. Although our data set is secondary data, we are conducting a study that is original, in the sense that it involves data not previously adopted in the same way we adapt it. Combining the above, we argue for the use of quantitative research.

5.1.1.1 Descriptive approach within survey research

The quantitative research described above falls under what is called descriptive research. This is in line with Kumar (2011) who states that if the research study is from the perspective of its objectives, it can be explained as descriptive. The purpose of such studies is to describe more thoroughly what is prevailing concerning what is being studied (Kumar, 2011). By using such method of data collection, this is made possible. Furthermore, this makes it easy to devise hypotheses on the related issues.

Our approach within this heading is described as survey research. The main purpose of such an approach is to learn about a larger population by surveying a sample of it (Perumal, 2014). The

responses are then presented in percentages, in frequency distributions or other statistical descriptions (Perumal, 2014). As a result of the collected data, made up by the web surveys sent to employees of firms that have participated in an FHF project, it is possible for us to do just this. By the sample of 120 respondents, we argue that we can generalize whether firm characteristics and project related factors can estimate project success (for the sake of the firm and the sake of the industry), in a behavioral additionality perspective- making up our research questions. This is made possible as of the numerical and statistical format of the responses. A typical way of conducting a survey is through questionnaires (Perumal, 2014), which is what was done by the researchers belonging to the project of FHF.

5.2 Data Collection

There exist two main sources of data; primary and secondary data (Kumar, 2011). The data collected by the researchers of the FHF project was to them, primary data. Since this data already existed and was collected for a different purpose, and then shared with us, it became secondary data. This thesis builds on secondary data.

As mentioned when introducing this chapter, a data-driven approach was used in analyzing this secondary data. First, we examined the data set provided to us and then we decided what kinds of questions we could answer on the basis of the data (see Cheng and Phillips, 2014 for a broader description). In addition to the data set, we use other sources of primary data in order to broaden our understanding of the topic. The following sub-chapter will explain our sources of secondary data in more detail.

5.3 Secondary data

5.3.1 Web survey by FHF

In collecting the data set of FHF projects, the researchers involved in the project used the FHF project database as a foundation for whom they would send an email to (Tveterås, 2015), requesting an answer to the questionnaire. The FHF projects of concern were within the period 2013 to 2015. Some of the persons in this database have been involved with several FHF project with several different people. This is especially true for large enterprises. We were only able

to use 108 of the 120 responses on this survey because of lacking organization number on the remaining. The observation units in the survey are enterprises, identified by company number and name, and projects – identified by project number and project title. This web survey included the firms report on satisfaction with the projects they had been part of and its execution. Furthermore, respondents describe the impact and success of participating in the project using several parameters.

Included in the finished data set we were offered, there was information in which the members of the project team were linked to existing databases like Ravn and Proff (Tveterås, 2015). For example; economic key figures, number of employees, address, NACE code and etcetera. From the FHF project database they also gathered information on project name, project number, start and end date, description of project objectives, information on the project manager, the responsible institution, organizations/ enterprises and persons in the project groups, organization/ enterprises and people in the management group, budget and finance (Tveterås, 2015). We supplemented the data by adding the founding year of each participating firm from Proff.no to be able to distinguish between newer and well-established firms.

The finished data set gave us the ability to analyze the relationship between FHF projects and characteristics of participating enterprises and characteristics of the project, characteristics of the R&D institutions/ researchers, and the experienced conditions at FHF.

5.3.2 Other secondary sources

However, in order to broaden our knowledge about the topic, we also needed to research theory and additional information about FHF. Examples of our collection include previous research, statistics, reports, and articles. Most of the major journals used we had collected in the course of our study. However, we had to supplement these with newer reports, on FHF in particular. Furthermore, in addition to the data set of the web survey, described above, we received a data set by Tveterås consisting of all FHF projects and its participants from 2012 to 2015. This data is used when examining previous experience with R&D projects. Such secondary data made it possible to examine our research questions.

5.4 Critique of research approach and method

In this section, we discuss the strengths and weaknesses of our research approach and method to ensure the credibility of it. When using data from secondary sources, it is essential to keep in mind their validity and reliability (Kumar, 2011). The term validity incorporates that of accuracy and appropriateness (Kumar, 2011). According to Smith (1991) *"Validity is defined as the degree to which the researchers has measured what he has set out to measure"* (in Kumar, 2011). While reliability is shown in the degree of stability and consistency in an instrument – in which the greater is better (Kumar, 2011). A statistical result of validity and reliability is presented in our data chapter.

We base our study on the dataset from a quantitative survey performed by members of the research team to the FHF project. Since we have professional expertise to perform the survey, we expect our sample to be representative for firms participating in FHF projects, and we expect to be able to trust the questionnaire to be concise, so the data gathered can imply proper measures.

5.4.1 Strengths

The strengths of having received a dataset from the FHF project includes that experienced people conducted it. The data from the FHF project was gathered and processed in collaboration between UIS-IRIS, Nofima, and SINTEF Ocean and there have been publications based on this dataset (IRIS, 2018). Furthermore, as argued by Tveterås (2015) the researchers from these organizations have complementarities on methodology, industry-specific, and knowledge about different parts of the marine sector.

Underlining the experience of the different organizations, UIS-IRIS has a joint research center called the Center for Innovation Research which has several leading researchers and an international network that contributes to the research front. In addition, the researchers at the Center contributes knowledge to many sectors nationally and internationally (Tveterås, 2015). Adding to this, Nofima and SINTEF Ocean have a significant portfolio of R&D projects in FHF in many areas of knowledge and technology and are the largest suppliers of FHF. Nofima and

SINTEF also have researchers with considerable expertise in innovation processes, with a particular focus on the marine sector (Tveterås, 2015).

Based on this information, we believe that the experience for collecting and processing information is excellent, making our data set credible. The selection process of projects is done thoroughly in the dialogue between the research group and FHF, which further calms us into believing that the dataset is representative of a larger population. Furthermore, we believe it would have been hard for us to draw a sample of firms of the same magnitude as we have received - not being able to access the same database, and not at least considering the costs – the budget for the whole FHF project was 6 million NOK. Furthermore, since the researchers collaborating in this project have a more industry-specific knowledge about the marine sector, we also believe that they have a broader sense of what questions to ask in accordance with the industry than we would.

Lastly, a final strength is that the questionnaire was online where the respondent has to answer the questions without any interference on an interviewer biasing the answers.

5.4.2 Weaknesses

There is a risk associated with researchers from these organizations studying R&D projects in their organizations, especially regarding the credibility of the industry. It is stated, however, that the project will ensure the professional integrity of the project and especially the studies of the large portfolios of R&D projects in Nofima and SINTEF Ocean (Tveterås, 2015). Furthermore, at the formal project organization, UIS-IRIS have the overall project management and responsibility for the project´s professional integrity and credibility.
Adding to this, securing professional integrity and credibility is addressed as a separate theme in meetings with the project´s management team, according to Tveterås (2015).

It is important to emphasize that firms have more potential sources for new knowledge and innovations – it is not only part of an FHF project that contributes to this. Such sources are, however, not taken into account in our data set. Furthermore, firms can participate in other collaborations and networks, neither of which is taken into account in our study, inhibiting our propositions based on previous R&D experience, where we only have information about previous FHF projects from 2012 to 2015.

A limitation to that it was a web survey is that no one was around to clarify any questions that may have come up, and people may interpret questions differently. We do not know if some of the respondents had questions regarding what was being asked, causing them to answer differently than if they knew the intention of the question. Furthermore, the layout of the questionnaire may draw focus away from the questions leading respondents to not give well-considered answers. As the last point, a response to a question may also be influenced by the response to other questions since the respondents could read all the questions before answering.

We were also not able to add questions to the questionnaire since the survey was completed when we were offered the dataset, restricting our research problem and questions to fit the original questionnaire. For example, we would like to have had more information about the respondent and the people working for the same firm (i.e., age, line of education, number of years in the firm, education of the employees of the company, etc.). Such information could enable us to examine more characteristics of the firm. However, such limitations are inherent to the description of secondary data. The data are not collected to address our particular research questions and neither our hypotheses.

After investigating the data set of the 120 respondents we found that we could only use 108 of them because of missing organization number. We believe there would be an advantage with more respondents to the study than 120. The sample size is considered important in quantitative research which in general hold that the larger the sample size, the more representative is the sample of the population under study. The low response rate to questionnaires, however, is considered unfortunate normality (Kumar, 2011). In such an event, there can be a self-selecting bias (Kumar, 2011). This is about people who in fact return the questionnaire and may have attitudes or motivations different from those who fail to return them. However, since there are made publications based on these data, we believe that the researchers of FHF did not find the 120 respondents as low response rate and we can say that the findings will be representative of the total study population.

6.0 Data analysis

The purpose of this thesis is to analyze project success in a behavioral additionality perspective of projects funded by FHF, differentiating between success for firms, and success for the industry. FHF has a stated goal of projects being beneficial to the industry since the industry is funding FHF, and as such are its stakeholders, while firms conducting projects are expected to be more interested in their own benefits from the project.

We will test how various measures of success in a behavior additionality perspective are different over the diverse project and firm characteristics, as described when presenting the propositions (chapter 4). Such testing is done by utilizing a two-sample t-test with equal variances over binary groups derived from demographic data.

6.1 Measurement- and grouping variables

The following tables explain the variables we have used. We distinguish between two groups of variables; the first is the measurement variable where we quantify a fragment of what constitutes success in a behavioral additionality perspective. The second is the grouping variable, where we try to meaningfully segment our demographic, based on available data.

Measurement variables	Description
success_firm	An amalgamation of the three variables know, speed and collab. Measures project success for the firm in a behavioral additionality perspective
success_ind	An amalgamation of the three variables know, speed and collab. Measures project success for the industry from a behavioral additionality perspective
know_firm	Knowledge increase for the company due to participation in the project.
know_ind	Knowledge increase for the industry due to the project.

speed_firm	Speed/acceleration – when will the company reap the benefits from the project? More immediate is better.
speed_ind	Speed/acceleration – when will the industry reap the benefits from the project? More immediate is better.
collab_firm	Successful collaboration, networking, and sharing of results between firm and partners such as research institutions and others directly involved in the project.
collab_ind	Successful collaboration, networking, and sharing of results between stakeholders in the industry.
Governingorganisationexperienc	Governing organization experience with FHF projects.
TotalParticipantsincludingFHF	Total number of participants in a project, including the responsible at FHF

Table 1Measurement Variables

Grouping Variables	Description
Yearsfromfoundingtoprojects	Years from firm founding until project start. Broken down into two groups: "new" firms that are 5 years old or younger, and "established" firms that are 6 years or older.
Numberofemployees	Number of employees at the firm. Broken down into quartiles.
Resultspretaxes	Result of firm pre-tax. Broken down into quartiles
Earnings	Revenue of the firm. Broken down into quartiles
OverallExperiencescore	The sum of each participating part´s previous experience with FHF projects. Broken down into quartiles.

Governingorganisationexperienc	Governing organization experience with FHF projects. Broken down into quartiles.
ResponsibleinFHFexperience	Experience with previous FHF projects of the one responsible for the project at FHF. Broken down into quartiles.
Responsibleorganisationexperie	Experience with previous FHF projects at the organization responsible for running the project. Broken down into quartiles.
Projectmanagerexperience	Project manager experience with previous FHF projects. Broken down into quartiles.
Durationindays	Project duration in days. Broken down into quartiles.
TotalParticipantsincludingFHF	Total number of participants in a project, including the responsible at FHF. Broken down into quartiles.
part_ind_high	Projects where there are more participants with an industry background compared to a research institution background. Industry = 1, Research = 0.
BackgroundprojectmanagerIndu	Background of project manager, Industry =1, Research = 0.
s_351	Was the respondent involved in the development of the project description (goals, activities, deliveries)? Yes = 1, No = 0
s_170_1	Who had the idea of the project (you can choose more options) - R&D institution or university/university college Yes = 1, No = 0

s_170_2	Who had the idea of the project (you can choose more options) – Firm/Industry Yes = 1, No = 0
s_170_3	Who had the idea of the project (you can choose more options) – FHF Yes = 1, No = 0
s_170_4	Who had the idea of the project (you can choose more options) – Don't know Yes = 1, No = 0

Table 2Grouping Variables

6.2 Constructed variables

The following variables were constructed using a combination of variables from the original dataset obtained from Tveterås' project. Unless otherwise specified, the variables are using a 5-point Likert scale where 1 is the worst result and 5 is the best.

Constructed variable: know_ind	Knowledge increase for the industry due to the project.
S_397	Has the project provided knowledge that can improve the management of the industry? (Yes/No)
S_333	To what extent does the project have utility for the industry when it comes to competence development?

Table 3Constructed Variable know_ind

Constructed variable: know_firm	Knowledge increase for the company due to participation in the project.
S_395	Has the project provided knowledge that can improve internal organization and routines in the business? (Yes/No)

S_392	Has the project provided knowledge that can lead to new or improved products? (Yes/No)
S_393	Has the project provided knowledge that can lead to new or improved production technology? (Yes/No)
S_394	Has the project provided knowledge that can improve distribution and/ or marketing? (Yes/No)
S_159	To what extent does the project have utility for the firm when it comes to developing competence?

Table 4Constructed Variable know_firm

Constructed variable: speed_ind	Speed/acceleration – when will the industry reap benefits from the project? More immediate is better.
S_157_2	Has the project had or is it expected to have positive effects? – During the project period – For the industry (Yes/No)
S_231_2	Has the project had or is it expected to have positive effects? – The first year after the project was completed – For the industry (Yes/No)
S_331_2	Has the project had or is it expected to have positive effects? – In the future – For the industry (Yes/No)

Table 5Constructed Variable speed_ind

Constructed variable: speed_firm	Speed/acceleration – when will the firm reap benefits from the project? More immediate is better.
S_157_1	Has the project had or is it expected to have positive effects? – During the project period – For your firm (Yes/No)
S_231_1	Has the project had or is it expected to have positive effects? – The first year after the project was completed – For your firm (Yes/No)
S_331_1	Has the project had or is it expected to have positive effects? – In the future – for your firm (Yes/No)

Table 6Constructed Variable speed_firm

Constructed variable: collab_ind	Successful networking and sharing of results between stakeholders in the industry.
S_332	To what extent does the project have utility value for the industry when it comes to cooperation and networking?
S_181	To what extent was the communication of information, knowledge and results, organized such that the following could partake in it? Other firms from the same industry not participating in the project

Table 7Constructed Variable collab_ind

Constructed variable: collab_firm	Successful collaboration, networking and sharing of results between firm and partners such as research institutions and others directly involved in the project.

S_158	To what extent does the project have value for the firm when it comes to cooperation and networking?
S_185	To what extent were the partners important for the outcome? – Companies in the industry
S_186	To what extent were the partners important for the outcome? – R&D institutions
S_187	To what extent were the partners important for the outcome? – University or college
S_356	To what extent are results from previous projects easily accessible from the following organizations? – FHF
S_357	To what extent are results from previous projects easily accessible from the following organizations? – NRC
S_201	To what extent do you agree with the following statements about the R&D institution(s)´s dissemination of knowledge and results from the project? The dissemination of the results was easy to understand
S_202	To what extent do you agree with the following statements about the R&D institution(s)´s dissemination of knowledge and results from the project? The researchers helped interpret the results of the project

S_203	To what extent do you agree with the following statements about the R&D institution(s)´s dissemination of knowledge and results from the project? The researchers helped us understand the importance of our company
S_204	To what extent do you agree with the following statements about the R&D institution(s)´s dissemination of knowledge and results from the project? The researchers helped us understand how we could use the results
S_190	To what extent do you agree with the following statements about collaborative R&D institution(s) in the project? – Easy to get in touch with project managers
S_191	To what extent do you agree with the following statements about collaborative R&D institution(s) in the project? – Took active contact to follow up on project work along the way
S_192	To what extent do you agree with the following statements about collaborative R&D institution(s) in the project? – Proved good ability to solve various problems and challenges that arose
S_193	To what extent do you agree with the following statements about collaborative R&D institution(s) in the project? - Seemed eager to solve the current project

S_288	To what extent do you agree with the following statements about collaborative R&D institution(s) in the project? – Communicated in a good way
S_289	To what extent do you agree with the following statements about collaborative R&D institution(s) in the project? – The dialogue with the researchers was in line with expectations
S_290	To what extent do you agree with the following statements about collaborative R&D institution(s) in the project? – There was continuous communication with the R&D institutions.
S_291	To what extent do you agree with the following statements about collaborative R&D institution(s) in the project? – Collaboration worked well during the project period.

Table 8Constructed Variable collab_firm

6.3 Research questions

Q1: Can firm characteristics estimate project success in a behavioral additionality perspective?

Q2: Can project related factors estimate project success in a behavioral additionality perspective?

To answer our research questions, we tested our hypotheses by using a two-sample t-test, using our grouping variables to compare the means between the two groups. To make testing of our research question more manageable, we further break them down into 13 propositions (see chapter four), subdivided into hypotheses. The null hypothesis is always that the mean is equal.

Any significant deviation from that would suggest that the groups are different from each other. To perform this test, we must meet four assumptions (Laerd Statistics, 2018):

1. The dependent variable must be continuous or ordinal (Wooldridge, 2014).

   The data in our dataset is collected on a Likert scale (ordinal) or is continuous such as size, income, age, fulfilling the first assumption.

2. The observations are independent of each other (Wooldridge, 2014).

   The data is originally collected through surveys where each participant is separate from each other, fulfilling the second assumption.

3. The dependent variable should be approximately normally distributed (Wooldridge, 2014).

   We performed a Shapiro-Wilks test to check for normality (Royston, 1983) on each of the measuring variables we have used. The test shows that we reject the null hypothesis about normality in most of the cases, failing to satisfy the assumption. However, due to our sample size being larger than 25, we can apply the central limit theorem and assume an approximation of asymptotic normal distribution (Wilcox, 2012). Doing so fulfills the assumption of normality.

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
success_firm	110	0.81943	16.147	6.203	0.00000
success_ind	110	0.97603	2.144	1.701	0.04451
know_firm	110	0.98167	1.639	1.102	0.13533
know_ind	110	0.92378	6.816	4.280	0.00001
speed_firm	110	0.91413	7.679	4.546	0.00000
speed_ind	110	0.93689	5.644	3.859	0.00006
collab_firm	110	0.76197	21.285	6.819	0.00000
collab_ind	110	0.95300	4.203	3.202	0.00068
Governingo~c	108	0.71973	24.680	7.142	0.00000
TotalParti~F	108	0.92145	6.916	4.308	0.00001

Table 9 Shapiro-Wilk test

4. The dependent variable should not contain any significant outliers (Laerd Statistics, 2018).

   Examining the box-plots for our dependent variables reveals a few outlier variables, but we cannot make a case for removing them just for being outliers.

More typically, it is usual to keep outliers if they affect both the results and the assumptions.

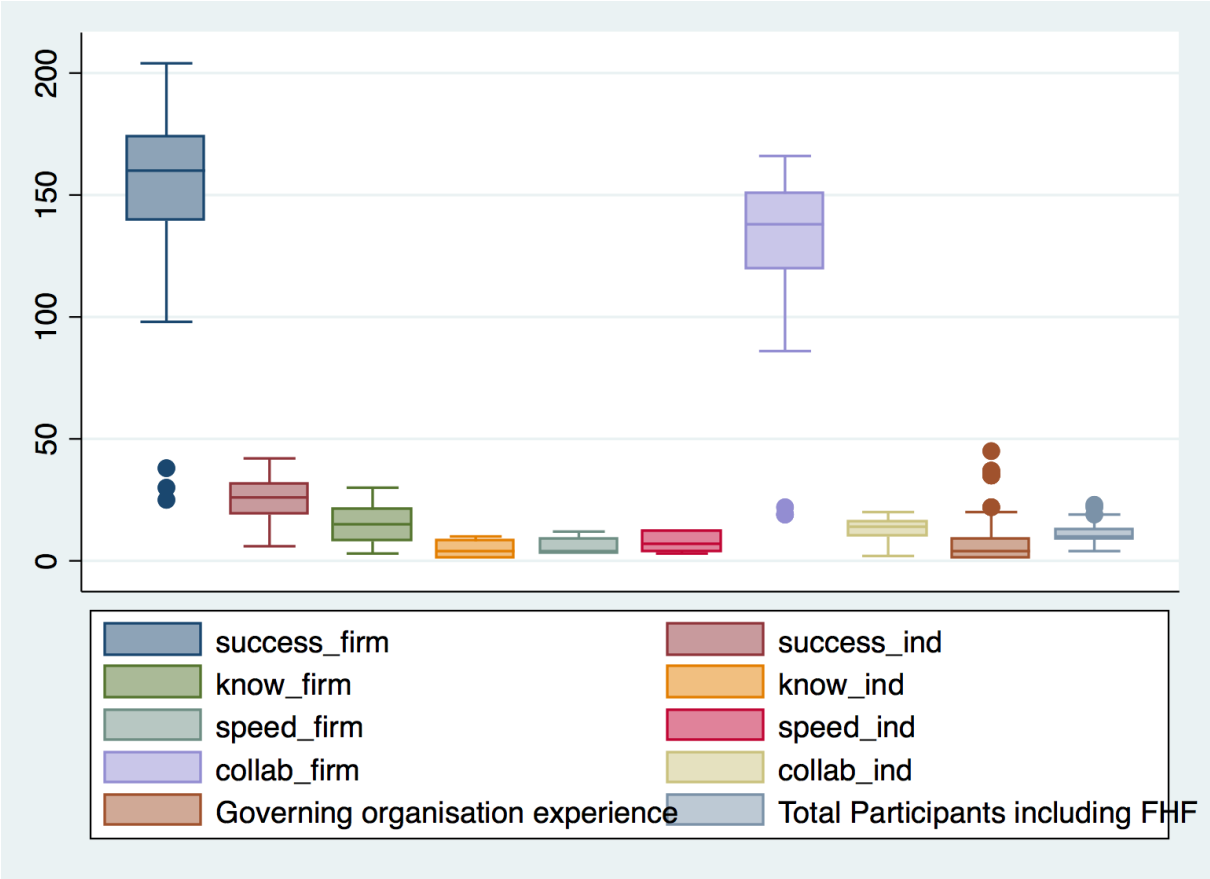

Table 10 Box plot of distribution

The correlation matrix of the measuring variables using both Spearman and Pearson correlation shows how they relate to each other. Spearman correlation is less sensitive to outliers then Pearson correlation. Displayed correlations are significant at the 10% level. 5% level is marked with a *.

	succes~m	succes~d	know_f~m	know_ind	speed_~m	speed_~d	collab~m	colla~nd	Govern~c	TotalP~F
success_firm	1.0000									
success_ind	0.5165*	1.0000								
know_firm	0.6789*	0.5054*	1.0000							
know_ind	0.3450*	0.7738*	0.3982*	1.0000						
speed_firm	0.4076*	0.2952*	0.4067*	0.1674	1.0000					
speed_ind	0.2763*	0.6678*	0.2738*	0.2292*	0.3293*	1.0000				
collab_firm	0.8731*	0.3886*	0.3286*	0.2276*		0.1674	1.0000			
collab_ind	0.6004*	0.7876*	0.4613*	0.4994*	0.2258*	0.3261*	0.5301*	1.0000		
Governingo~c									1.0000	
TotalParti~F			0.1640							1.0000

Table 11 Spearman correlation table

This is the Pearson correlation of the same variables.

	succes~m	succes~d	know_f~m	know_ind	speed_~m	speed_~d	collab~m
success_firm	1.0000						
success_ind	0.6689*	1.0000					
know_firm	0.5858*	0.5333*	1.0000				
know_ind	0.3798*	0.7600*	0.4023*	1.0000			
speed_firm	0.3179*	0.2916*	0.3841*		1.0000		
speed_ind	0.3491*	0.6842*	0.3092*	0.2382*	0.3195*	1.0000	
collab_firm	0.9714*	0.6079*	0.3915*	0.3257*	0.1717	0.2932*	1.0000
collab_ind	0.7684*	0.8345*	0.4964*	0.5003*	0.2296*	0.3608*	0.7368*
Governingo~c							
TotalParti~F			0.1625				

	colla~nd	Govern~c	TotalP~F
collab_ind	1.0000		
Governingo~c		1.0000	
TotalParti~F			1.0000

Table 12 Pearson correlation table

7.0 Empirical findings

We will present our findings two-fold. First, we present all significant findings organized by grouping variable; showing the measurement variables with significant results when tested over the grouping variables. Secondly, we present our propositions based on firm characteristics and those of project related factors, showing which of their hypotheses are significant.

7.1. Significant measurement variables by grouping variables

When examining the hypotheses, we ran tests on all measurement variables by all grouping variables. The following firm characteristics and project related factors have significant results at 10% or 5% level. Please note that the grouping variable is always group 1, so if the difference is positive, it means that the grouping variable has a lower average mean then the rest of the population, the inverse is valid for a negative number.

by new firm

	diff.	
Governing organization experience	8.212*	(1.98)
Observations	108	

t statistics in parentheses
$^{+}p < 0.10$, $^{*}p < 0.05$

by low # employees

	diff.	
Governing organization experience	8.506*	(3.32)
Observations	108	

t statistics in parentheses
$^{+}p < 0.10$, $^{*}p < 0.05$

by high # employees

	diff.	
collab_firm	12.70+	(1.75)
Governing organization experience	-6.210*	(-2.37)
Observations	108	

t statistics in parentheses
$^{+}p < 0.10$, $^{*}p < 0.05$

by low results pre-tax

	diff.	
Governing organization experience	8.704*	(3.41)
Observations	108	

t statistics in parentheses
$^{+}p < 0.10$, $^{*}p < 0.05$

by high results pre-tax

	diff.	
speed_firm	-1.531+	(-1.94)
collab_firm	13.79+	(1.90)
Governing organization experience	-19.49*	(-10.21)
Observations	108	

t statistics in parentheses
$^{+}p < 0.10$, $^{*}p < 0.05$

Table 13 Significant results 1

by low revenue

	diff.	
know_firm	3.198^{+}	(1.69)
Governing organization experience	5.296*	(2.01)
Observations	108	

t statistics in parentheses
$^{+}$ $p < 0.10$, * $p < 0.05$

by high revenue

	diff.	
success_firm	15.60^{+}	(1.87)
collab_firm	15.81*	(2.19)
collab_ind	1.457^{+}	(1.68)
Governing organization experience	-7.889*	(-3.06)
Observations	108	

t statistics in parentheses
$^{+}$ $p < 0.10$, * $p < 0.05$

by high experience group

	diff.	
know_firm	-3.323^{+}	(-1.78)
Governing organization experience	-13.39*	(-5.78)
Total Participants including FHF	-1.995*	(-2.43)
Observations	108	

t statistics in parentheses
$^{+}$ $p < 0.10$, * $p < 0.05$

by low experience group

	diff.	
Governing organization experience	8.405*	(3.32)
Total Participants including FHF	1.670*	(2.02)
Observations	108	

t statistics in parentheses
$^{+}$ $p < 0.10$, * $p < 0.05$

Table 14 Significant results 2

by gov. org low experience

	diff.	
Governing organization experience	11.34*	(4.87)
Observations	108	

t statistics in parentheses
$^{+}p < 0.10$, $^{*}p < 0.05$

by gov. org high experience

	diff.	
speed_ind	-1.411+	(-1.90)
collab_ind	1.622*	(2.00)
Governing organization experience	-21.13*	(-14.32)
Observations	108	

t statistics in parentheses
$^{+}p < 0.10$, $^{*}p < 0.05$

by high project duration

	diff.	
know_ind	-1.691*	(-2.06)
Observations	108	

t statistics in parentheses
$^{+}p < 0.10$, $^{*}p < 0.05$

by majority of participants with industry background

	diff.	
success_firm	-18.13*	(-2.45)
success_ind	-3.127+	(-1.82)
collab_firm	-17.46*	(-2.72)
collab_ind	-1.604*	(-2.07)
Total Participants including FHF	2.756*	(3.53)
Observations	100	

t statistics in parentheses
$^{+}p < 0.10$, $^{*}p < 0.05$

Table 15 Significant results 3

by project manager with industry background

	diff.	
success_firm	-19.44*	(-2.02)
collab_firm	-16.63+	(-1.97)
Total Participants including FHF	3.022*	(3.19)
Observations	108	

t statistics in parentheses
+ $p < 0.10$, * $p < 0.05$

by Firm being part of making project description

	diff.	
success_firm	-34.13*	(-5.08)
success_ind	-4.495*	(-2.78)
know_firm	-4.441*	(-2.70)
know_ind	-1.324+	(-1.82)
speed_firm	-1.481*	(-2.13)
collab_firm	-28.20*	(-4.76)
collab_ind	-2.110*	(-2.82)
Observations	108	

t statistics in parentheses
+ $p < 0.10$, * $p < 0.05$

by Origin of Idea: Research institution/university/college

	diff.	
speed_ind	1.250+	(1.72)
Observations	108	

t statistics in parentheses
+ $p < 0.10$, * $p < 0.05$

Table 16 Significant results 4

by Origin of Idea: Industry/Firm

	diff.	
success_firm	-30.25*	(-4.32)
success_ind	-5.407*	(-3.35)
know_firm	-6.431*	(-4.01)
know_ind	-1.560*	(-2.13)
speed_firm	-2.038*	(-2.95)
speed_ind	-1.394+	(-1.97)
collab_firm	-21.79*	(-3.47)
collab_ind	-2.453*	(-3.27)
Observations	108	

t statistics in parentheses
+ $p < 0.10$, * $p < 0.05$

by Origin of Idea: FHF

	diff.	
Total Participants including FHF	2.318*	(2.22)
Observations	108	

t statistics in parentheses
+ $p < 0.10$, * $p < 0.05$

by Origin of Idea: Don't know

	diff.	
success_firm	25.47*	(2.54)
know_firm	4.856*	(2.12)
collab_firm	19.49*	(2.22)
collab_ind	2.283*	(2.18)
Observations	108	

t statistics in parentheses
+ $p < 0.10$, * $p < 0.05$

Table 17 Significant results 5

by low experience project responsible in FHF

	diff.	
success_ind	3.337^{+}	(1.89)
know_firm	5.123*	(2.93)
speed_firm	2.650*	(3.70)
Governing organization experience	6.069*	(2.45)
Observations	108	

t statistics in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$

by high experience project responsible in FHF

	diff.	
Governing organization experience	-7.058*	(-3.02)
Observations	108	

t statistics in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$

by Responsible org. low experience

	diff.	
know_ind	-1.505^{+}	(-1.87)
speed_ind	-1.294^{+}	(-1.67)
Observations	108	

t statistics in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$

by Project manager low experience

	diff.	
Total Participants including FHF	-1.513^{+}	(-1.98)
Observations	108	

t statistics in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$

Table 18 Significant results 6

by Project manager high experience		
	diff.	
Total Participants including FHF	1.513^{+}	(1.98)
Observations	108	

t statistics in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$

Table 19 Significant results 7

7.2. Significant findings and the propositions

7.2.1 Propositions on firm characteristics

Proposition 1: Most of the projects funded by FHF belongs to young firms with a low degree of network

H0: Group 1 ≤ Group 0 & Experience Group 1 > Experience Group 0

When analyzing the data, we find that most of the projects in this dataset belong to firms older than five years (Group 0, n=99), which we set as our cut-off point for belonging to the "new" firm (Group 1, n=9) category. However, the sentiment that new firms have a low degree of network holds true.

When testing the firm experience with previous FHF projects by these groups, we find that we can reject H0 at a 5% level. There is a significant difference in the mean between the two groups, and the firms belonging in the new category, group 1, have significantly less experience compared to the firms belonging in group 0.

Result for *Proposition 1: New firms do not perform the majority of projects. New firms, however, do have significantly less experience compared to older firms. We fail to reject H0.*

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	99	9.767677	1.241656	12.35432	7.303652	12.2317
1	9	1.555556	.3767961	1.130388	.6866622	2.424449
combined	108	9.083333	1.159048	12.04518	6.785655	11.38101
diff		8.212121	4.13714		.0098387	16.4144

diff = mean(0) - mean(1) t = 1.9850
Ho: diff = 0 degrees of freedom = 106

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.9751 Pr(|T| > |t|) = 0.0497 Pr(T > t) = 0.0249

Table 20 T-test proposition 1

Proposition 2: Well-established firms are more successful in collaboration.

Our null hypothesis being that well-established and newer firms are equally successful in collaboration.

No significant results were found. We are unable to reject the null hypothesis and as such we cannot demonstrate a significant difference between newer and well-established firms when it comes to successful collaboration.

Proposition 3: The larger the firm size, the more successful, and the more extensive is the collaboration.

Our null hypothesis being that firms of a large size are equally successful and have equally extensive collaboration as the rest of the firms.

Three significant results were found, but they were all contrary to our proposition. We are unable to reject the null hypothesis. We are unable to demonstrate a significant and positive relationship between larger firms and success and extent of collaboration.

Proposition 3.8 The firms in the top quartile of number of employees (Group 1) will have a higher project success score compared to the remaining firms (group 0) from a firm perspective.

H0: success_firm Group 1 = success_firm Group 0

As we can see from the data, there is a significant difference in the mean between the two groups; group 1 has a lower mean than group 0.

Result Proposition 3.8: We can reject H0 at a 10% level, but the result is contrary to our proposition.

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	81	154	4.063804	36.57424	145.9128	162.0872
1	27	142.2963	7.911515	41.10944	126.0339	158.5586
combined	108	151.0741	3.647303	37.90389	143.8437	158.3044
diff		11.7037	8.386028		-4.922413	28.32982

diff = mean(0) - mean(1) t = 1.3956
Ho: diff = 0 degrees of freedom = 106

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.9171 Pr(|T| > |t|) = 0.1657 Pr(T > t) = 0.0829

Table 21 T-test proposition 3.8

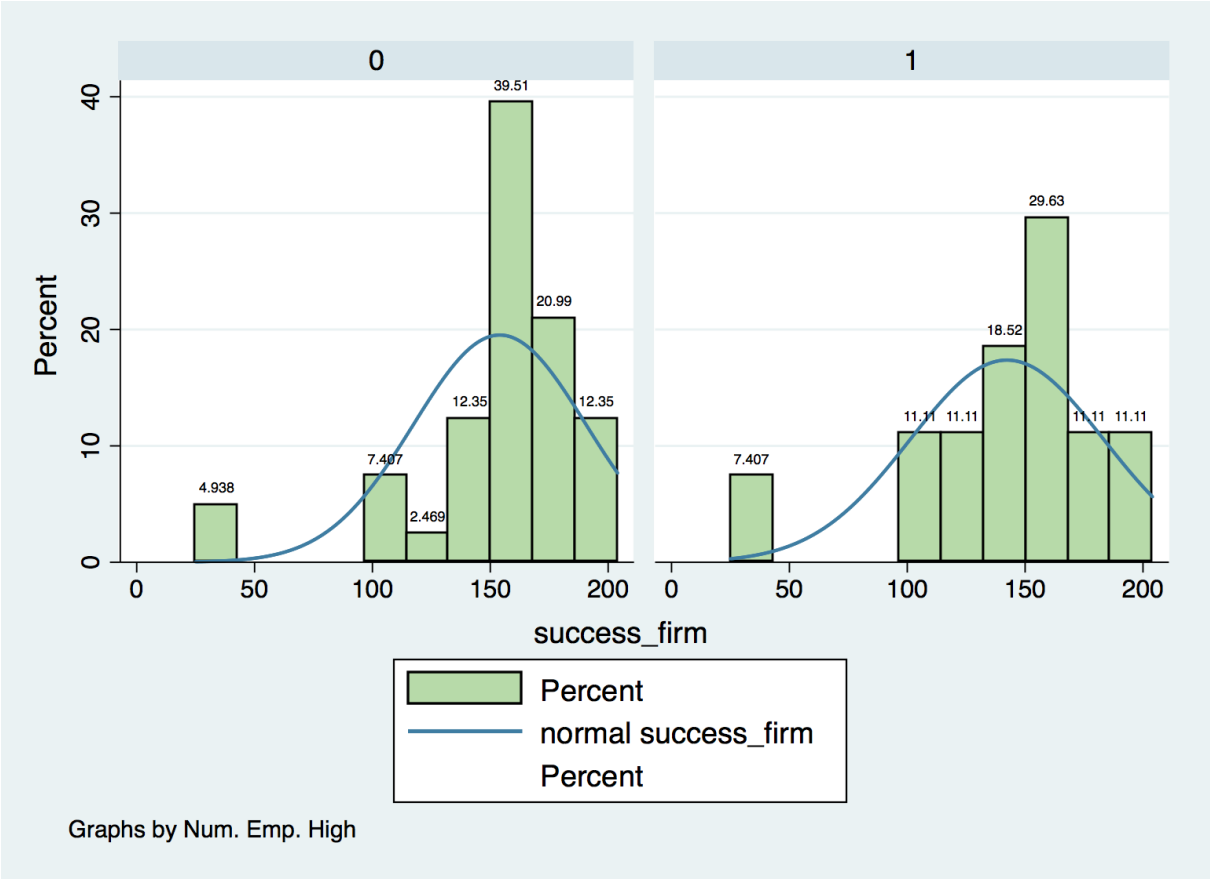

Table 22 Distribution Proposition 3.8

Proposition 3.12 The firms in the top quartile of Revenue (Group 1) will have a higher project success score compared to the remaining firms (group 0) from a firm perspective.

H0: success_firm Group 1 = success_firm Group 0

There is a significant difference between the mean of the two groups at the 5% level. The firms in the top quartile of earnings demonstrate a lower project success score in a firm perspective, relative to the rest of the population. This finding is contrary to our proposition.

Results Proposition 3.12: We reject H0 at 5% level.

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	81	154.9753	3.970181	35.73163	147.0744	162.8762
1	27	139.3704	8.152421	42.36122	122.6128	156.1279
combined	108	151.0741	3.647303	37.90389	143.8437	158.3044
diff		15.60494	8.325888		-.9019436	32.11182

diff = mean(0) - mean(1) t = 1.8743

Ho: diff = 0 degrees of freedom = 106

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0

Pr(T < t) = 0.9682 Pr(|T| > |t|) = 0.0636 Pr(T > t) = 0.0318

Table 23T-test Proposition 3.12

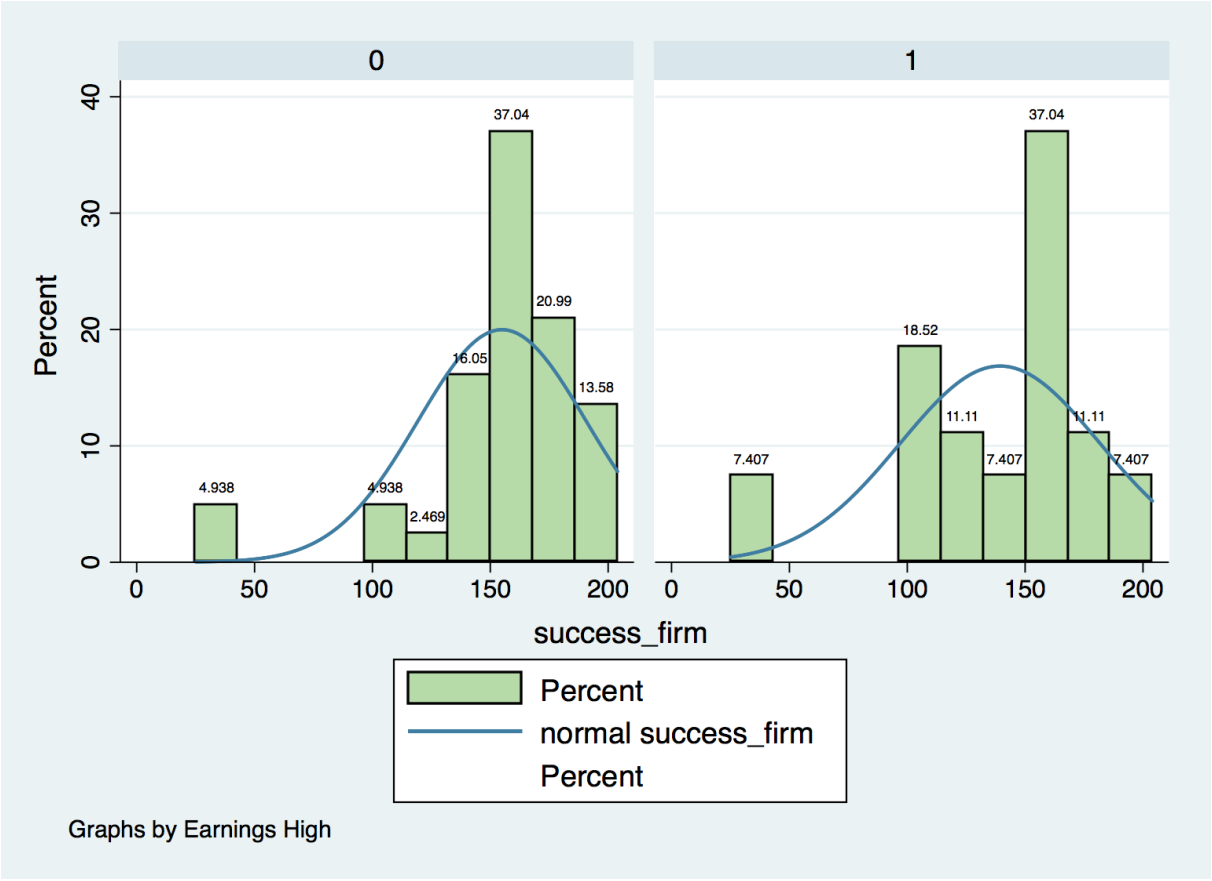

Table 24 Distribution Proposition 3.12

Proposition 3.18 The firms in the top quartile of number of employees (Group 1) will have higher total project participants compared to the remaining firms (group 0).

H0: TotalParticipantsincludingFHF 1 = TotalParticipantsincludingFHF Group 0

There is a significant difference between the mean of the two groups at 10% level. This is contrary to our proposition. The projects by firms in the top quartile of revenue have fewer total participants compared to the rest of the population.

Results Proposition 3.18: We reject H0 at 10% level.

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	81	11.4321	.4547209	4.092488	10.52718	12.33702
1	27	10.22222	.5238835	2.722179	9.145364	11.29908
combined	108	11.12963	.3676736	3.820977	10.40076	11.8585
diff		1.209877	.8449693		-.4653572	2.88511

diff = mean(0) - mean(1) t = 1.4319

Ho: diff = 0 degrees of freedom = 106

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0

Pr(T < t) = 0.9224 Pr(|T| > |t|) = 0.1551 Pr(T > t) = 0.0776

Table 25 T-test proposition 3.18

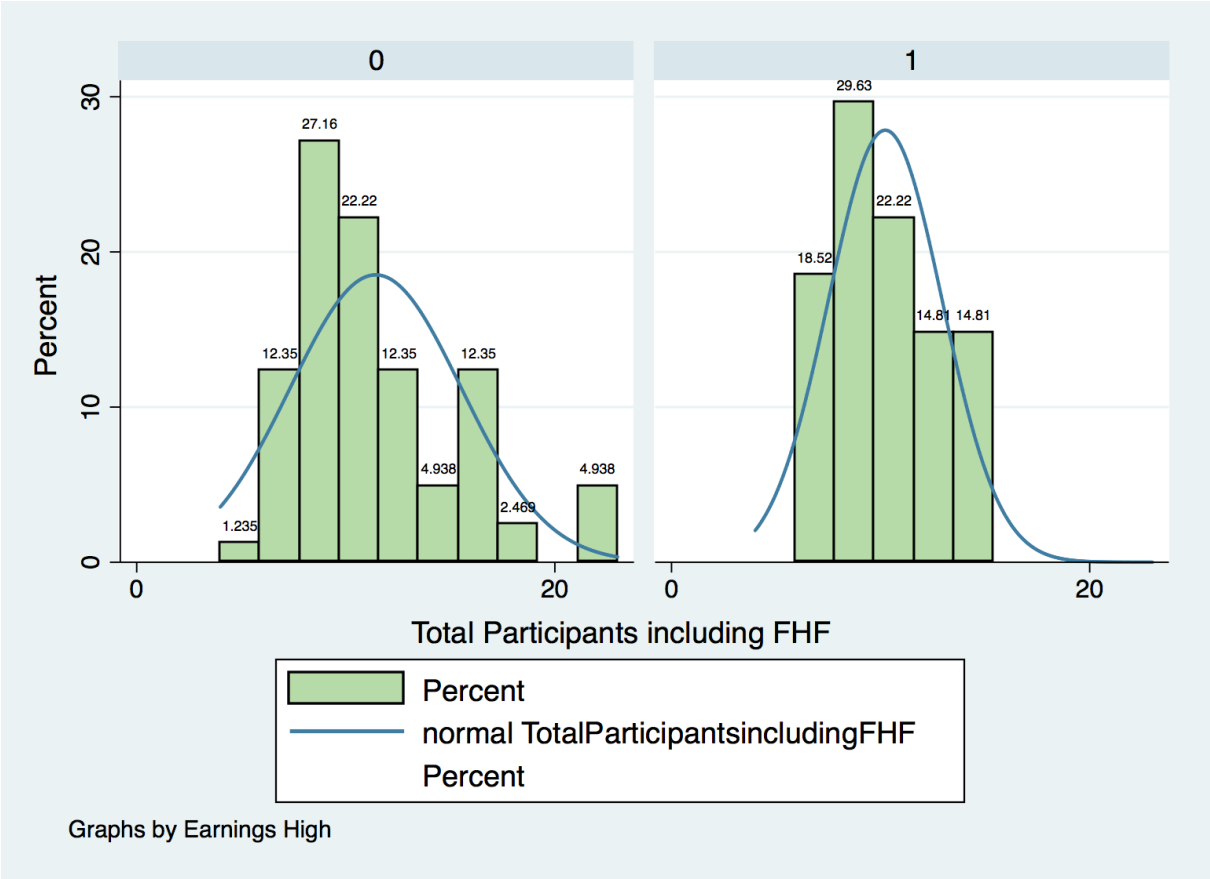

Table 26 Distribution proposition 3.18

Proposition 4: The smaller the firm size, the higher level of speed/ acceleration of projects.

Our null hypothesis is that smaller firms have an equal level of speed/acceleration to the rest.

Two significant results were found, but they were both contrary and in direct opposition of our proposition. According to the results firms in the top quartile of number of employees enjoy a higher speed/acceleration score compared to the rest, and firms in the top quartile of results pre-taxes also have a higher speed/acceleration then the rest.

We fail to reject the null hypothesis.

Proposition 4.2 The firms in the top quartile of number of employees (Group 1) will have lower speed/acceleration compared to the remaining firms (group 0) in an industry perspective.

H0: speed_ind Group 1 = speed_ind Group 0

The difference between the mean between the two groups is significant and negative at 10% level; the top quartile of firms by numbers of employees have a higher speed/acceleration compared to the rest of the population. This finding is contrary to our proposition.

Results Proposition 4.2: H0 rejected at 10% level.

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	81	7.45679	.4086448	3.677803	6.643561	8.270019
1	27	8.740741	.623821	3.241469	7.458458	10.02302
combined	108	7.777778	.3466532	3.602526	7.090578	8.464977
diff		-1.283951	.7946021		-2.859327	.2914253

diff = mean(0) - mean(1) t = -1.6158
Ho: diff = 0 degrees of freedom = 106

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.0546 Pr(|T| > |t|) = 0.1091 Pr(T > t) = 0.9454

Table 27 T-test proposition 4.2

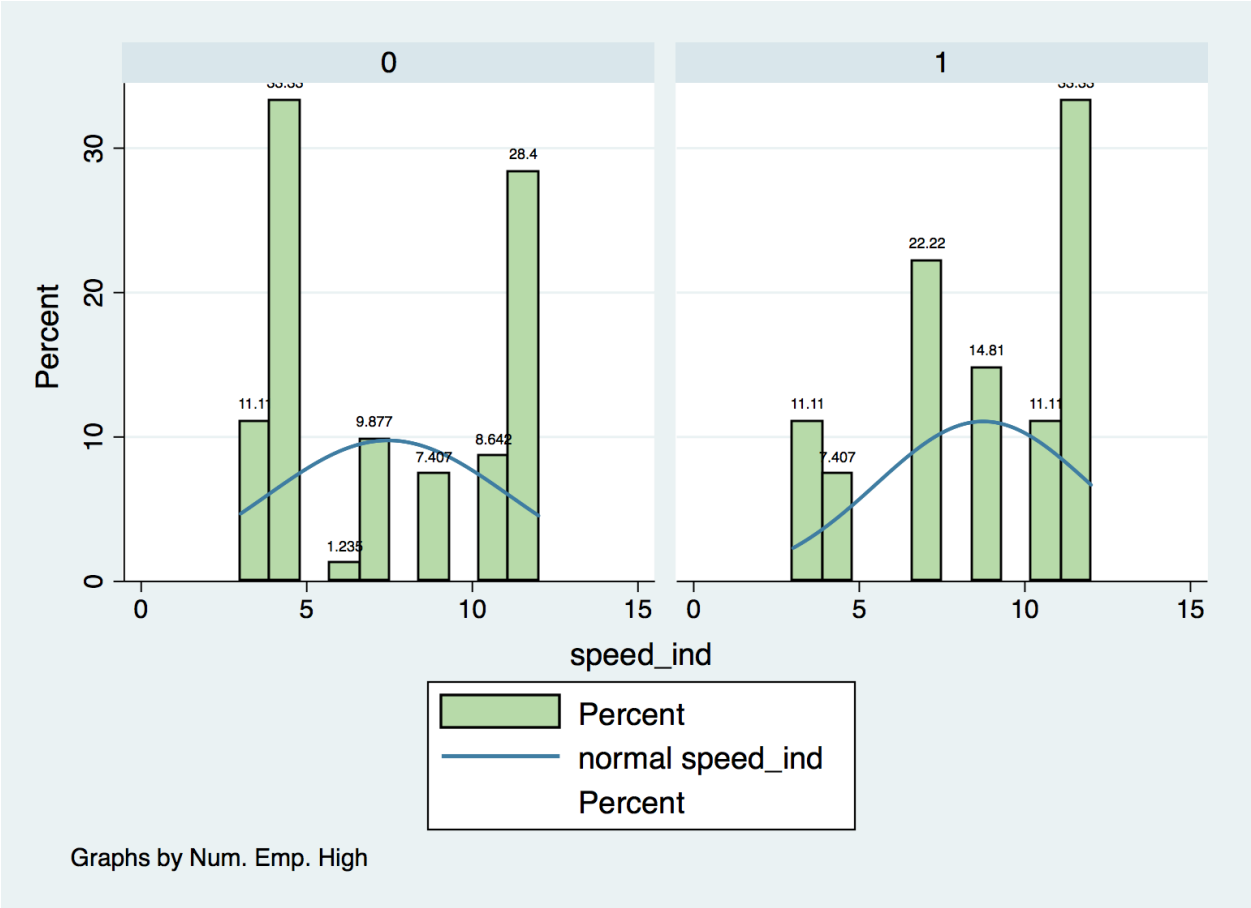

Table 28 Distribution proposition 4.2

Proposition 4.9 The firms in the top quartile of results pre-taxes (Group 1) will have lower speed/acceleration compared to the remaining firms (group 0) from a firm perspective.

H0: speed_firm Group 1 = speed_firm Group 0

Here we see that there is a significant and negative difference in the mean between the groups at 5% level. Group 1 has a higher mean, indicating a higher speed/acceleration, which is contrary to our proposition.

Results Proposition 4.9: H0 rejected at 5% level.

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	81	5.950617	.3848606	3.463745	5.18472	6.716514
1	27	7.481481	.730629	3.79646	5.979652	8.983311
combined	108	6.333333	.3458201	3.593868	5.647785	7.018881
diff		-1.530864	.7884985		-3.094139	.0324108

diff = mean(0) - mean(1) t = -1.9415

Ho: diff = 0 degrees of freedom = 106

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0

Pr(T < t) = 0.0274 Pr(|T| > |t|) = 0.0549 Pr(T > t) = 0.9726

Table 29 T-test proposition 4.9

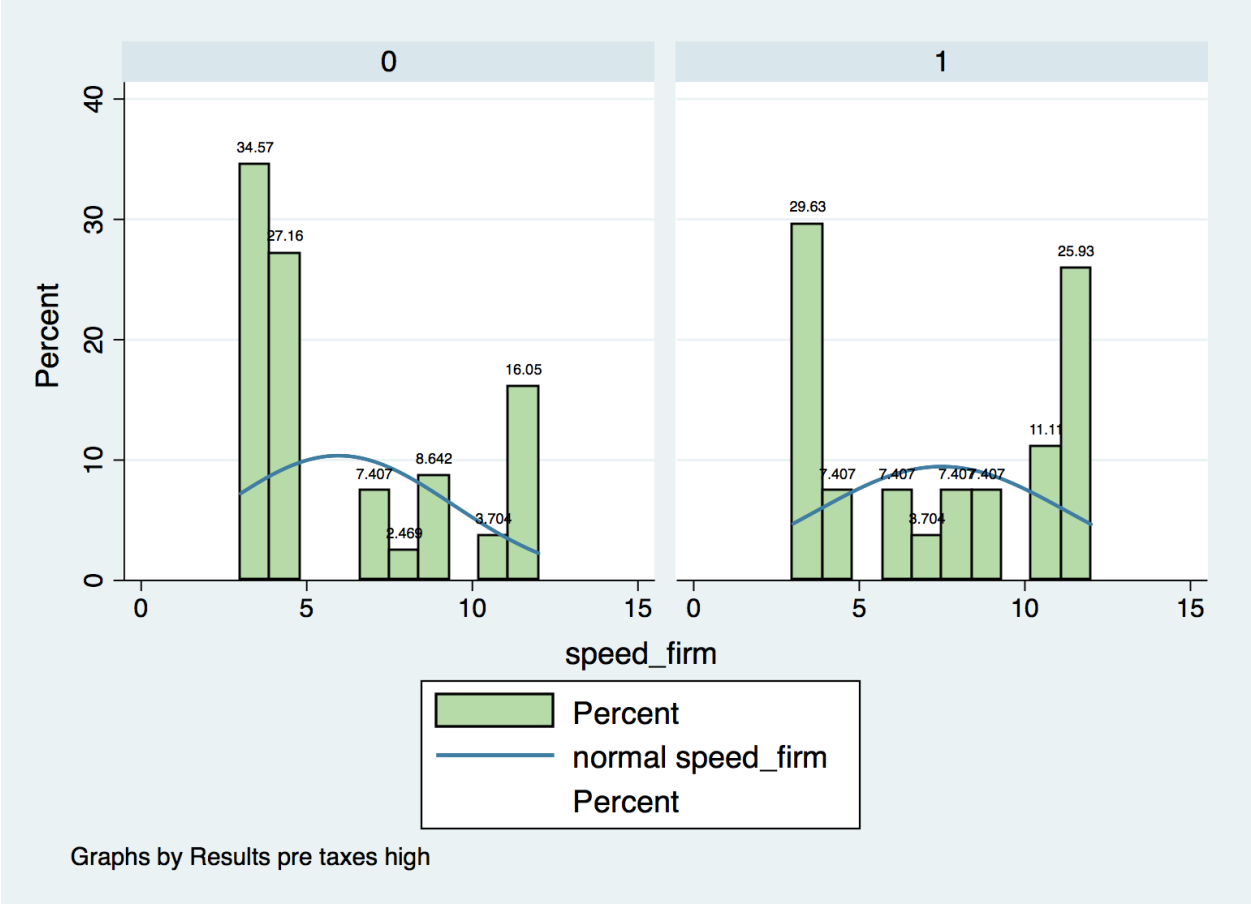

Table 30 Distribution proposition 4.9

Proposition 5: A firm that has previously been involved with R&D projects will be more successful in collaborations

Our null hypothesis here is that previous experience does not influence successful collaboration score.

We have two significant results, both contrary to our proposition. They demonstrate a significantly lower level of collaborative success for the firms belonging to the top quartile of previous experience with FHF projects, both in a firm and in an industry perspective.

We reject the null hypothesis; previous experience with FHF projects directly and negatively impacts the collaborative success score.

Proposition 5.6: The collaborative score in an industry perspective of firms in the top quartile of firm experience (group 1) will be higher compared to the rest of the population (group 0).

H0: collab_ind Group 1 = collab_ind Group 0.

There is a significant and positive difference in the mean between the two groups; group 1 has a lower mean at the 5% level. This means that firms in the highest quartile of experience have a lower collaborative success score in an industry perspective. This is contrary to our proposition.

Results Proposition 5.6: We reject H0 at a 5% level.

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	75	13.44	.4254261	3.684298	12.59232	14.28768
1	33	11.81818	.74551	4.282629	10.29963	13.33674
combined	108	12.94444	.3780571	3.928885	12.19499	13.6939
diff		1.621818	.8093932		.0171175	3.226519

diff = mean(0) − mean(1) t = 2.0037

Ho: diff = 0 degrees of freedom = 106

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0

Pr(T < t) = 0.9762 Pr(|T| > |t|) = 0.0476 Pr(T > t) = 0.0238

Table 31 T-test proposition 5.6

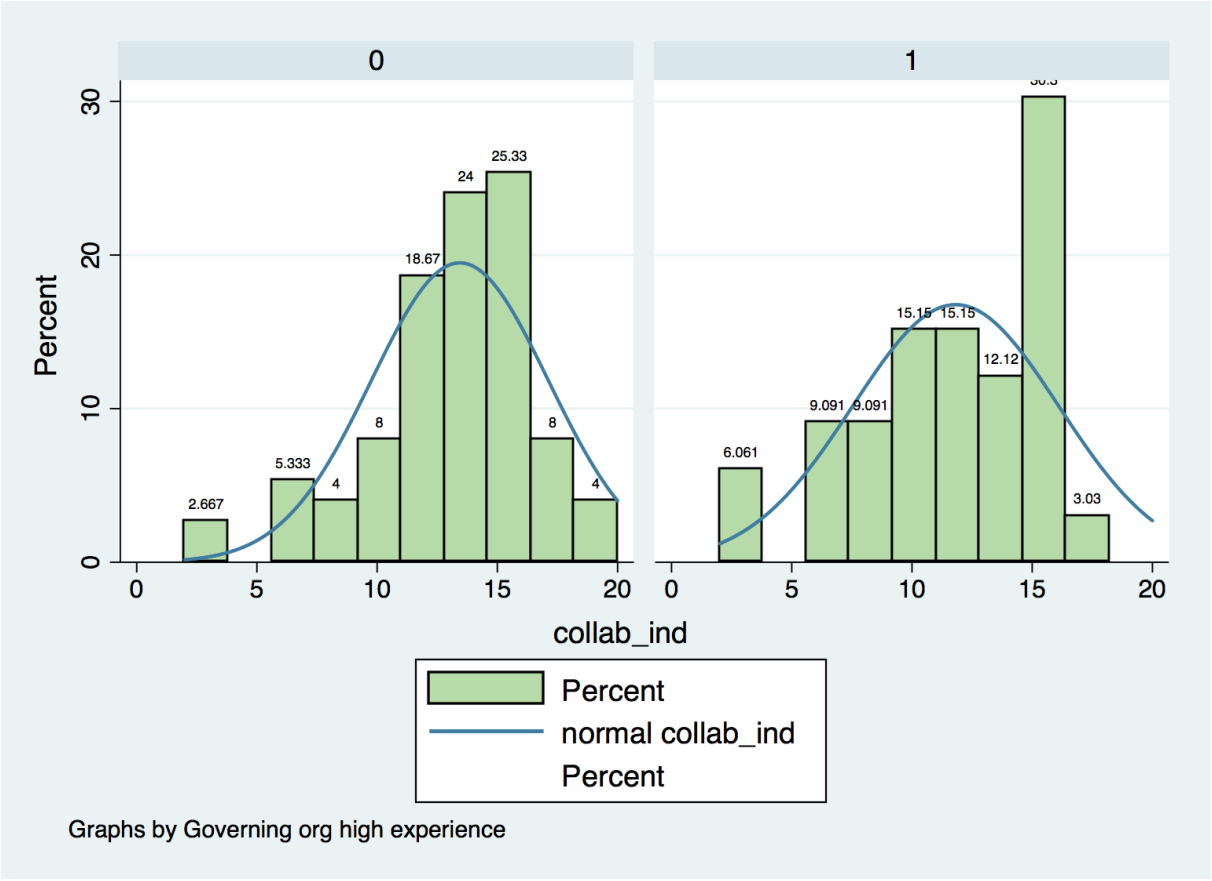

Table 32 Distribution proposition 5.6

Proposition 5.8: The collaborative score in an industry perspective of firms in the top quartile of firm experience (group 1) will be higher compared to the rest of the population (group 0).

H0: collab_firm Group 1 = collab_firm Group 0.

There is a significant and positive difference in the mean between the two groups; group 1 has a lower mean at the 10% level. This means that firms in the highest quartile of experience have a lower collaborative success score in an industry perspective. This is contrary to our proposition.

Results Proposition 5.8: We reject H0 at a 10% level.

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	75	133.36	3.738846	32.37936	125.9102	140.8098
1	33	123.7273	5.939128	34.11769	111.6297	135.8249
combined	108	130.4167	3.181352	33.06158	124.11	136.7233
diff		9.632727	6.875471		-3.998563	23.26402

diff = mean(0) - mean(1) t = 1.4010

Ho: diff = 0 degrees of freedom = 106

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0

Pr(T < t) = 0.9179 Pr(|T| > |t|) = 0.1641 Pr(T > t) = 0.0821

Table 33 T-test proposition 5.8

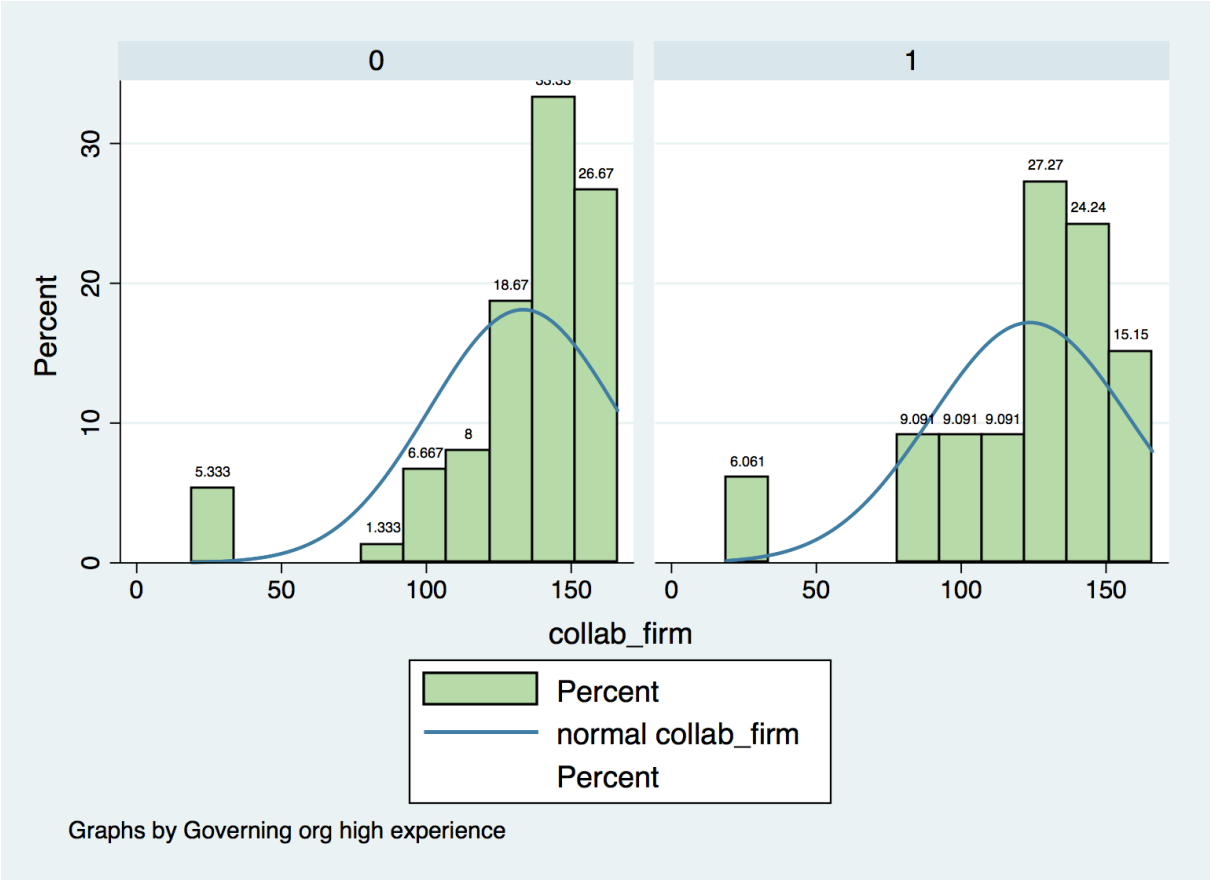

Table 34 Distribution proposition 5.8

Proposition 6: A firm that has previously been involved with R&D projects will be more successful (in general)

Our null hypothesis here is that previous experience with FHF R&D projects does not lead to a higher project success score.

We have one significant result showing that projects in the top quartile of project experience have a higher project success score compared to the those not in the top quartile of project experience. This is in line with our proposition. The other results are inconclusive where we fail to reject the null. In total we are unable to reject the Null hypothesis for this proposition. Tests are inconclusive as to the positive effects of prior R&D experience.

Proposition 6.7 The projects at the top quartile of project experience (group 1) will have more success in a firm perspective compared to the rest of the population (group 0).

H0: success_firm Group 1 = success_firm Group 0

There is a significant difference between the mean of the two groups at 10% level. This is in line with our proposition. Projects at the top quartile of project experience (group 1) have a higher success in a firm perspective, compared to the rest of the population (group 0).

Results proposition 6.7: We reject H0 at 10%.

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	80	147.5625	4.576524	40.93367	138.4532	156.6718
1	28	161.1071	4.818488	25.49704	151.2204	170.9939
combined	108	151.0741	3.647303	37.90389	143.8437	158.3044
diff		-13.54464	8.257872		-29.91668	2.827392

diff = mean(0) - mean(1) t = -1.6402
Ho: diff = 0 degrees of freedom = 106

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.0520 Pr(|T| > |t|) = 0.1039 Pr(T > t) = 0.9480

Table 35 T-test proposition 6.7

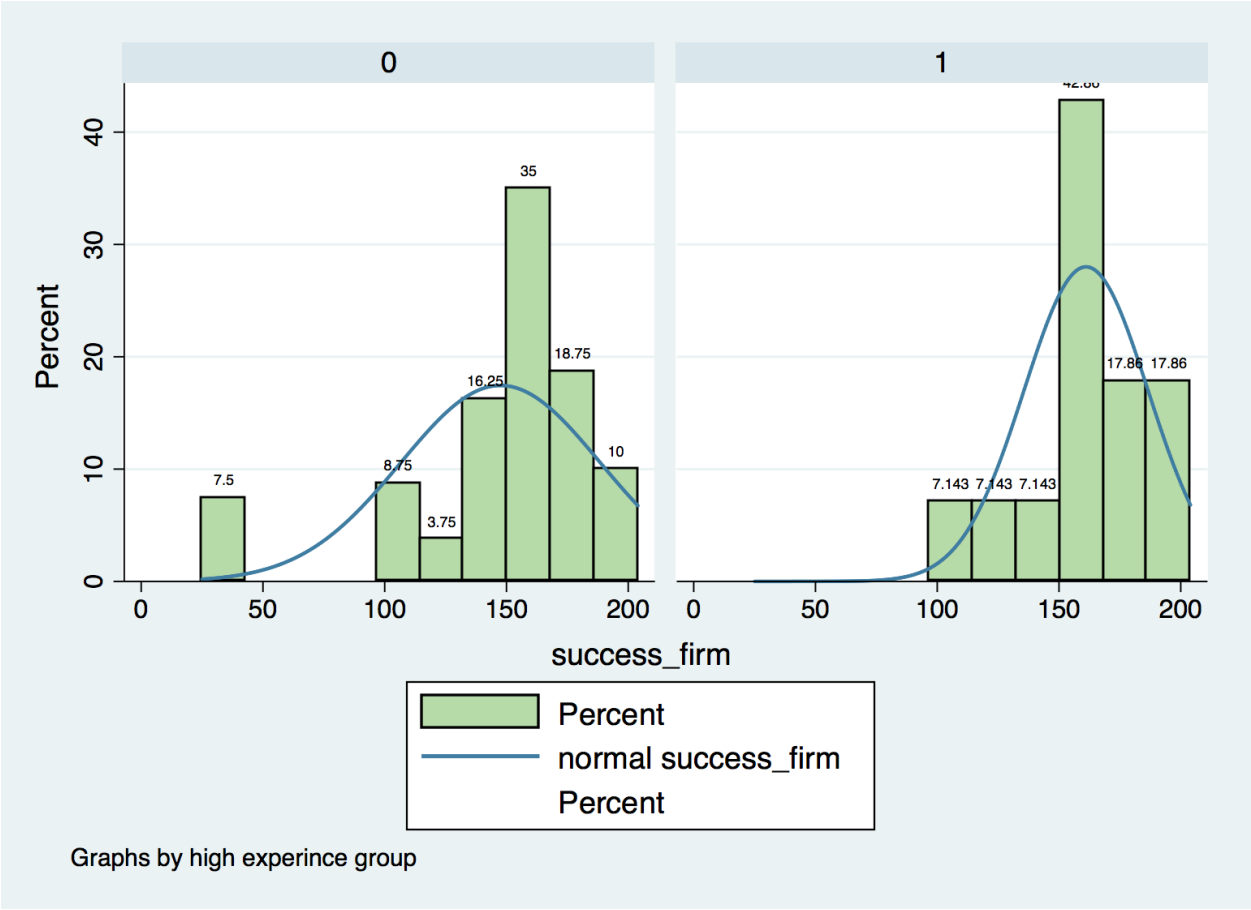

Table 36 Distribution proposition 6.7

7.2.2 Propositions on project related factors

Proposition 7: The longer the duration of a project, the more successful it is

Here our Null hypothesis is that project duration has no impact on project success. We have one significant result where the projects with the longest duration have a significantly higher project success score in an industry perspective. The other results were inconclusive. We fail to reject the Null hypothesis for this proposition.

Proposition 7.2 The projects at the top quartile of project length (group 1) will have more success in an industry perspective compared to the remaining population (group 0).

H0: success_ind Group 1 = success_ind Group 0

There is a significant difference between the mean of the two groups at a 10% level. This is in line with our proposition. Projects at the top quartile of project length (group 1) have a higher success in an industry perspective, compared to the rest of the population (group 0).

Results proposition 7.2: We reject H0 at 10%.

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	81	24.7284	.8813942	7.932547	22.97436	26.48243
1	27	27.33333	1.896165	9.852762	23.43571	31.23096
combined	108	25.37963	.8160426	8.480563	23.76192	26.99734
diff		-2.604938	1.876457		-6.325198	1.115321

diff = mean(0) - mean(1) t = -1.3882
Ho: diff = 0 degrees of freedom = 106

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.0840 Pr(|T| > |t|) = 0.1680 Pr(T > t) = 0.9160

Table 37 T-test proposition 7.2

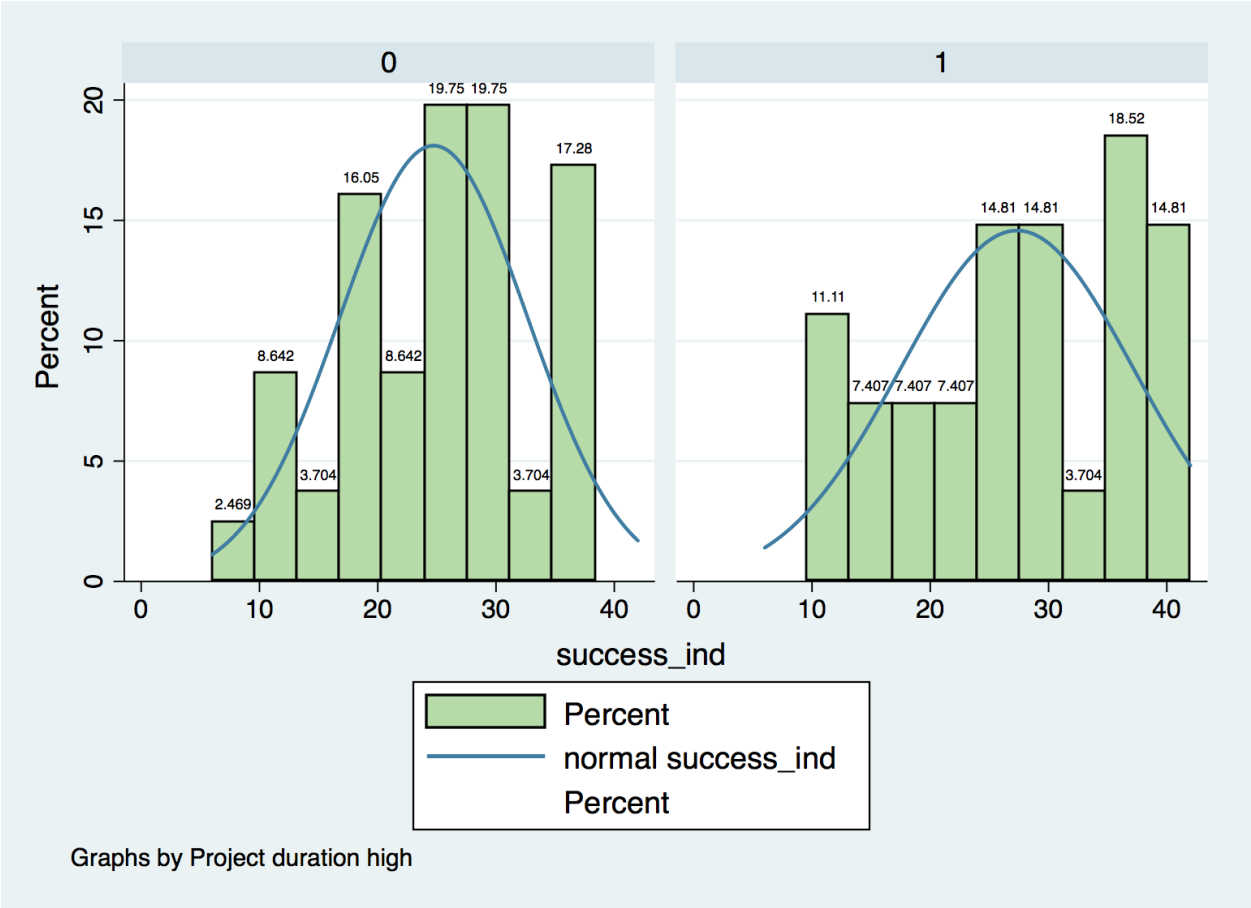

Table 38 Distribution proposition 7.2

Proposition 8: A more substantial number of participants in a project will lead to a higher project success score.

Here our null hypothesis is that a higher number of participants will not affect project success. We have no significant results for this proposition. We fail to reject the null hypothesis.

Proposition 9: Projects consisting of a majority of partners from the industry will be more successful

Here our null hypothesis is that the background of the partners is inconsequential for the success. We have two significant results, both in line with our proposition. We can reject the null hypothesis. Having a majority of participants with an industry background is associated with a higher success score, both in a firm and in an industry perspective.

Proposition 9.1 The projects where group 1 represents a majority of participants with industry background will be more successful in an industry perspective compared to group 0, representing the remaining of the population.

H0: success_ind Group 1 = success_ind Group 0

There is a significant difference between the mean of the two groups at a 5% level. This is in line with our proposition. The projects where the majority of participants have industry background (group 1) is more successful in an industry perspective compared to the remaining of the population (group 0).

Results proposition 9.1: We reject H0 at 5% level.

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	35	23.65714	1.371954	8.116587	20.869	26.44529
1	65	26.78462	1.017985	8.207261	24.75096	28.81828
combined	100	25.69	.8271522	8.271522	24.04875	27.33125
diff		-3.127473	1.714138		-6.529123	.2741784

diff = mean(0) - mean(1) t = -1.8245
Ho: diff = 0 degrees of freedom = 98

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.0356 Pr(|T| > |t|) = 0.0711 Pr(T > t) = 0.9644

Table 39 T-test proposition 9.1

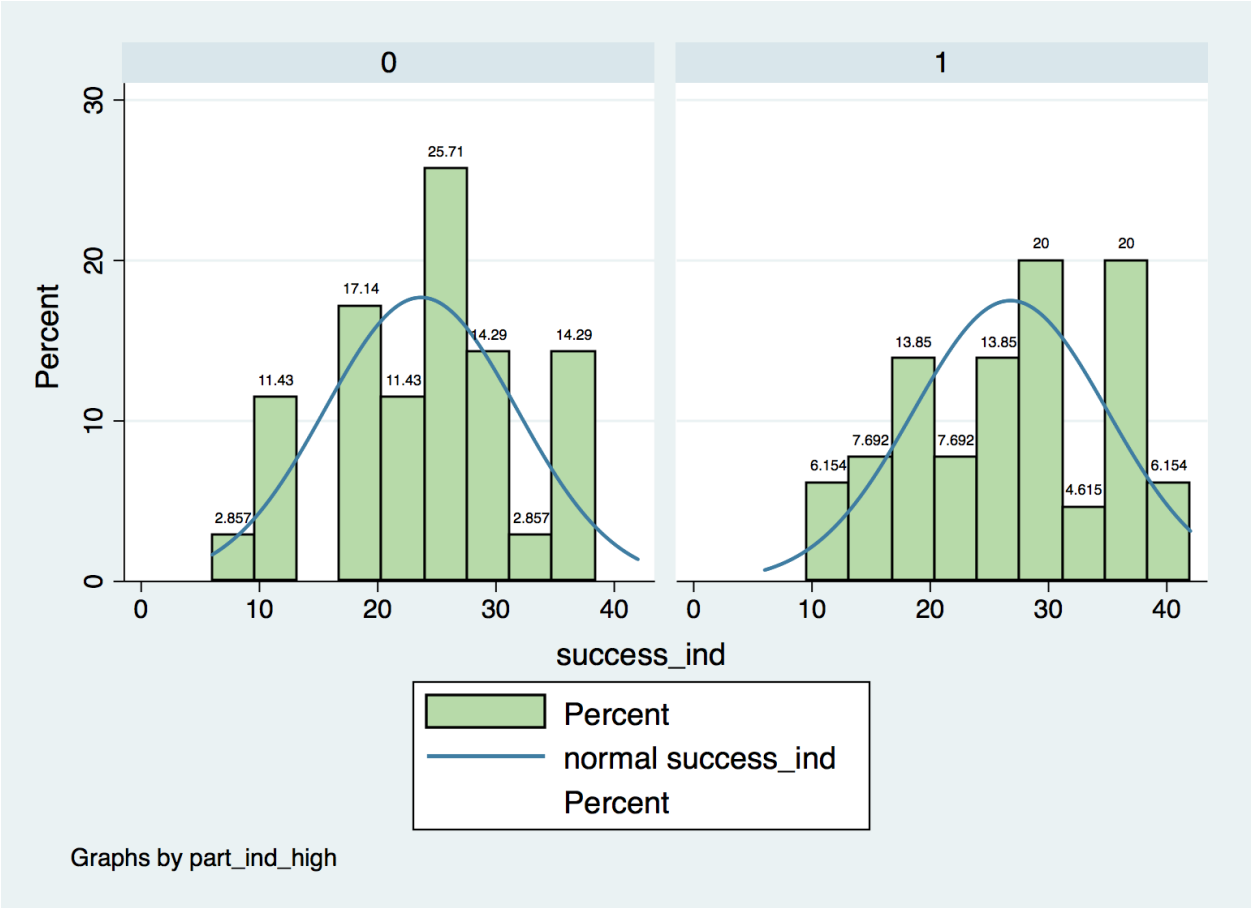

Table 40 Distribution proposition 9.1

Proposition 9.2 The projects where group 1 represents a majority of participants with industry background will be more successful in a firm perspective compared to group 0, representing the remaining of the population.

H0: success_firm Group 1 = success_firm Group 0

There is a significant difference between the mean of the two groups at a 1% level. This is in line with our proposition. The projects where the majority of participants have industry background (group 1) is more successful in a firm perspective compared to the remaining of the population (group 0).

Results proposition 9.2: We reject H0 at 1% level.

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	35	141.0286	8.514396	50.37184	123.7252	158.3319
1	65	159.1538	2.929478	23.61821	153.3015	165.0062
combined	100	152.81	3.615949	36.15949	145.6352	159.9848
diff		-18.12527	7.396423		-32.80324	-3.447313

diff = mean(0) - mean(1) t = -2.4505
Ho: diff = 0 degrees of freedom = 98

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.0080 Pr(|T| > |t|) = 0.0160 Pr(T > t) = 0.9920

Table 41 T-test proposition 9.2

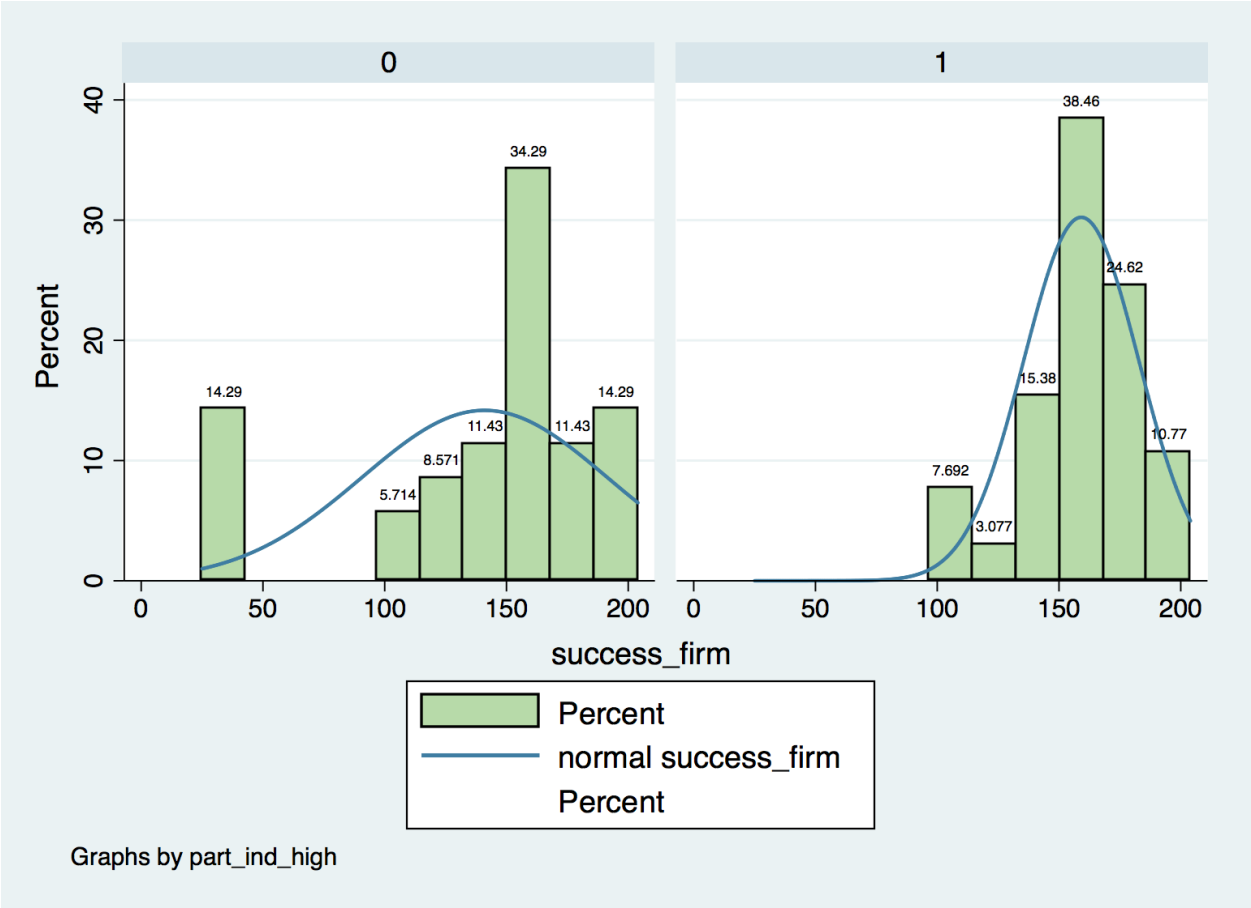

Table 42 Distribution proposition 9.2

Proposition 10: If the project manager of the FHF project comes from the industry, the project is more successful.

Here the Null hypothesis is that the background of the project manager does not influence project success. We have two significant results, both in line with our proposition. We can reject the Null hypothesis. A project manager with an industry background is associated with a higher project success, both in a firm and in an industry perspective.

Proposition 10.1 The projects where group 1 represents that the project manager is from the industry will have a more successful project in an industry perspective compared to group 0 representing that the project manager is from a research institution.

H0: success_ind Group 1 = success_ind Group 0

There is a significant difference between the mean of the two groups at a 10% level. This is in line with our proposition. The projects where the project manager is from the industry (group 1) is more successful in an industry perspective compared to if the project manager is from a research institution (group 0).

Results proposition 10.1: We reject H0 at 10% level.

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	90	24.88889	.9042064	8.578055	23.09225	26.68553
1	18	27.83333	1.822607	7.732666	23.98797	31.6787
combined	108	25.37963	.8160426	8.480563	23.76192	26.99734
diff		-2.944444	2.181308		-7.2691	1.380212

diff = mean(0) - mean(1) t = -1.3499
Ho: diff = 0 degrees of freedom = 106

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.0900 Pr(|T| > |t|) = 0.1799 Pr(T > t) = 0.9100

Table 43 T-test proposition 10.1

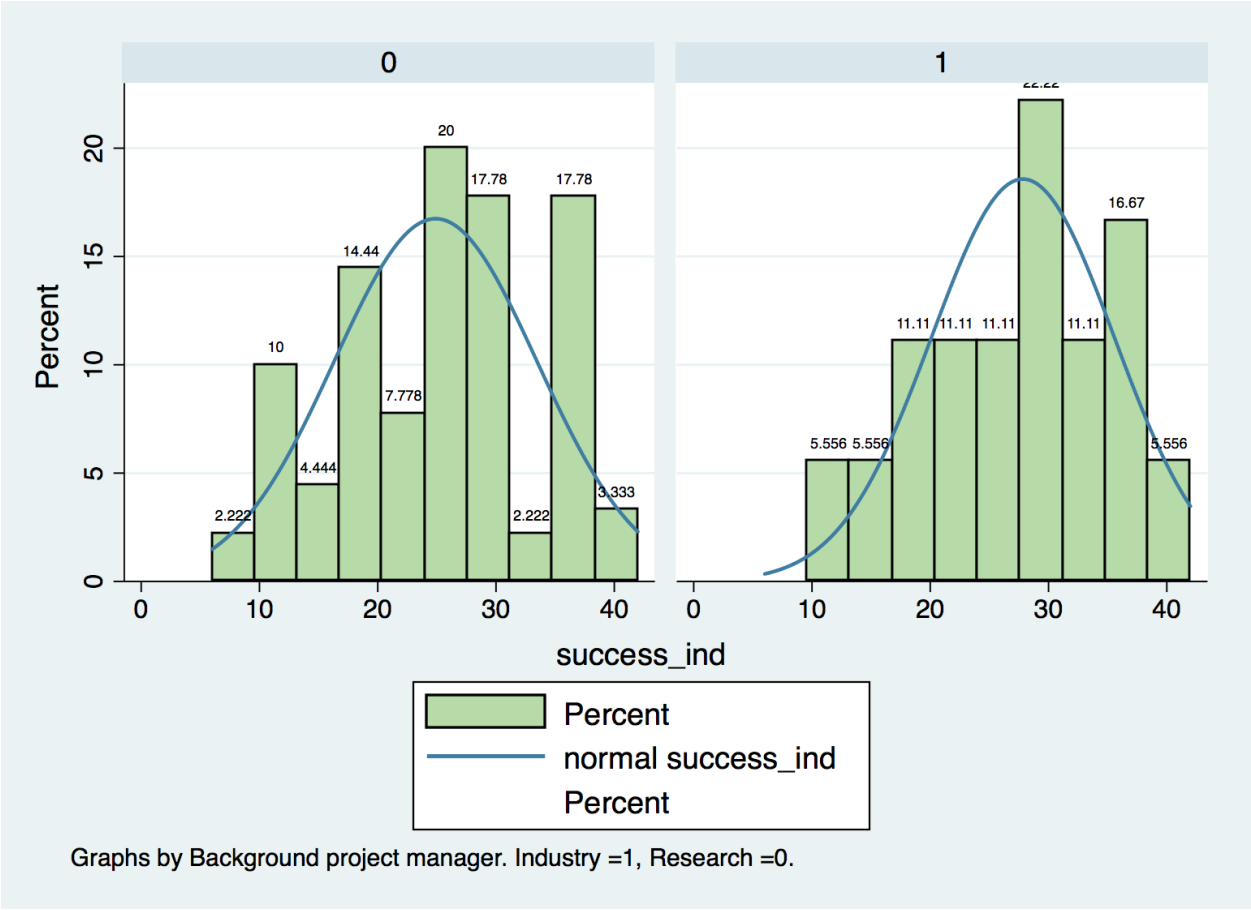

Table 44 Distribution proposition 10.1

Proposition 10.2 The projects where group 1 represents that the project manager is from the industry will have a more successful project in a firm perspective compared to group 0 representing that the project manager is from a research institution.

H0: success_ind Group 1 = success_ind Group 0

There is a significant difference between the mean of the two groups at a 5% level. This is in line with our proposition. The projects where the project manager is from the industry (group 1) is more successful in a firm perspective compared to if the project manager is from a research institution (group 0).

Results proposition 10.2: We reject H0 at 5% level.

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	90	147.8333	4.227673	40.10723	139.433	156.2336
1	18	167.2778	3.998207	16.96295	158.8423	175.7133
combined	108	151.0741	3.647303	37.90389	143.8437	158.3044
diff		-19.44444	9.649718		-38.57595	-.3129406

diff = mean(0) - mean(1) t = -2.0150
Ho: diff = 0 degrees of freedom = 106

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.0232 Pr(|T| > |t|) = 0.0464 Pr(T > t) = 0.9768

Table 45 T-test Proposition 10.2

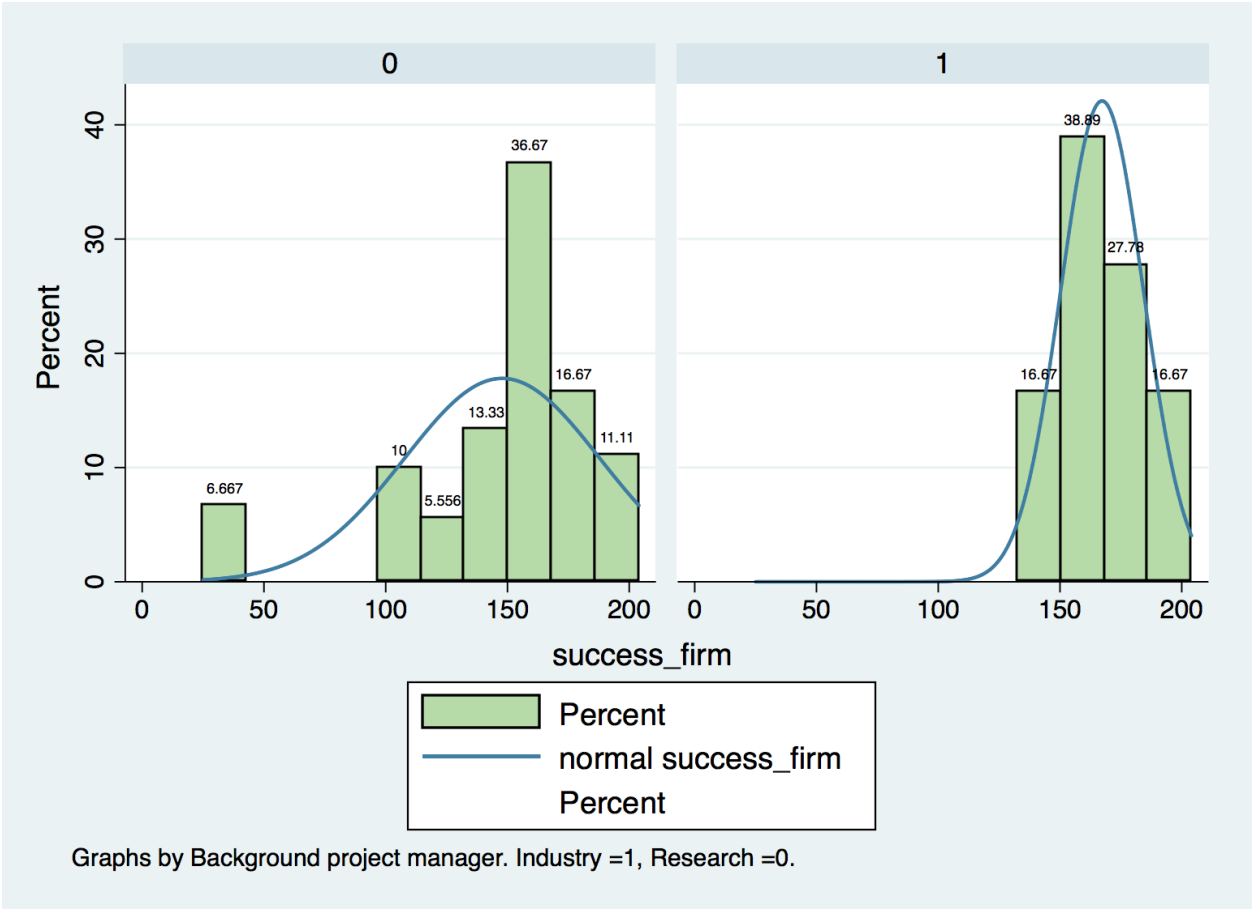

Table 46 Distribution proposition 10.2

Proposition 11: If the respondent of the questionnaire were part of the project description (its goals, activities, deliveries) the project will be more successful

Here our Null hypothesis is that being part of making the project description does not affect the project success score. We have two significant results, both in line with our proposition. We can reject the null hypothesis. Being part of the project description does significantly and positively affect the project success score, both in a firm and in an industry perspective.

Proposition 11. 1 The projects where group 1 ("JA") has been part of the project description will have a more successful project in an industry perspective compared to group 0 ("NEI") who has not been part of the project description.

H0: success_ind Group "JA" = success_ind Group "NEI"

There is a significant difference between the mean of the two groups at 5% level. This is in line with our proposition. The projects where the respondent have been part of the project description ("JA") will have a more successful project in an industry perspective compared to those who have not ("NEI").

Results proposition 11.1: We reject H0 at 5% level.

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
NEI	43	22.67442	1.48515	9.738781	19.67726	25.67157
JA	65	27.16923	.8755683	7.059057	25.42008	28.91838
combined	108	25.37963	.8160426	8.480563	23.76192	26.99734
diff		-4.494812	1.616984		-7.70064	-1.288984

diff = mean(NEI) - mean(JA) t = -2.7798
Ho: diff = 0 degrees of freedom = 106

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.0032 Pr(|T| > |t|) = 0.0064 Pr(T > t) = 0.9968

Table 47 T-test proposition 11.1

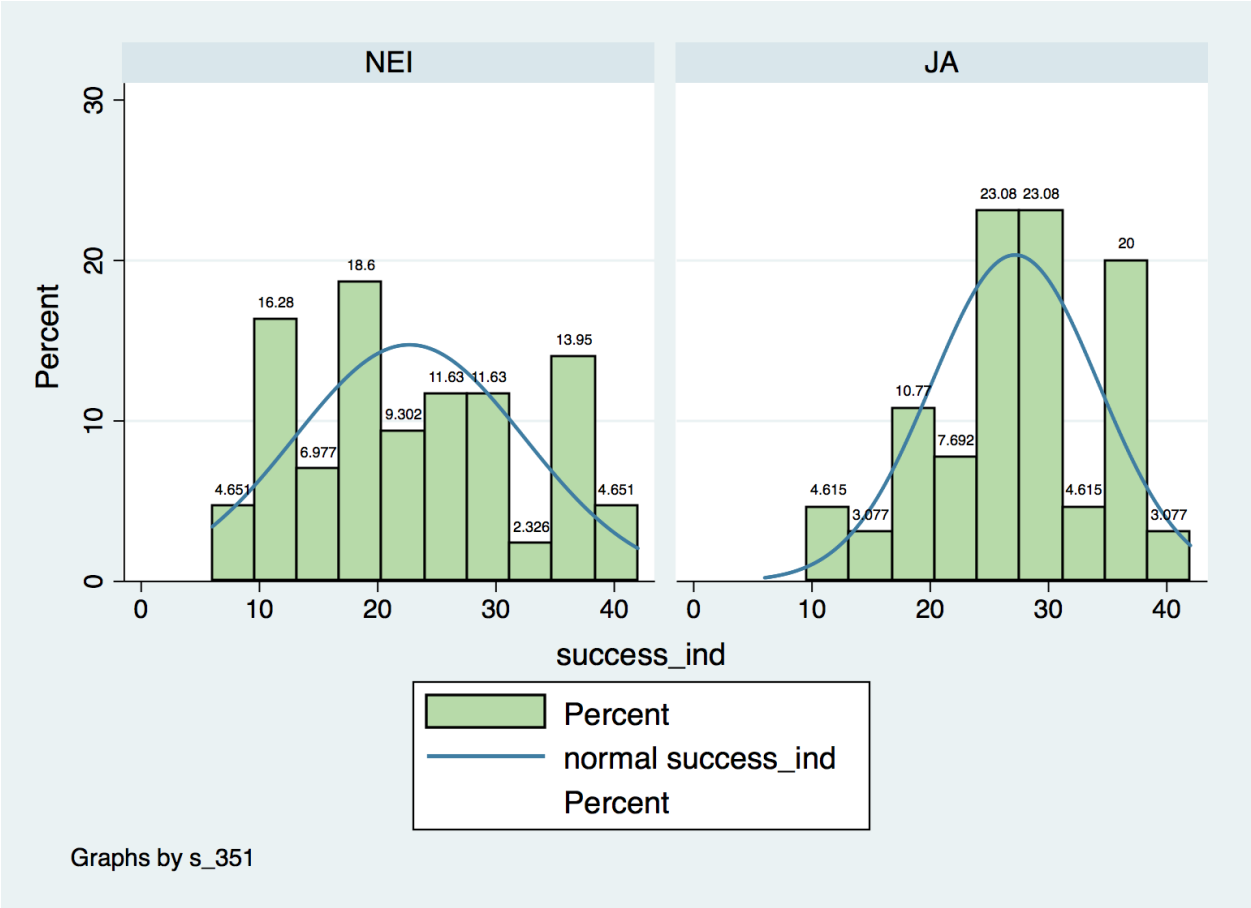

Table 48 Distribution proposition 11.1

Proposition 11. 2 The projects where group 1 ("JA") has been part of the project description will have a more successful project in a firm perspective compared to group 0 ("NEI") who has not been part of the project description.

H0: success_firm Group "JA" = success_firm Group "NEI"

There is a significant difference between the mean of the two groups at 1% level. This is in line with our proposition. The projects where the respondent have been part of the project description ("JA") will have a more successful project in a firm perspective compared to those who have not ("NEI").

Results proposition 11.2: We reject H0 at 1% level.

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
NEI	43	130.5349	7.507276	49.2285	115.3846	145.6852
JA	65	164.6615	2.289323	18.45711	160.0881	169.235
combined	108	151.0741	3.647303	37.90389	143.8437	158.3044
diff		-34.12665	6.712045		-47.43394	-20.81937

diff = mean(NEI) - mean(JA) t = -5.0844
Ho: diff = 0 degrees of freedom = 106

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.0000 Pr(|T| > |t|) = 0.0000 Pr(T > t) = 1.0000

Table 49 T-test proposition 11.2

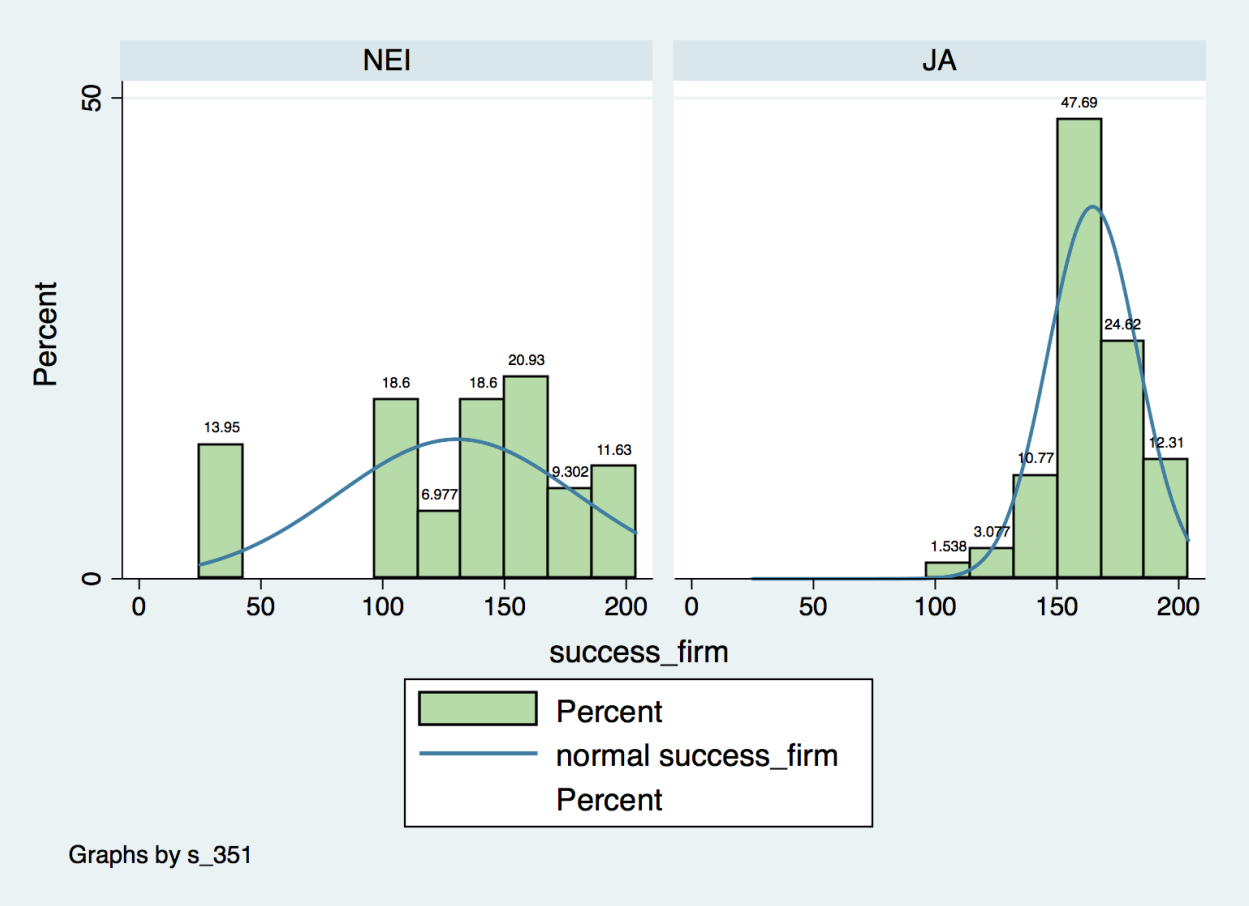

Table 50 Distribution proposition 11.2

Proposition 12: If the idea came from the industry or firm the project is more successful.

Here our Null hypothesis is that origin of the idea does not affect project success. We have four significant results here that are in line with our proposition. If the idea originates from the

firm/industry it is significantly more successful than if it did not originate from the firm/industry, both in a firm and in an industry perspective. Furthermore, if the respondent has no idea where the idea originated from, that is significantly associated with a lower project success score, both in a firm and in an industry perspective. We reject the null hypothesis.

Proposition 12.2 The projects where group 1 ("Valgt") represent that the idea came from the industry or firm will have a more successful project in an industry perspective compared to group 0 ("Ikke valgt") representing that the idea came from others.

H0: success_ind Group "Valgt" = success_ind Group "Ikke valgt"

There is a significant difference between the mean of the two groups at 1%. This is in line with our proposition. The projects where the idea came from the industry or firm ("Valgt") will have a more successful project in an industry perspective compared to if the idea came from others ("Ikke valgt").

Results proposition 12.2: We reject H0 at 1%.

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
Ikke val	40	21.975	1.53985	9.738866	18.86036	25.08964
Valgt	68	27.38235	.8459036	6.9755	25.69392	29.07078
combined	108	25.37963	.8160426	8.480563	23.76192	26.99734
diff		-5.407353	1.614541		-8.608337	-2.206369

diff = mean(**Ikke val**) - mean(**Valgt**) t = **-3.3492**

Ho: diff = 0 degrees of freedom = **106**

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0

Pr(T < t) = **0.0006** Pr(|T| > |t|) = **0.0011** Pr(T > t) = **0.9994**

Table 51 T-test proposition 12.2

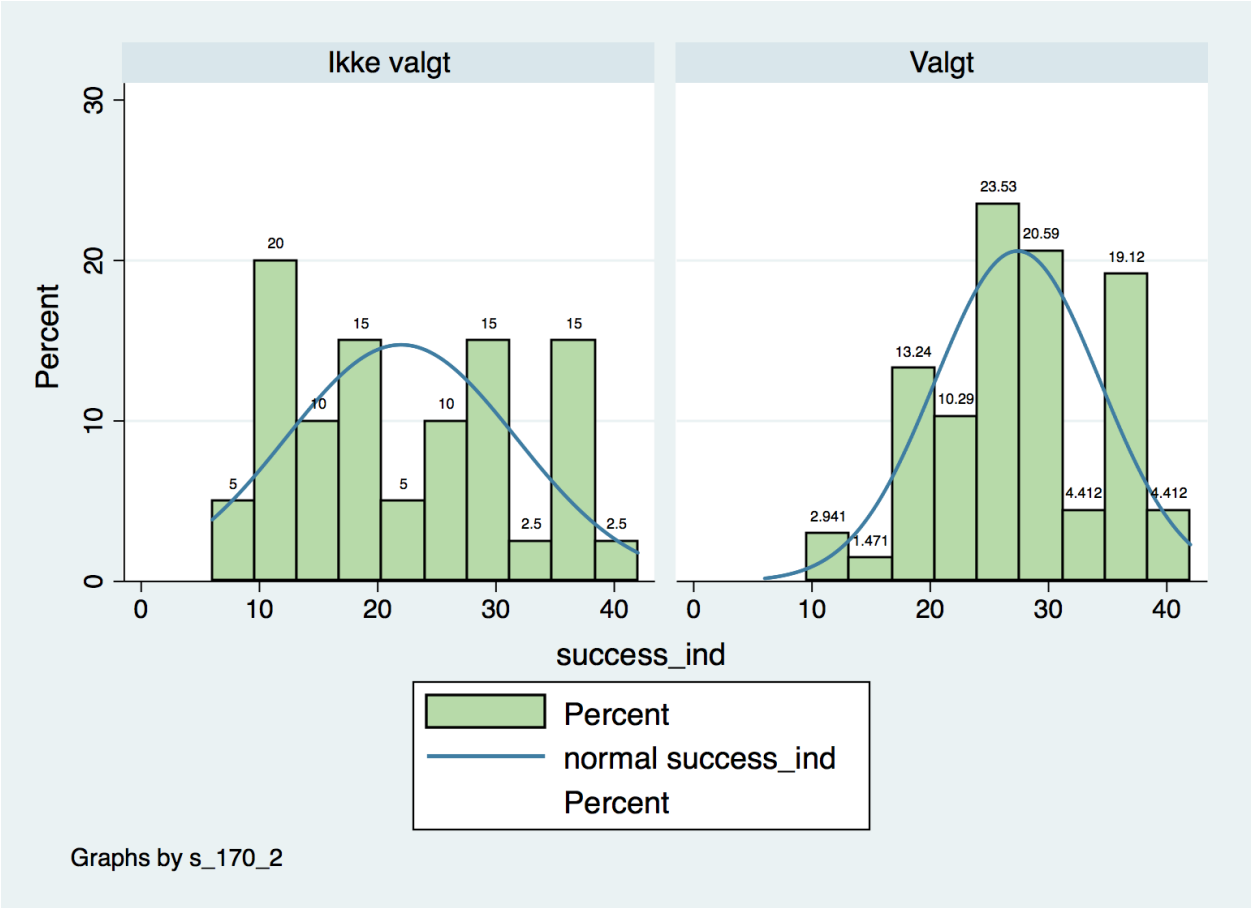

Table 52 Distribution proposition 12.2

Proposition 12.4 The projects where group 1 ("Valgt") represent that the one participating in this survey do not know where the idea came from will have a less successful project in an industry perspective compared to group 0 ("Ikke valgt") representing that they knew where the idea came from.

H0: success_ind Group "Valgt" = success_ind Group "Ikke valgt"

There is a significant difference between the mean of the two groups at 10% level. This is in line with our proposition. The projects where it was not known where the idea came from ("Valgt") will have a less successful project in an industry perspective compared to if it was known where the idea came ("Ikke valgt").

Results proposition 12.4: We reject H0 at 10%.

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
Ikke val	92	25.84783	.8212035	7.876708	24.21661	27.47905
Valgt	16	22.6875	2.823589	11.29436	16.66916	28.70584
combined	108	25.37963	.8160426	8.480563	23.76192	26.99734
diff		3.160326	2.287421		-1.374708	7.69536

diff = mean(**Ikke val**) - mean(**Valgt**) t = **1.3816**

Ho: diff = 0 degrees of freedom = **106**

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0

Pr(T < t) = **0.9150** Pr(|T| > |t|) = **0.1700** Pr(T > t) = **0.0850**

Table 53 T-test proposition 12.4

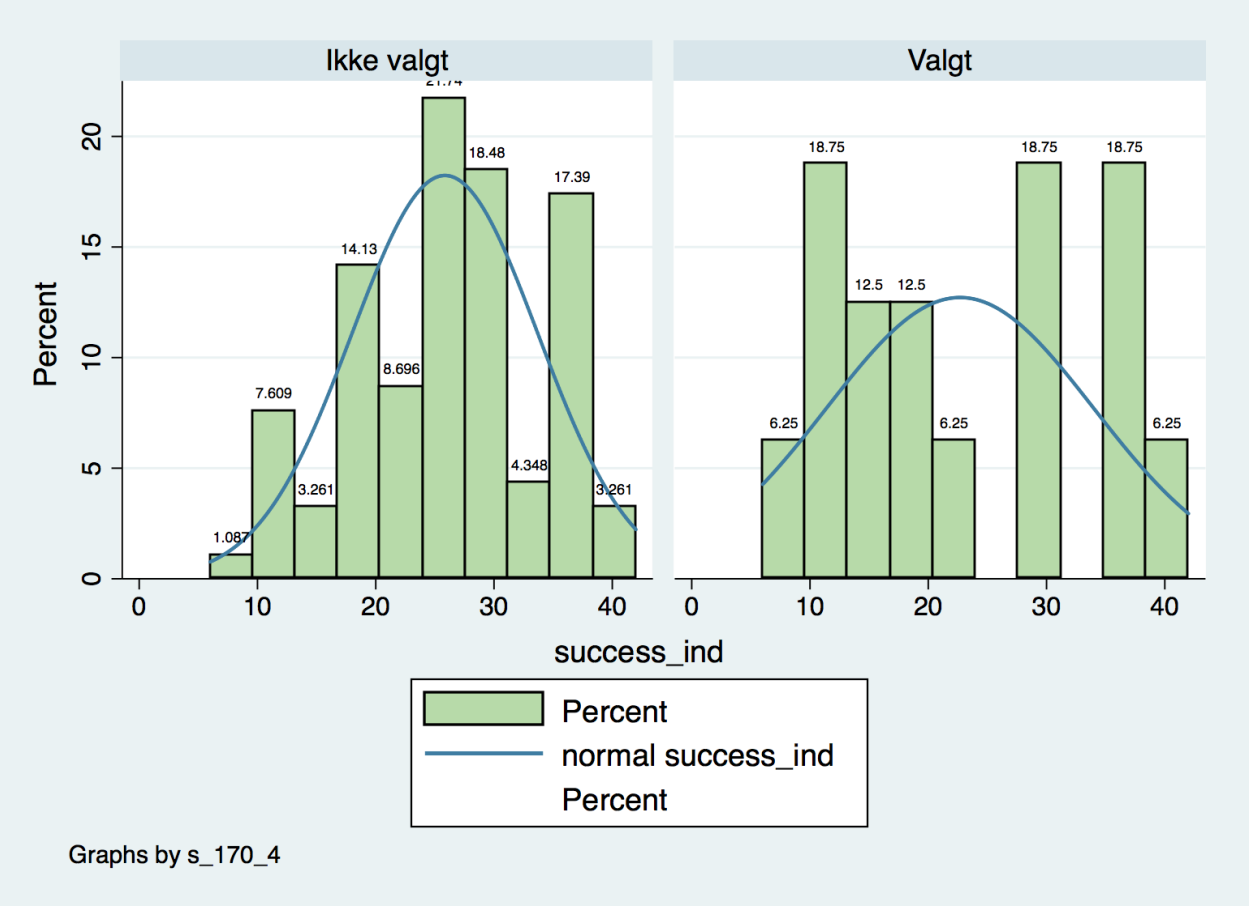

Table 54 Distribution proposition 12.4

Proposition 12.6 The projects where group 1 ("Valgt") represent that the idea came from the industry or firm will have a more successful project in a firm perspective compared to group 0 ("Ikke valgt") representing that the idea came from others.

H0: success_firm Group “Valgt” = success_firm Group “Ikke valgt”

There is a significant difference between the mean of the two groups at 1%. This is in line with our proposition. The projects where the idea came from the industry or firm (“Valgt”) will have a more successful project in a firm perspective compared to if the idea came from others (“Ikke valgt”).

Results proposition 12.6: We reject H0 at 1%.

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
Ikke val	40	132.025	7.941007	50.22334	115.9628	148.0872
Valgt	68	162.2794	2.662691	21.95711	156.9647	167.5942
combined	108	151.0741	3.647303	37.90389	143.8437	158.3044
diff		-30.25441	6.996328		-44.12531	-16.38351

diff = mean(**Ikke val**) - mean(**Valgt**) t = **-4.3243**

Ho: diff = 0 degrees of freedom = **106**

Ha: diff < 0	Ha: diff != 0	Ha: diff > 0
Pr(T < t) = **0.0000**	Pr(|T| > |t|) = **0.0000**	Pr(T > t) = **1.0000**

Table 55 T-test proposition 12.6

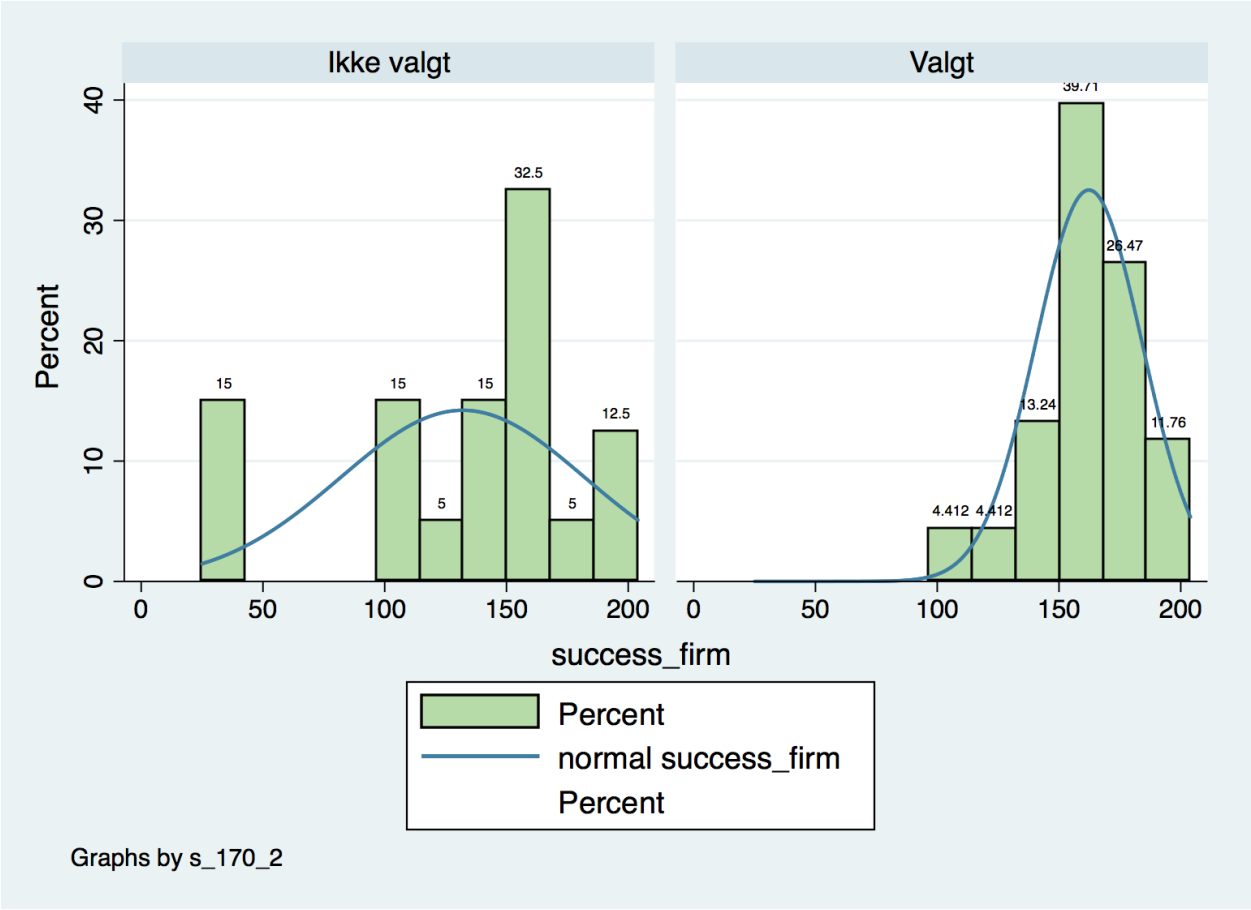

Table 56 Distribution proposition 12.6

Proposition 12.8 The projects where group 1 ("Valgt") represent that the one participating in this survey do not know where the idea came from will have a less successful project in a firm perspective compared to group 0 ("Ikke valgt") representing that they knew where the idea came from.

H0: success_firm Group "Valgt" = success_firm Group "Ikke valgt"

There is a significant difference between the mean of the two groups at 1% level. This is in line with our proposition. The projects where it was not known where the idea came from ("Valgt") will have a less successful project in a firm perspective compared to if it was known where the idea came ("Ikke valgt").

Results proposition 12.8: We reject H0 at 1%.

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
Ikke val	92	154.8478	3.3645	32.27115	148.1647	161.531
Valgt	16	129.375	14.45017	57.80066	98.5752	160.1748
combined	108	151.0741	3.647303	37.90389	143.8437	158.3044
diff		25.47283	10.01416		5.618773	45.32688

diff = mean(**Ikke val**) - mean(**Valgt**) t = **2.5437**

Ho: diff = 0 degrees of freedom = **106**

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0

Pr(T < t) = **0.9938** Pr(|T| > |t|) = **0.0124** Pr(T > t) = **0.0062**

Table 57 T-test proposition 12.8

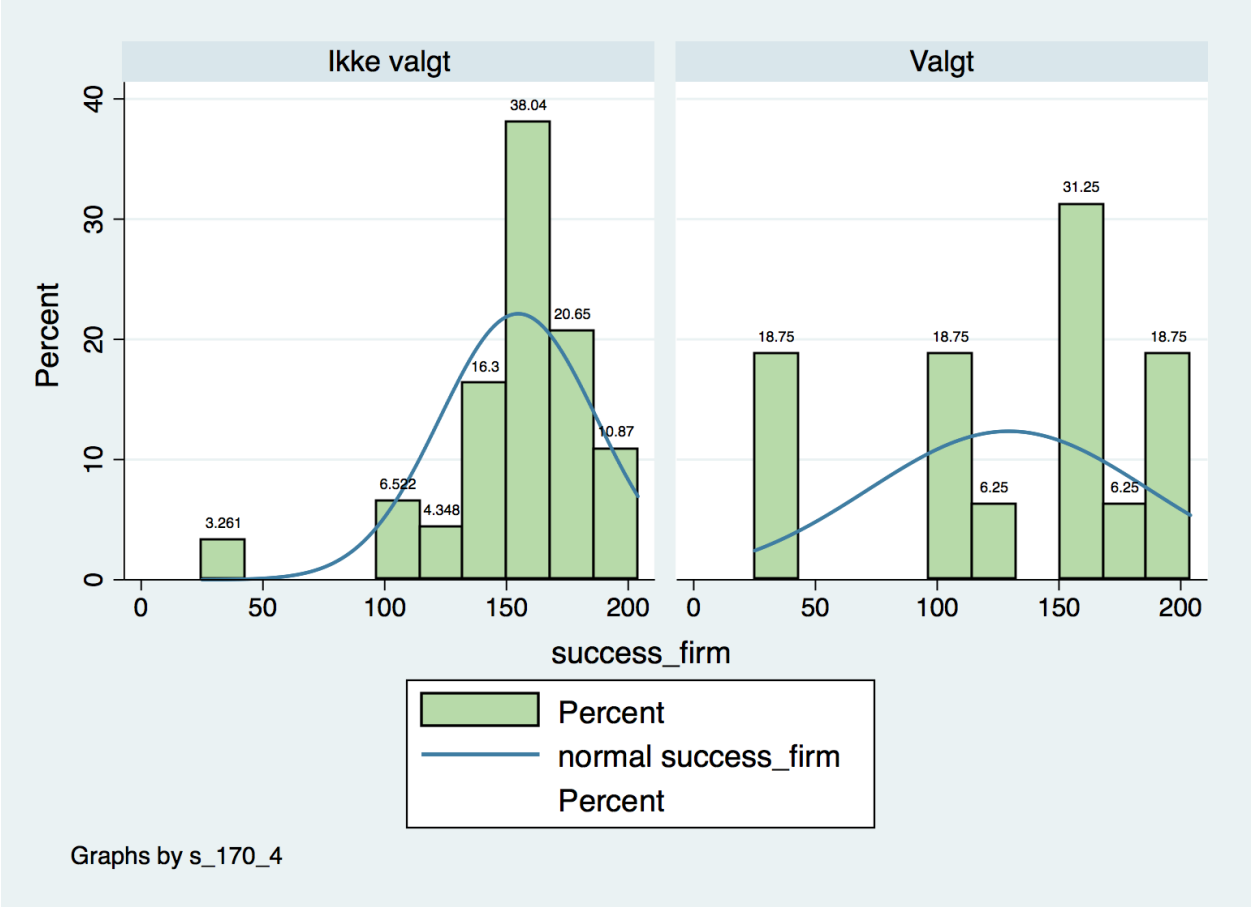

Table 58 Distribution proposition 12.8

Proposition 13: The project is more likely to succeed if the partners have prior experience in R&D projects

Here our Null hypothesis is that partners´ prior experience in FHF projects does not affect project success score. We have two significant results here. Projects where the responsible from FHF are in the bottom quartile of prior experience result in significantly lower success score in an industry perspective. And projects where the responsible organization is in the bottom quartile of prior experience result in significantly lower project success score in a firm perspective. Both of these are in line with our proposition, but we fail to reject the null on the other tests. In total we cannot reject the Null hypothesis based solely on these two.

Proposition 13.1 The projects with the responsible from FHF in the bottom quartile of the amount of prior experience in R&D projects (group 1) will have less success in an industry perspective compared to the remaining projects (group 0).

H0: success_ind Group 1 = success_ind Group 0

There is a significant difference between the mean of the two groups at 5% level. This is in line with our proposition. The projects with the responsible from FHF in the bottom quartile of the amount of prior experience in R&D projects have less success compared to the rest of the population.

Results proposition 13.1: We reject H0 at 5% level.

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	76	26.36842	.9801257	8.544538	24.41591	28.32093
1	32	23.03125	1.408846	7.969637	20.15789	25.90461
combined	108	25.37963	.8160426	8.480563	23.76192	26.99734
diff		3.337171	1.766035		-.1641658	6.838508

diff = mean(0) - mean(1) t = 1.8896
Ho: diff = 0 degrees of freedom = 106

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.9692 Pr(|T| > |t|) = 0.0615 Pr(T > t) = 0.0308

Table 59 T-test proposition 13.1

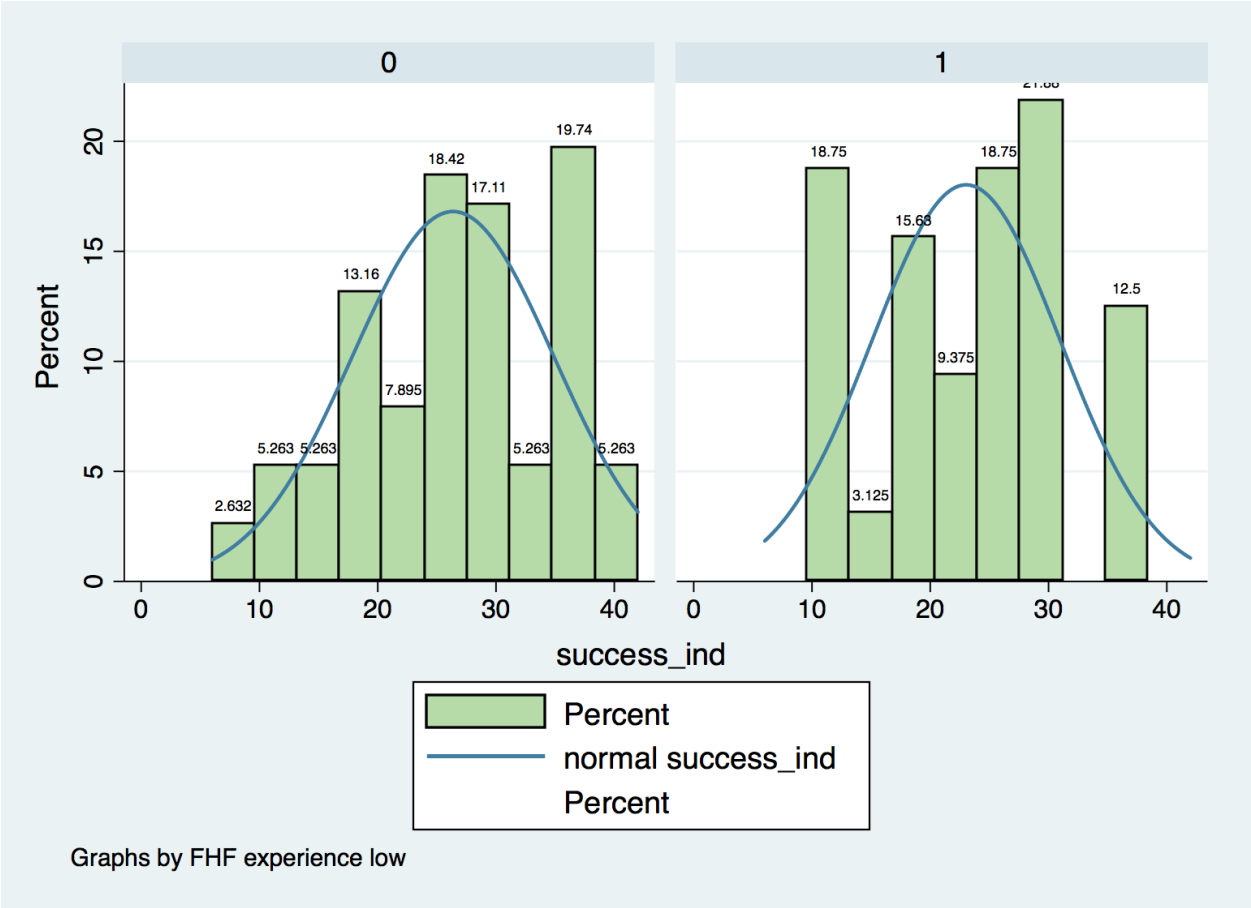

Table 60 Distribution proposition 13.1

Proposition 13.6 The projects with *the* responsible organization in the bottom quartile of the amount of prior experience in R&D projects (group 1) will have lower success in a firm perspective compared to the remaining projects (group 0).

H0: success_firm Group 1 = success_firm Group 0

There is a significant difference between the mean of the two groups at 10%. This is in line with our proposition. The projects with the responsible organization in the bottom quartile of the amount of prior experience in R&D projects (group 1) will have a lower success in a firm perspective compared to the remaining projects (group 0).

Results proposition 13.5: We reject H0 at 10%.

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	79	154.1646	4.117727	36.59916	145.9668	162.3623
1	29	142.6552	7.562266	40.72405	127.1646	158.1458
combined	108	151.0741	3.647303	37.90389	143.8437	158.3044
diff		11.50938	8.192493		-4.73303	27.7518

diff = mean(0) - mean(1) t = 1.4049
Ho: diff = 0 degrees of freedom = 106

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.9185 Pr(|T| > |t|) = 0.1630 Pr(T > t) = 0.0815

Table 61 T-test proposition 13.6

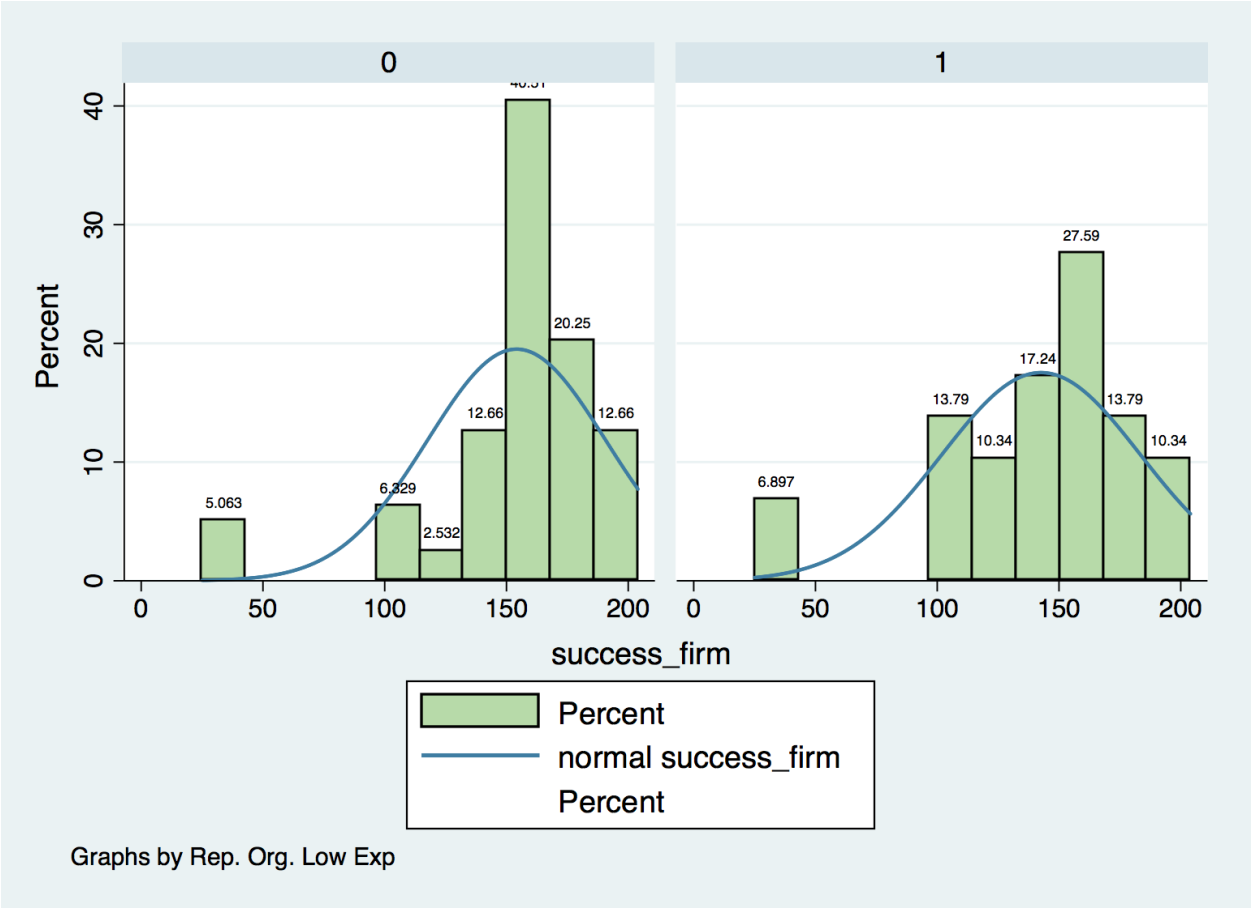

Table 62 Distribution proposition 13.6

8.0. Discussion and analysis

This section aims to answer our research problem through the two research questions Q1 and Q2, by the use of our findings and existing theory. The purpose of our research questions was to find out whether firm characteristics and project related factors can estimate project success in a behavioral additionality perspective for an FHF project. Our project success factor is made up of collaboration, knowledge, and speed. These three determinants are chosen since we view these traits as most important when examining behavioral additionality based on the previous literature of the concept.

The dataset about FHF projects made it possible to examine such success in the light of the seafood industry and in the light of the firm itself. Dividing project success into an industry and firm perspective was vital since FHF as a public funder, and private firms will have different attitudes with concern to the benefit of FHF funding. The goal of FHF regarding funded projects is that the benefit shall go to the industry, while from a firm perspective we expect the firms to be more concerned about own benefits.

We found that examining success in a behavior additionality perspective was most suitable with our dataset and because FHF projects are recognized as collaborative research projects we found it most appropriate to examine the projects in light of this. The concept of behavior additionality was introduced to help visualize the effects generated when companies collaborate, or those related to R&D. These effects are typically not captured when examining input additionality and output additionality. Furthermore, by using this perspective on the projects both for the sake of the firm and for the industry we are contributing to new knowledge that can benefit FHF, the industry and the firms of concern.

8.1. Research Question Q1

Q1: Can firm characteristics estimate project success in a behavior additionality perspective?

As discussed earlier in chapter 4, firm characteristics and firm-related factors have been emphasized to be a critical factor when explaining the capacities to develop and exploit innovation and R&D. Whether it is in collaboration or in-house (Ahuja and Katila, 2004; Damanpour, 1991; Leonard-Barton, 1992; in Constantopoulos et al., n. a.).

When talking about firm characteristics in this behavioral additionality setting, we mean internal features such as capabilities for innovation and proficiencies to facilitate benefits from cooperative R&D (Spanos et al., 2014). The firm characteristics we will examine related to our research question are firm age, firm size and previous experience with FHF projects.

8.1.1. Firm age

When examining the age variable, we decided the best approach would be to simply measure the firm age at the start of the project. This way all firms are benchmarked the same. The average firm age is 24 years old, with a median of 20 years. Only 8% of firms in our dataset are five years or younger; what we categorize as younger firms. The oldest firm is 208 years, while the youngest is 2.

In proposition 1, we posit that newer firms are more active (participating in more collaborative projects) than older firms. This is because newer firms will more often enter collaborations since they lack the necessary knowledge for in-house innovation (Cohen and Levinthal, 1990), or they lack financial or other types of resources, or even experience (Katila and Shane, 2005; Teece, 1986; in Constantopoulos et al., n. d.). This assumption is thoroughly disproven by our dataset. Out of the 108 projects studied, only 9 belonged to "younger" firms. The reason for this is hard to pinpoint. It is possible that there is some bias in the collection of data, where older firms are more active in participating in FHF projects. Alternatively, perhaps since the seafood industry operates on licenses, there is a considerable barrier to entry for newer firms leading to a high number of established firms. The median firm age is 20, which coincides with the start of the last significant increase in value created in the seafood industry (Richardsen and Bull-Berg, 2013). The green line in the following figure 3 represents growth in gross-product for the seafood industry from 1970-2014, adjusted to 2005 prices. The projects in our dataset are all from 2013-2015, meaning that the median of firms was founded in the early to mid-nineties. As is apparent from the graph, the growth in the seafood sector started booming around that time.

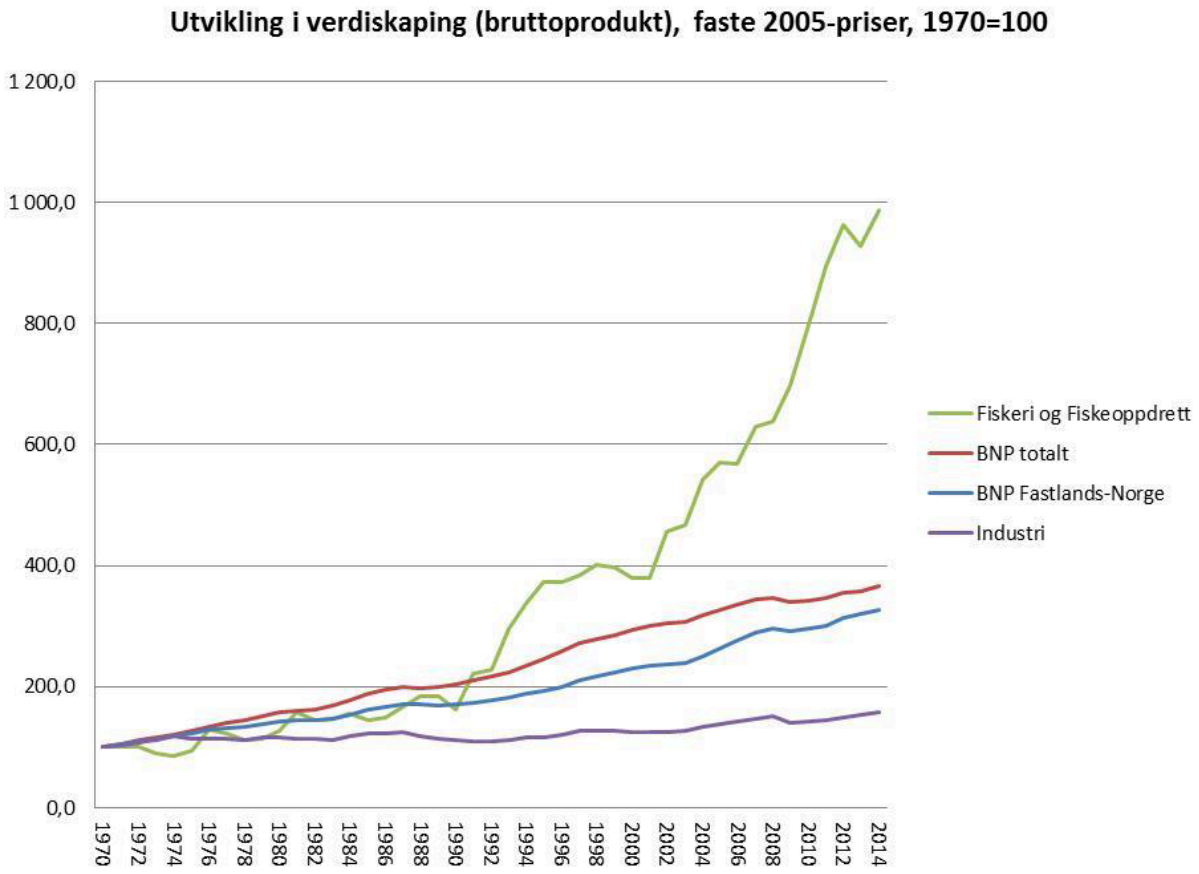

Figure 3 Growth in gross-product

There are many possibilities as to why new firms are underrepresented in our dataset, but it is reasonable to expect our dataset to be representative of the industry. Accordingly, this means that there are in general few new firms participating in R&D collaborations through FHF.

Part two of Proposition 1 deals with network and experience, and we expect newer firms to have a lesser network and less experience. We have chosen to use previous experience from participating in FHF projects as a measure of network extension. This score then, reveals to us that newer firms have significantly less experience than older firms. This is natural since they have had fewer opportunities to participate due to their low age.

Ultimately, we are unable to reject our null hypothesis for proposition one. The theory would lead us to believe that there would be a higher number of newer firms participating in FHF projects, but perhaps the very nature of companies participating in FHF projects lends itself to older, more mature companies. Although we demonstrate that newer firms have less experience than their more well-established peers, it is insufficient to support the totality of proposition 1.

In proposition 2, we continue to explore the effect of firm age. Here we look at collaborative success, both in a firm and an industry perspective, and if there exist differences between younger and more well-established firms in how they perceive their success in such. There were no significant results which signify that within the scope of our dataset, no discernable difference between the collaborative success of either newer or more well-established firms was demonstrable.

Based on proposition 1 and 2, our conclusion is merely that firm age as a characteristic predicting success in a behavioral perspective is insignificant. This does not mean that firm age has no bearing on the projects – it clearly does. Younger firms have less experience, but this lack of experience does not influence the success of their collaborations.

8.1.2. Firm size

Human, physical or financial resources are what constitute firm size. In our case, the dataset lends itself to using number of employees, results before taxes and revenue as metrics describing firm size. Theory suggests that firm size has a significant and positive impact on all forms of innovation and that size will affect firm's ability to collaborate and develop networks (Fitjar and Rodríguez-Pose, 2011). There are however results where firm size is insignificant, such as Clarysse et al., (2004). One potential reason for larger firm's success might be their excess resources and higher tolerance to potential losses (Constantopoulos et al., n. d.).

In proposition 3, we propose that the larger the firm size, the more successful, and the more extensive is the collaboration. While using our definitions of firm size, we explore how it impacts project success in a firm and industry perspective and how it affects the extent of their collaboration through the total number of participants in the project.

The results are mostly insignificant, indicating that firm size as defined here does not impact project success or collaboration scope. However three sub-propositions are significant, albeit contrary to our central proposition. This is interesting because it suggests that the firms in our dataset within the top quartile of number of employees and revenue have a lower project success score in a firm perspective compared to the rest of the population. Additionally, we find that the projects of firms in the top quartile of revenue have fewer participants compared to the rest.

Although we have three significant results when looking at firm size as a predictor for project success and extent of collaboration, it is only three out of 18 (16,7%) tests. It is not possible for us to reject the Null hypothesis that the firm characteristics are insignificant in determining project success and the extent of collaboration. This, however, is in line with previous results by Clarysse et al., (2004).

Proposition 4 deals with the speed or acceleration of projects in light of firm size. Bergman et al., (2009) find that smaller firms tend to have a stronger level of scale and acceleration compared to large firms (in Pérez, 2016). Our findings are again, mostly insignificant. The exception being sub-proposition 4.2 which deal with firms in the top quartile of number of employees and have significant results indicating a higher speed/acceleration in an industry perspective relative to the rest of firms. Furthermore, sub-proposition 4.9 which deal with firms in the top quartile of results pre-tax is significant for speed/acceleration. Both of these results are again contrary to our proposition, but again it is only two out of nine tests (22%) showing significant results, not enough for us to reject our proposition. As far as is demonstrable by our dataset, firm characteristics are insignificant relative to the speed or acceleration of projects.

When viewed in relationship with the results from proposition three, it would have been more surprising if all of a sudden, the results would deviate from the others based on the same characteristics. The results are consistent in their insignificance and a slight trend showing results contrary to our expectations.

8.1.3. Previous experience with R&D

Previous experience with R&D, in this case, is limited to previous experience with FHF projects. We cannot account for the firm's other experiences with R&D in settings outside of FHF projects as we only have data available for FHF projects. Still, we believe that experience with FHF projects will be relevant for our thesis since it is success with FHF projects we are trying to measure. Constantopoulos et al., (n. a.) suggest that prior experience with R&D activities enable firms to be better in collaborative endeavors since they can contribute more, might enjoy synergies with their partners and already be a part of collaborative learning. The ability of firms to learn from previous projects through assimilation and further development of collaborative R&D into own efforts is defined by Cohen and Levinthal (1990) as absorptive capacity. This capacity regulates how beneficial exposure to new knowledge, technology, etc.,

will be for the firm (Spanos et al., 2014). Following firms prior experience with R&D projects will influence the effect of participation in collaborative R&D projects (Kleinknecht and Reijen, 1992; Colombo and Garrone, 1996; in Spanos et al., 2014)

Albors-Garrigos and Rodriquez Barrera (2011) conclude that behavioral responses are more dependent on prior innovative behavior and less reliant on firm size (in Pérez, 2016). Rooted in these assumptions, we formulate proposition 5; A firm that has previously been involved with R&D projects will have more successful collaborations. Moreover, 6; A firm that has previously been involved with R&D projects will have more successful projects.

For Proposition 5, only two out of eight (25%) of tests are significant. These two are significant and contrary to our proposition. Firms in the top quartile of experience with FHF projects have a lower and significant collaboration score both in industry and in a firm perspective. This is interesting because the firms in the bottom quartile do not have a significantly different collaborative score. It is entirely possible that more experience with FHF projects will lead to increased expectations when it comes to collaboration and collaborative partners, and as such, firms with a high experience score will be more likely to score satisfaction more strictly in light of previous experiences.

For Proposition 6, we examine the relationship between the experience of the project participants with FHF projects and project success both in a firm and in an industry perspective. We have but one out of eight (12.5%) significant results, but it is interesting in that it is in line with our proposition, which has been quite uncommon for our first research question. We find that firms in the top quartile of project participant experience enjoy a higher project success score in a firm perspective compared to the rest of the population. However, the rest of the sub-propositions are insignificant. The same objections raised when discussing proposition 5, can be applied here for proposition 6.

8.1.4. Implications for research question Q1

The totality of testing our propositions reveal that based on the data we have available and how we designed our propositions, we are unable to verify them. However, this does not mean that we cannot conclude. Our tests demonstrate that we cannot use firm characteristics to predict project success for the firm/ industry in a behavioral additionality perspective. This is, in fact,

quite a positive result for FHF as an organization; it means that firm characteristics, factors that are beyond their control, are insignificant when determiningg project success in a behavior additionality perspective. It is therefore not necessary for FHF to screen participating firms based on firm characteristics, but instead focus strictly on the merits of each project.

8.2 Research question Q2

Q2: Can project related factors estimate project success in a behavioral additionality perspective?

This research question has enabled us to examine project related factors, and whether these can estimate project success in a behavioral additionality perspective, for FHF funded projects. We have made propositions based on available theory and previous findings of such factors to check if these apply to the data we have on FHF projects. The information in the dataset shows how employees of the firms view the project in which they have participated.

As described in chapter four, typical project related factors are explained by the thematic area a project belongs, the size of the project, how the project is managed, and length of the project (Constantopoulos et al., n. a.). We chose to focus on project length and size, the origins of participating partners and the background of the project manager, the term "ownership of project" and the partners´ previous experience with R&D. The decision to focus on these factors is based on what we could estimate with the help of our dataset about success in a behavioral additionality perspective and are those best fitting with the FHF projects at concern.

8.2.1 Project length

The first proposition on project related factors is Proposition 7. The proposition is that the longer the duration of a project, the more successful it is. As mentioned in chapter four, the theory states that project performance and success is positively related to length because this means that members of the project have worked together for a long time, sharing experiences (Gibson, 1999; Hoang and Rothaermel, 2005; Katz 1982; in Constantopoulos et al., n. a.). This is also stated as positive for communication internally in the project, making learning more effective and standards for work patterns will be emerging (Katz, 1982; in Constantopoulos et al., n. a.).

For this proposition we only find one significant result, that is; projects with the most extended duration have a significantly higher project success score from an industry perspective, which is in line with our proposition. When testing the other way around, however, projects with the shortest duration does not have significantly lower success. Also, for tests on project success from a firm perspective, we fail to reject the Null hypotheses. Based on this we cannot say that proposition 7 holds.

When examining how long the project duration of FHF projects in the dataset typically is, we can see that projects of the top quartile represent projects that last for about two years and up to a little more than three years- being the longest duration of a project. The projects of the bottom quartile, on the other hand, represent projects lasting for shorter than one year to less than three months- being the shortest duration of a project. The theory does not specify how long duration a project shall have to be considered having a long duration. However we can see a clear difference between the top and bottom quartile even though the projects of the top quartile start already at about two years. The conclusion is that we fail to establish a significant effect between duration and project success.

8.2.2 Project size

The second proposition on project related factors is Proposition 8. The proposition is that a more substantial number of participants in a project will lead to a more successful result. As mentioned in chapter four, the theory states that a large consortium will affect team dynamics which is associated with performance (Ancona and Caldwell, 1992b; Jehn, 1995; Smith and Lipsky, 1994b; in Constantopoulos et al., n. a.). It is positively related to success as the effort and expertise of several partners foster problem- solving (Schilling, 2005; in Constantopoulos et al., n. a.). However, this is only up to a certain point relating to issues of free riding decreasing the learning taking place (Gibson and Vermeulen, 2003; Wong, 2004; in Constantopoulos et al., n. a.).

For this proposition, we cannot find any significant results, except proposition 8.4 where it is shown that projects with the highest number of total participants will have more success in a firm perspective, compared to the rest of the population. However, this is significant at 11%,

and we chose to set 5% and 10% as our base for significance. Nevertheless, one significant result is not enough to support our proposition in total.

As theory states, project success in relation to large projects only holds up to a certain point. Since we are not running regressions, we are not able to check if there is a decreasing return to scale for the duration. Furthermore, since we do not know where *"up to a certain point"* is, we are unable us to check this manually. Lack of data and the size of the dataset might explain why we fail to reject our null hypothesis on this proposition.

8.2.3 Origins of the participating partners

The third proposition on project related factors is Proposition 9. The proposition is that projects with a majority of partners from the industry will be more successful. As mentioned in chapter four, the theory states that firms in the industry will have knowledge production as a motivation- being a stepping stone for further development (Constantopoulos et al., n. a.; Cohen and Levinthal, 1989). While it is stated that partners from the research community are more interested in abstract forms of knowledge, leading to research publications, in line with firms collaborating with universities not progressing beyond the stage of initial discussions (Wilson, 2012).

On this proposition, all our tests show significant results in line with our proposition. This means that having a majority of participants with an industry background is associated with a higher success score, both in a firm and in an industry perspective. Such information can prove to be useful for FHF being that they are collaborative research projects. In this event, FHF could aim for enough participants of a project with an industry background, meaning participants with first-handed knowledge about the marine sector and with knowledge production as motivations, to ensure higher success regarding increased knowledge, speed and successful collaboration – making up our success factor.

8.2.4 The background of the project manager

The fourth proposition on project related factors is Proposition 10. The proposition is that if the project manager of the FHF project comes from the industry, the project is more successful. As mentioned in chapter four, the theory states that the leader of an R&D project from the industry

will have greater motivation and efforts towards commercialization (Spanos et al., 2014). In this event, the theory is similar to that of participants from the industry being favorable for success.

On this proposition, all our tests show significant results in line with our proposition. This means that a project manager with an industry background is associated with a higher project success score, compared to a project manager from a research institution. This applies in both a firm and an industry perspective. A project manager from the industry being associated with higher success is interesting and can also provide useful information to FHF. In this event, FHF could aim to make sure that the manager of the project is from the industry whereas the similar argument as for proposition 9 applies.

8.2.5 Ownership of the project

Regarding ownership of the project, we have two propositions. Propositions 11 and 12. The fifth proposition on project related factors is Proposition 11. The proposition is that if the respondent of the questionnaire were part of the project description (its goals, activities, deliveries) the project would be more successful. The sixth proposition on project related factors is Proposition 12. The proposition is that if the idea came from the industry or the firm, the project is more successful.

Propositions 11 and 12 are in accordance with the theory about whether most participants in the project are from the industry and whether the leader is from the industry. Proposition 11 relates to this theory because the respondent is an employee from the firms that have received funding from FHF previously. In other words, the person belongs to the industry, making the same theory apply to him/her. Proposition 12 relates to the same theory because it states that ideas from firms or industry will positively affect the success.

On proposition 11 all our test shows significant results in line with our proposition. This means that being part of the project description does significantly and positively affect project success, both in a firm and in an industry perspective. On Proposition 12 we have four significant results that are in line with our proposition. The results show that if the idea originates from the firm or the industry, it is significantly more successful than if it originated from elsewhere, both regarding the firm and for the industry. Furthermore, if the respondent has no idea where the

idea came from, this is significantly associated with lower project success, both for the firm and the industry, respectively. We fail, however, in making any statements about the significance of ideas originating with FHF, or from a university or research institution.

This is interesting because it clearly shows us that having strong ownership to project description and that the industry or firm itself fostered the idea for the project significantly increases project success. Perhaps FHF should prioritize projects originating with firms/industry over those from FHF or research institutions while making sure the participating firms are active in developing the project description.

8.2.6 The partners´ previous experience with R&D projects

The seventh and last proposition on project related factors is Proposition 13. The proposition is that the project is more likely to succeed if the partners have prior experience in R&D projects. As mentioned in chapter four, the theory states that one of the most critical factors for the success of an R&D consortium is partners previous experience with R&D (Child and Yan, 1999; Fiol and Lyles; 1985; in Constantopoulos et al., n. a.). This is because the learning effect enables a firm to develop a relational capability useful for managing inter-organizational relationships (Dyer and Singh, 1998; Constantopoulos et al., n. a.). Furthermore, that some members of the project are expected to develop superior capabilities at managing such consortia (Constantopoulos et al., n. a.). And that firms with prior R&D consortia experience, in general, have significantly greater project performance (Anand and Khanna, 2000; in Constantopoulos et al., n. a.).

On this proposition, there are two significant results in line with the proposition. One being that projects where the responsible from FHF are in the bottom quartile of prior experience result in significantly lower success score in an industry perspective (not found in a firm perspective). The second is that projects where the responsible organization is in the bottom quartile of prior experience result in significantly lower project success score in a firm perspective (not found in an industry perspective). In total proposition 13 does not hold, only based on these results.

Since we base the previous experience of partners in relation to R&D through their participation on other FHF projects (in the period from 2012-2015), this limits our search for such previous experience. The responsible organization of the project, the responsible from FHF and the

project manager, may have been part of other R&D projects in which we do not have data. We wanted to check if this proposition could hold based on this data. However we fail to reject the Null hypothesis on this proposition.

8.2.7 Implications for research question Q2

Out of the seven propositions we have made on project related factors, four of them holds. Propositions about project length, project size and the partners´ previous experience with R&D does not provide any significant insight regarding project success in a behavioral additionality perspective. However, we can prove a relationship to that of origins of the participating partners, the background of the project manager and to ownership of the project, where there are significant results in line with the propositions. Such information is useful since this lets us know that FHF projects where most partners are from the industry and where the project manager is from the industry are regarded as more successful in a behavioral additionality perspective. Furthermore, it tells us the importance of people in the industry partaking in developing the idea for the project, and last but not least, to be part of the project description. In other words, the importance of the industry having a sense of ownership of the project is proven to be significant. These findings are useful for FHF in that they represent variables of project execution that FHF themselves can control. In the perspective of the firms in the sector, they should aim for an active role in projects.

9.0 Limitations

We recognize that there are limitations to this research. In this section, we will address those deemed most important. Some have already been mentioned in other chapters. However, they need to be addressed more thoroughly here. The less essential limitations are described in chapter 5.4.2 in our critique of the research method.

First and foremost, we are pleased with receiving a dataset on previous FHF projects. A dataset of this magnitude would not have been manageable, or most likely not feasible, for us to collect ourselves, only mentioning the time and budget put into this. There are, however, limitations connected to using secondary data. For one, the data we base our research on is not collected and designed for this study.

If we could decide the content of the dataset, we would have chosen to include questions more in line with that of behavioral additionality and that way we might not have had to construct own variables to measure the effect on this. We construct our success factor by that of knowledge increase, speed/ acceleration (where more immediate is better) and successful collaboration, to represent project success in a behavioral additionality perspective. We also construct these three variables making up that success factor. They consist of several variables of how the respondents in the web survey self-rate the project in which they have participated. The first issue to mention here is the fact of self-reporting. The second is that we maybe should have weighed the variables differently- we decided that an equal rating would be most appropriate, however, maybe we would have gained other results weighing them differently.

Furthermore, we believe that a larger sample size could have provided more substantial and significant results, where we also could have used regressions on the variables. Instead, we made several tests examining different groups. Moreover, while examining the dataset, we realize that we are dealing with somewhat homogeneous groups of firms. We comprehend that firms are represented very homogeneously due to barriers to entry, and outside policies dictated by government institutions such as operating licenses contributing to these effects.
As mentioned in the chapter on methodology (chapter five), there have already been publications based on this dataset, meaning that the data used yet is credible and representative, and in such suitable for use.

While this subject has been mentioned several times, we feel that it is important to mention here as well since this has been regarded as the most essential project related factor regarding project success. There is a lack of data on previous R&D experience. This is true for the partners in the projects and the respondent of the survey. We only based previous R&D experience on previous FHF projects that we had data on, while these projects were for the period 2012-2015. We recognize that the participants have other sources of collaboration and networking by participating in other R&D projects. We believe that this lack of data inhibited our propositions based on previous R&D experience.

Even though we admit that the research is subject to quite a few limitations, we still believe the study provides a valuable contribution to knowledge that can benefit FHF in replicating our findings.

10.0 Further Research

At this point, we see the potential for further research. For researchers looking to investigate these issues further, it will be crucial to ensure that the construct measuring project success is thoroughly streamlined and validated. Furthermore, we suggest that there should be some external measures involved so as not to be reliant on just self-reporting. Expanding or adding additional success criteria to also encompass output additionality would perhaps give future studies more of a basis to make policy suggestions. Moreover, having the ability to investigate returns to scale; to see the effect of altered levels of significant factors would also be very useful in understanding the how and why these factors are relevant in prediction project success.

We suggest that a new study should be done in conjunction with FHF and the participating firms. To help ensure that relevant and actionable primary data on the firms' prior R&D experience outside of FHF projects, as well as employee education level and general absorptive capacity could be captured. Additionally, the project success in a behavioral additionality perspective we see that firms obtain by being part of an FHF project could be interesting to see how are maintained. For example, by relating questions to how firms retain the learning in its routines, making a broader case for the effects of behavioral additionality. In such event, there can be possibilities to check if there are changes that are necessary for the reinforcement of learning in the firms.

11.0 Conclusion

With record exports exceeding 74 billion NOK in 2015, and 5 billion NOK invested in marine R&D in Norway with FHF representing over 200 million NOK in R&D investments, increasing the understanding of what makes collaborative efforts more successful is an effort that is needed. Both to ensure that FHF stakeholders' interests are maintained and to increase returns on investment in R&D.

FHF is funded by a levy of 0.3% on all seafood exports from Norway. These funds are then used to finance R&D projects with a stated goal *"to create added value for the seafood industry through industry-oriented research and development*" (FHF, 2017). The funding is distributed as grants to research programs and large projects.

The challenges facing the seafood industry justifies such large investments in R&D. A common challenge the industry faces is a requirement for new research-based knowledge. In the research project «Fra virkemiddel til verdi, hvordan få mer verdiskapning ut av marin FoU? », professor Tveterås examines if the industry and society will get a sufficient return on this R&D resource use.

The concept of behavioral additionality was introduced to help visualize the effects generated when companies collaborate or those related to R&D (Pérez, 2016). Considering this concept, we investigate whether firm characteristics and project related factors can be used to predict project success in a behavioral additionality perspective.

Through our quantitative analysis we address our research problem by seeking to answer the following research questions:

> Q1: Can firm characteristics estimate project success in a behavioral additionality perspective?
>
> Q2: Can project related factors estimate project success in a behavioral additionality perspective?

We find that firm characteristics are unimportant in determining project success. However, project related factors are highly significant and exact. Specifically, being part of developing the project description, having a project idea originating within the firm or industry, having an

industry background rather than a research background and having a project manager with an industry background, all contributed positively to project success in a behavioral additionality perspective.

Potential policies for behavioral additionality are only viewed as successful if it increases the capacities of participants that are necessary for innovation and performance, for example, cognitive capacities, networking etcetera, that leads to determined effects (Gök and Edler, 2012)

In conclusion firm characteristics are uncontrollable and not significant when determining project success. This means we can avoid making policies discriminating project applications based on firm characteristics. On the other hand, project related factors are very much controllable and significant for project success. Enforcing policies with a focus on significant project related factors seem to be a reasonable approach for FHF when distributing funds to maximize stakeholder interests. Furthermore, for the sake of firms offered grants to projects, participants should try to take an active role.

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Appendix

Stata output

```
-------------------------------------------------------------------------------
      name:  <unnamed>
       log:  C:\Users\Jon\Documents\ragnar\dataset\final.smcl
  log type:  smcl
 opened on:  14 Aug 2018, 19:49:57

. do "C:\Users\Jon\OneDrive - Universitetet i Stavanger\Master Nakken Gjerstad\M
> aster Thesis\Dataset\do_final_1.do"

. *Load data*
. use "C:\Users\Jon\OneDrive - Universitetet i Stavanger\Master Nakken Gjerstad\
> Master Thesis\Dataset\final_set.dta", clear

.
.
. *recoded data for streamlined responses*
.
. */                                                    ** ---Start of survey
> avsluttet datasett analyser--- **
.
. recode s_392 (2 = 0) (3 = 2)
(s_392: 36 changes made)

. recode s_393 (2 = 0) (3 = 2)
(s_393: 38 changes made)

. recode s_394 (2 = 0) (3 = 2)
(s_394: 76 changes made)

. recode s_395 (2 = 0) (3 = 2)
(s_395: 58 changes made)

. recode s_396 (2 = 0) (3 = 2)
(s_396: 47 changes made)

. recode s_397 (2 = 0) (3 = 2)
(s_397: 46 changes made)

.
. label define JNI 1 "JA" 0 "NEI" 2 "Ikke relevant"

. label values s_392 s_393 s_394 s_395 s_396 s_397 JNI

.
. recode s_349 (2 = 0)
(s_349: 87 changes made)

. label define s_349_l 1 "would" 0 "wouldn't"

. label values s_349 s_349_l

.
. label define JN 1 "JA" 0 "NEI"

. label values s_157_1 s_157_2 s_231_1 s_231_2 s_331_1 s_331_2 JN

.
. recode s_158 (2 = 5) (3 = 4) (4 = 3) (5 = 2) (6 = 1)
(s_158: 103 changes made)

. recode s_159 (2 = 5) (3 = 4) (4 = 3) (5 = 2) (6 = 1)
(s_159: 103 changes made)

. recode s_160 (2 = 5) (3 = 4) (4 = 3) (5 = 2) (6 = 1)
(s_160: 103 changes made)

. recode s_161 (2 = 5) (3 = 4) (4 = 3) (5 = 2) (6 = 1)
(s_161: 103 changes made)

. recode s_162 (2 = 5) (3 = 4) (4 = 3) (5 = 2) (6 = 1)
(s_162: 104 changes made)
```

```
. recode s_163 (2 = 5) (3 = 4) (4 = 3) (5 = 2) (6 = 1)
(s_163: 103 changes made)

. recode s_332 (2 = 5) (3 = 4) (4 = 3) (5 = 2) (6 = 1)
(s_332: 103 changes made)

. recode s_333 (2 = 5) (3 = 4) (4 = 3) (5 = 2) (6 = 1)
(s_333: 104 changes made)

. recode s_334 (2 = 5) (3 = 4) (4 = 3) (5 = 2) (6 = 1)
(s_334: 100 changes made)

. recode s_335 (2 = 5) (3 = 4) (4 = 3) (5 = 2) (6 = 1)
(s_335: 102 changes made)

. recode s_336 (2 = 5) (3 = 4) (4 = 3) (5 = 2) (6 = 1)
(s_336: 104 changes made)

. recode s_337 (2 = 5) (3 = 4) (4 = 3) (5 = 2) (6 = 1)
(s_337: 103 changes made)

.
. label define likert5 1 "Svært liten grad" 2 "Liten grad" 3 "Hverken eller" 4 "
> Stor grad" 5 "Svært stor grad"

. label values s_158 s_159 s_160 s_161 s_162 s_163 s_332 s_333 s_334 s_335 s_336
>  s_337 likert5

.
. label define Valgt_ikke 1 "Valgt" 0 "Ikke valgt"

. label values s_170_1 s_170_2 s_170_3 s_170_4 Valgt_ikke

.
. recode s_351 (2 = 0)
(s_351: 42 changes made)

. label values s_351 JN

.
. recode s_284 (1 = 5) (2 = 4) (3 = 3) (4 = 2) (5 = 1)
(s_284: 89 changes made)

. recode s_285 (1 = 5) (2 = 4) (3 = 3) (4 = 2) (5 = 1)
(s_285: 99 changes made)

. recode s_286 (1 = 5) (2 = 4) (3 = 3) (4 = 2) (5 = 1)
(s_286: 89 changes made)

. recode s_287 (1 = 5) (2 = 4) (3 = 3) (4 = 2) (5 = 1)
(s_287: 52 changes made)

. label define likert5_a 1 "Ikke viktig" 2 "Lite viktig" 3 "Hverken/eller" 4 "Ga
> nske viktig" 5 "Svært viktig"

. label values s_284 s_285 s_286 s_287 likert5_a

.
. recode s_175 (2 = 5) (3 = 4) (4 = 3) (5 = 2) (6 = 1)
(s_175: 103 changes made)

. recode s_174 (2 = 5) (3 = 4) (4 = 3) (5 = 2) (6 = 1)
(s_174: 101 changes made)

. recode s_176 (2 = 5) (3 = 4) (4 = 3) (5 = 2) (6 = 1)
(s_176: 102 changes made)

. recode s_177 (2 = 5) (3 = 4) (4 = 3) (5 = 2) (6 = 1)
(s_177: 86 changes made)

. label values s_175 s_174 s_176 s_177 likert5

.
. recode s_190 (1 = 5) (2 = 4) (3 = 3) (4 = 2) (5 = 1)
(s_190: 85 changes made)
```

```
. recode s_191 (1 = 5) (2 = 4) (3 = 3) (4 = 2) (5 = 1)
(s_191: 82 changes made)

. recode s_192 (1 = 5) (2 = 4) (3 = 3) (4 = 2) (5 = 1)
(s_192: 83 changes made)

. recode s_193 (1 = 5) (2 = 4) (3 = 3) (4 = 2) (5 = 1)
(s_193: 84 changes made)

. recode s_288 (1 = 5) (2 = 4) (3 = 3) (4 = 2) (5 = 1)
(s_288: 80 changes made)

. recode s_289 (1 = 5) (2 = 4) (3 = 3) (4 = 2) (5 = 1)
(s_289: 79 changes made)

. recode s_290 (1 = 5) (2 = 4) (3 = 3) (4 = 2) (5 = 1)
(s_290: 83 changes made)

. recode s_291 (1 = 5) (2 = 4) (3 = 3) (4 = 2) (5 = 1)
(s_291: 85 changes made)

. label define likert5_b 1 "Svært uenig" 2 "litt uenig" 3 "Hverken/eller" 4 "Lit
> t enig" 5 "Svært enig"

. label values s_190 s_191 s_192 s_193 s_288 s_289 s_290 s_291 likert5_b

.
. recode s_185 (1 = 5) (2 = 4) (3 = 3) (4 = 2) (5 = 1)
(s_185: 82 changes made)

. recode s_186 (1 = 5) (2 = 4) (3 = 3) (4 = 2) (5 = 1)
(s_186: 88 changes made)

. recode s_187 (1 = 5) (2 = 4) (3 = 3) (4 = 2) (5 = 1)
(s_187: 65 changes made)

. label values s_185 s_186 s_187 likert5

.
.
. recode s_201 (4 = 5) (3 = 4) (5 = 3)
(s_201: 96 changes made)

. recode s_202 (4 = 5) (3 = 4) (5 = 3)
(s_202: 90 changes made)

. recode s_203 (4 = 5) (3 = 4) (5 = 3)
(s_203: 82 changes made)

. recode s_204 (4 = 5) (3 = 4) (5 = 3)
(s_204: 84 changes made)

. label values s_201 s_202 s_203 s_204 likert5_b

.
. recode s_180 (2 = 5) (3 = 4) (4 = 3) (5 = 2) (6 = 1)
(s_180: 100 changes made)

. recode s_181 (2 = 5) (3 = 4) (4 = 3) (5 = 2) (6 = 1)
(s_181: 101 changes made)

. label values s_180 s_181 likert5

.
. recode s_356 (2 = 5) (3 = 4) (4 = 3) (5 = 2) (6 = 1)
(s_356: 100 changes made)

. recode s_357 (2 = 5) (3 = 4) (4 = 3) (5 = 2) (6 = 1)
(s_357: 98 changes made)

. label values s_356 s_357 likert5

.
. recode s_389 (2 = 0)
(s_389: 15 changes made)

. recode s_390 (2 = 0)
```

```
(s_390: 41 changes made)

. recode s_391 (2 = 0)
(s_391: 27 changes made)

. label values s_389 s_390 s_391 JN

.
. recode s_376 (2 = 0)
(s_376: 27 changes made)

. recode s_377 (2 = 0)
(s_377: 64 changes made)

. recode s_378 (2 = 0)
(s_378: 69 changes made)

. recode s_379 (2 = 0)
(s_379: 24 changes made)

. recode s_380 (2 = 0)
(s_380: 71 changes made)

. recode s_381 (2 = 0)
(s_381: 61 changes made)

. recode s_382 (2 = 0)
(s_382: 15 changes made)

. recode s_383 (2 = 0)
(s_383: 61 changes made)

. recode s_384 (2 = 0)
(s_384: 26 changes made)

.
. label values s_376 s_377 s_378 s_379 s_380 s_381 s_382 s_383 s_384 JN

.
. *generate variable for value to own firm of partaking in project*
. gen value_self = s_158*s_159*s_160*s_161*s_162*s_163
(2 missing values generated)

. gen value_self_high = s_158 >= 4 & s_159 >= 4 & s_160 >= 4 & s_161 >= 4 & s_16
> 2 >= 4 & s_163 >= 4

. gen value_ind = s_332*s_333*s_334*s_335*s_336*s_337
(2 missing values generated)

. gen value_ind_high = s_332 >= 4 & s_333 >= 4 & s_334 >= 4 & s_335 >= 4 & s_336
>  >= 4 & s_337 >= 4

.
. egen catRespFHF = group(ResponsibleFHF), label
(2 missing values generated)

. egen catProjectmngmt = group(ProjectManager), label
(4 missing values generated)

. egen catGOVorg = group(Governingorganisation), label
(2 missing values generated)

. egen catRespORG = group(Responsibleorganisation), label
(2 missing values generated)

.
. egen catcompany = group(Company), label
(2 missing values generated)

. egen catPostplace = group(Postplace), label
(2 missing values generated)

. egen catNACEcode = group(NACEcode), label
(2 missing values generated)

. egen catField = group(Field), label
(2 missing values generated)
```

```
. egen catStatus = group(Status), label
(2 missing values generated)

.
. *generating variables measuring project success in a behaviour additionality p
> erspective for the industry
. *Generating a variable for knowledge gain in industry due to the project*
. *Due to recodeing missing variables as 1, we have to multiply by 2, so that th
> ere are no 1s in the variable*
.
. gen know_ind = 2 * s_333 * s_397 if s_397 == 1
(55 missing values generated)

. mvencode know_ind, mv(1)
    know_ind: 55 missing values recoded

.
. *generating variables for speed/acceleration on return from project for the in
> dustry
. *generating a variable for positive return during project duration.
.
. gen speed_ind_1 = s_157_2*6 if s_157_2 !=0
(58 missing values generated)

.
. *generating a variable for positive return first year after project completion
.
. gen speed_ind_2 = s_231_2*4 if s_231_2 !=0
(53 missing values generated)

.
. *generating a variable for positive returns in the future, 1 year after projec
> t completion
.
. gen speed_ind_3 = s_331_2*2 if s_331_2 !=0
(25 missing values generated)

.
. mvencode speed_ind_1 speed_ind_2 speed_ind_3, mv(1)
 speed_ind_1: 58 missing values recoded
 speed_ind_2: 53 missing values recoded
 speed_ind_3: 25 missing values recoded

.
. *generating a variable for total speed/acceleration on returns for the project
> .
.
. gen speed_ind = speed_ind_1 + speed_ind_2 + speed_ind_3

.
. *generating a variable for industry collaboration and network building from th
> e project.
.
. gen collab_ind_1 = s_332 * 2 if s_332 != 0
(7 missing values generated)

. gen collab_ind_2 = s_181 * 2 if s_181 != 0
(9 missing values generated)

. mvencode collab_ind_1 collab_ind_2, mv(1)
collab_ind_1: 7 missing values recoded
collab_ind_2: 9 missing values recoded

. gen collab_ind = collab_ind_1 + collab_ind_2

. *generate variable for project success in a behavior additionality perspective
>  for the industry
.
. gen success_ind = know_ind + speed_ind + collab_ind

.
. *generating variables measuring project success in a behaviour additionality p
> erspective for the firm
. *Generating a variable for knowledge gain in firm due to the project*
.
. gen know_firm_1 = 2*s_159 * s_395 if s_395 == 1 & s_159 !=0
```

```
(67 missing values generated)

. mvencode know_firm_1, mv(1)
 know_firm_1: 67 missing values recoded

.
. gen know_firm_2 = 2*s_159 * s_392 if s_392 == 1 & s_159 !=0
(44 missing values generated)

. mvencode know_firm_2, mv(1)
 know_firm_2: 44 missing values recoded

.
. gen know_firm_3 = 2*s_159 * s_393 if s_393 == 1 & s_159 !=0
(46 missing values generated)

. mvencode know_firm_3, mv(1)
 know_firm_3: 46 missing values recoded

.
. gen know_firm = know_firm_1 + know_firm_2 + know_firm_3

.
. *generating variables for speed/acceleration on return from project for the fi
> rm
. *generating a variable for positive return during project duration.
.
. gen speed_firm_1 = s_157_1*6 if s_157_1 !=0
(71 missing values generated)

.
. *generating a variable for positive return first year after project completion
.
. gen speed_firm_2 = s_231_1*4 if s_231_1 !=0
(75 missing values generated)

.
. *generating a variable for positive returns in the future, 1 year after projec
> t completion
.
. gen speed_firm_3 = s_331_1*2 if s_331_1 !=0
(50 missing values generated)

.
. mvencode speed_firm_1 speed_firm_2 speed_firm_3, mv(1)
speed_firm_1: 71 missing values recoded
speed_firm_2: 75 missing values recoded
speed_firm_3: 50 missing values recoded

.
. *generating a variable for total speed/acceleration on returns for the project
> .
.
. gen speed_firm = speed_firm_1 + speed_firm_2 + speed_firm_3

.
. *generating a variable for firm collaboration and network building from the pr
> oject.
.
. gen collab_firm_1 = 2*s_158 if s_158 !=0
(7 missing values generated)

. mvencode collab_firm_1, mv(1)
collab_fir~1: 7 missing values recoded

.
. gen collab_firm_2a = 2*s_185 if s_185 !=0
(11 missing values generated)

. gen collab_firm_2b = 2*s_186 if s_186 !=0
(8 missing values generated)

. gen collab_firm_2c = 2*s_187 if s_187 !=0
(16 missing values generated)

. mvencode collab_firm_2a collab_firm_2b collab_firm_2c, mv(1)
collab_fi~2a: 11 missing values recoded
```

```
collab_fi~2b: 8 missing values recoded
collab_fi~2c: 16 missing values recoded

. gen collab_firm_2 = collab_firm_2a + collab_firm_2b + collab_firm_2c

.
. gen collab_firm_3a = 2*s_356 if s_356 !=0
(10 missing values generated)

. gen collab_firm_3b = 2*s_357 if s_357 !=0
(12 missing values generated)

. mvencode collab_firm_3a collab_firm_3b, mv(1)
collab_fi~3a: 10 missing values recoded
collab_fi~3b: 12 missing values recoded

. gen collab_firm_3 = collab_firm_3a + collab_firm_3b

.
. gen collab_firm_4a = 2*s_201 if s_201 !=0
(8 missing values generated)

. gen collab_firm_4b = 2*s_202 if s_202 !=0
(10 missing values generated)

. gen collab_firm_4c = 2*s_203 if s_203 !=0
(9 missing values generated)

. gen collab_firm_4d = 2*s_204 if s_204 !=0
(9 missing values generated)

. mvencode collab_firm_4a collab_firm_4b collab_firm_4c collab_firm_4d, mv(1)
collab_fi~4a: 8 missing values recoded
collab_fi~4b: 10 missing values recoded
collab_fi~4c: 9 missing values recoded
collab_fi~4d: 9 missing values recoded

. gen collab_firm_4 = collab_firm_4a + collab_firm_4b + collab_firm_4c + collab_
> firm_4d

.
. gen collab_firm_5a = 2*s_190 if s_190 !=0
(9 missing values generated)

. gen collab_firm_5b = 2*s_191 if s_191 !=0
(8 missing values generated)

. gen collab_firm_5c = 2*s_192 if s_192 !=0
(8 missing values generated)

. gen collab_firm_5d = 2*s_193 if s_193 !=0
(8 missing values generated)

. gen collab_firm_5e = 2*s_288 if s_288 !=0
(8 missing values generated)

. gen collab_firm_5f = 2*s_289 if s_289 !=0
(10 missing values generated)

. gen collab_firm_5g = 2*s_290 if s_290 !=0
(8 missing values generated)

. gen collab_firm_5h = 2*s_291 if s_291 !=0
(8 missing values generated)

. mvencode collab_firm_5a collab_firm_5b collab_firm_5c collab_firm_5d collab_fi
> rm_5e collab_firm_5f collab_firm_5g collab_firm_5h, mv(1)
collab_fi~5a: 9 missing values recoded
collab_fi~5b: 8 missing values recoded
collab_fi~5c: 8 missing values recoded
collab_fi~5d: 8 missing values recoded
collab_fi~5e: 8 missing values recoded
collab_fi~5f: 10 missing values recoded
collab_fi~5g: 8 missing values recoded
collab_fi~5h: 8 missing values recoded

. gen collab_firm_5 = collab_firm_5a + collab_firm_5b + collab_firm_5c + collab_
```

```
> firm_5d + collab_firm_5e + collab_firm_5f + collab_firm_5g + collab_firm_5h

.
. gen collab_firm_6 = 2*s_180 if s_180 !=0
(10 missing values generated)

. mvencode collab_firm_6, mv(1)
collab_fir~6: 10 missing values recoded

.
. gen collab_firm = collab_firm_1 + collab_firm_2 + collab_firm_3 + collab_firm_
> 4 + collab_firm_5 + collab_firm_6

.
. *generate variable for project success in a behavior additionality perspective
>  for the firm
.
. gen success_firm = know_firm + speed_firm + collab_firm

.
. *shapiro wilks normality test*
. swilk success_firm success_ind know_firm know_ind speed_firm speed_ind collab_
> firm collab_ind Governingorganisationexperienc TotalParticipantsincludingFHF

                    Shapiro-Wilk W test for normal data

    Variable |        Obs       W           V         z       Prob>z
-------------+--------------------------------------------------------
success_firm |        110    0.81943     16.147     6.203    0.00000
 success_ind |        110    0.97603      2.144     1.701    0.04451
   know_firm |        110    0.98167      1.639     1.102    0.13533
    know_ind |        110    0.92378      6.816     4.280    0.00001
  speed_firm |        110    0.91413      7.679     4.546    0.00000
   speed_ind |        110    0.93689      5.644     3.859    0.00006
 collab_firm |        110    0.76197     21.285     6.819    0.00000
  collab_ind |        110    0.95300      4.203     3.202    0.00068
Governingo~c |        108    0.71973     24.680     7.142    0.00000
TotalParti~F |        108    0.92145      6.916     4.308    0.00001

. *spearman correlation*
. spearman success_firm success_ind know_firm know_ind speed_firm speed_ind coll
> ab_firm collab_ind Governingorganisationexperienc TotalParticipantsincludingFH
> F, print(0.10) star(0.05)
(obs=108)

             | succes~m succes~d know_f~m know_ind speed_~m speed_~d collab~m co
> lla~nd Govern~c TotalP~F
-------------+------------------------------------------------------------------
> ------------------------
success_firm |   1.0000
 success_ind |   0.5165*  1.0000
   know_firm |   0.6789*  0.5054*  1.0000
    know_ind |   0.3450*  0.7738*  0.3982*  1.0000
  speed_firm |   0.4076*  0.2952*  0.4067*  0.1674   1.0000
   speed_ind |   0.2763*  0.6678*  0.2738*  0.2292*  0.3293*  1.0000
 collab_firm |   0.8731*  0.3886*  0.3286*  0.2276*           0.1674   1.0000
  collab_ind |   0.6004*  0.7876*  0.4613*  0.4994*  0.2258*  0.3261*  0.5301*
> 1.0000
Governingo~c |
>          1.0000
TotalParti~F |                     0.1640
>                   1.0000

. pwcorr success_firm success_ind know_firm know_ind speed_firm speed_ind collab
> _firm collab_ind Governingorganisationexperienc TotalParticipantsincludingFHF,
>  print(0.10) star(0.05)

             | succes~m succes~d know_f~m know_ind speed_~m speed_~d collab~m
-------------+------------------------------------------------------------------
success_firm |   1.0000
 success_ind |   0.6689*  1.0000
   know_firm |   0.5858*  0.5333*  1.0000
    know_ind |   0.3798*  0.7600*  0.4023*  1.0000
  speed_firm |   0.3179*  0.2916*  0.3841*           1.0000
   speed_ind |   0.3491*  0.6842*  0.3092*  0.2382*  0.3195*  1.0000
 collab_firm |   0.9714*  0.6079*  0.3915*  0.3257*  0.1717   0.2932*  1.0000
  collab_ind |   0.7684*  0.8345*  0.4964*  0.5003*  0.2296*  0.3608*  0.7368*
```

```
Governingo~c |
TotalParti~F |                    0.1625

             | colla~nd Govern~c TotalP~F
-------------+---------------------------
  collab_ind |   1.0000
Governingo~c |            1.0000
TotalParti~F |                    1.0000

. * Testing proposition #1. "Proposition 1: Most of the projects funded by FHF b
> elongs to new firms with a low degree of network ".
. ttest Governingorganisationexperienc, by(Lessthan5yearsoldatproject)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      99    9.767677    1.241656    12.35432    7.303652     12.2317
       1 |       9    1.555556    .3767961    1.130388    .6866622    2.424449
---------+--------------------------------------------------------------------
combined |     108    9.083333    1.159048    12.04518    6.785655    11.38101
---------+--------------------------------------------------------------------
    diff |            8.212121     4.13714                .0098387     16.4144
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   1.9850
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9751         Pr(|T| > |t|) = 0.0497          Pr(T > t) = 0.0249

. histogram Governingorganisationexperienc, percent fcolor("183 218 169") lcolor
> (black) addlabel addlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 1
> 62") lwidth(medthick)) by(Lessthan5yearsoldatproject)

. graph export graph_1.png
(file graph_1.png written in PNG format)

.
. * Most projects belong to older firms, but apparently older firms also have mo
> re experience *
.
. * Testing proposition #2. "Proposition 2: Older firms are more successful in c
> ollaboration ".
. ttest success_firm, by(Lessthan5yearsoldatproject)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      99    150.1818    3.871928     38.5252    142.4981    157.8655
       1 |       9    160.8889    10.09049    30.27146    137.6202    184.1576
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |           -10.70707    13.21769               -36.91243    15.49829
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.8101
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.2099         Pr(|T| > |t|) = 0.4197          Pr(T > t) = 0.7901

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(Lessthan5yearsoldatproject)

. graph export graph_2.png
(file graph_2.png written in PNG format)

. ttest collab_firm, by(Lessthan5yearsoldatproject)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      99    129.6162    3.405366    33.88296    122.8583     136.374
       1 |       9    139.2222    7.156539    21.46962    122.7192    155.7252
```

```
---------+--------------------------------------------------------------------
combined |     108    130.4167    3.181352    33.06158      124.11    136.7233
---------+--------------------------------------------------------------------
    diff |           -9.606061    11.52703               -32.45952     13.2474
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.8334
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.2033         Pr(|T| > |t|) = 0.4065          Pr(T > t) = 0.7967

. histogram collab_firm, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(Lessthan5yearsoldatproject)

. graph export graph_2_1.png
(file graph_2_1.png written in PNG format)

.
. * Testing proposition #3. "Proposition 3: The larger the firm size, the more o
> dds for project success and the more extensive is the collaboration ".
. *Testing industry success results first.*
.
. ttest success_ind, by(NumEmpLow) /* Testing for number of employees for both f
> irst, and fourth quartile*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    25.71605    .9336366     8.40273    23.85805    27.57405
       1 |      27    24.37037    1.692238    8.793127    20.89193    27.84882
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |            1.345679    1.888922               -2.399292     5.09065
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   0.7124
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.7611         Pr(|T| > |t|) = 0.4778          Pr(T > t) = 0.2389

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(NumEmpLow)

. graph export graph_3_1.png
(file graph_3_1.png written in PNG format)

.
. ttest success_ind, by(NumEmpHigh)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    25.24691    .9523413    8.571072    23.35169    27.14213
       1 |      27    25.77778    1.606906    8.349727    22.47474    29.08082
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |           -.5308642    1.892736               -4.283398    3.221669
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.2805
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.3898         Pr(|T| > |t|) = 0.7797          Pr(T > t) = 0.6102

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(NumEmpHigh)

. graph export graph_3_2.png
(file graph_3_2.png written in PNG format)
```

```
.
. ttest success_ind, by(Resultspretaxeshigh) /* Testing for results pre taxes fo
> r both lowest and highest quartile*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81     25.2716     .932111    8.388999    23.41664    27.12657
       1 |      27     25.7037    1.713708    8.904687    22.18113    29.22628
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |           -.4320988    1.892973               -4.185102    3.320904
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.2283
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.4099         Pr(|T| > |t|) = 0.8199          Pr(T > t) = 0.5901

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(Resultspretaxeshigh)

. graph export graph_3_3.png
(file graph_3_3.png written in PNG format)

.
. ttest success_ind, by(Resultspretaxeslow)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    25.34568    .9794431    8.814988    23.39653    27.29483
       1 |      27    25.48148    1.451368    7.541528    22.49815    28.46481
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |           -.1358025    1.893392               -3.889637    3.618032
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.0717
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.4715         Pr(|T| > |t|) = 0.9430          Pr(T > t) = 0.5285

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(Resultspretaxeslow)

. graph export graph_3_4.png
(file graph_3_4.png written in PNG format)

.
. ttest success_ind, by(EarningsLow) /* Testing for Earnings for both lowest and
>  highest quartile*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    25.34568    .9986349    8.987715    23.35833    27.33303
       1 |      27    25.48148    1.325157    6.885717    22.75758    28.20538
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |           -.1358025    1.893392               -3.889637    3.618032
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.0717
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.4715         Pr(|T| > |t|) = 0.9430          Pr(T > t) = 0.5285

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
```

```
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(EarningsLow)

. graph export graph_3_5.png
(file graph_3_5.png written in PNG format)

.
. ttest success_ind, by(EarningsHigh)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    25.79012     .911808    8.206272    23.97557    27.60468
       1 |      27    24.14815    1.791642    9.309646    20.46537    27.83092
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |            1.641975     1.88671               -2.09861    5.382561
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   0.8703
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.8069         Pr(|T| > |t|) = 0.3861          Pr(T > t) = 0.1931

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(EarningsHigh)

. graph export graph_3_6.png
(file graph_3_6.png written in PNG format)

.
. *Testing for number of participants in project*
.
. ttest TotalParticipantsincludingFHF, by(NumEmpLow)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    11.14815    .3689789     3.32081    10.41386    11.88244
       1 |      27    11.07407    .9840985    5.113526    9.051231    13.09692
---------+--------------------------------------------------------------------
combined |     108    11.12963    .3676736    3.820977    10.40076     11.8585
---------+--------------------------------------------------------------------
    diff |            .0740741    .8530714               -1.617223    1.765371
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   0.0868
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.5345         Pr(|T| > |t|) = 0.9310          Pr(T > t) = 0.4655

.
. histogram TotalParticipantsincludingFHF, percent fcolor("183 218 169") lcolor(
> black) addlabel addlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 16
> 2") lwidth(medthick)) by(NumEmpLow)

. graph export graph_3_7.png
(file graph_3_7.png written in PNG format)

.
. ttest TotalParticipantsincludingFHF, by(NumEmpHigh)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    11.37037    .4538737    4.084864    10.46713    12.27361
       1 |      27    10.40741    .5450091     2.83195    9.287125    11.52769
---------+--------------------------------------------------------------------
combined |     108    11.12963    .3676736    3.820977    10.40076     11.8585
---------+--------------------------------------------------------------------
    diff |             .962963     .847959               -.7181982    2.644124
------------------------------------------------------------------------------
```

```
    diff = mean(0) - mean(1)                                      t =   1.1356
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.8707         Pr(|T| > |t|) = 0.2587          Pr(T > t) = 0.1293

.
. histogram TotalParticipantsincludingFHF, percent fcolor("183 218 169") lcolor(
> black) addlabel addlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 16
> 2") lwidth(medthick)) by(NumEmpHigh)

. graph export graph_3_8.png
(file graph_3_8.png written in PNG format)

.
. ttest TotalParticipantsincludingFHF, by(Resultspretaxeslow)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    11.09877    .3918951    3.527056    10.31887    11.87866
       1 |      27    11.22222    .8984528    4.668498    9.375426    13.06902
---------+--------------------------------------------------------------------
combined |     108    11.12963    .3676736    3.820977    10.40076     11.8585
---------+--------------------------------------------------------------------
    diff |           -.1234568    .8530174               -1.814647    1.567733
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.1447
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.4426         Pr(|T| > |t|) = 0.8852          Pr(T > t) = 0.5574

. histogram TotalParticipantsincludingFHF, percent fcolor("183 218 169") lcolor(
> black) addlabel addlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 16
> 2") lwidth(medthick)) by(Resultspretaxeslow)

. graph export graph_3_9.png
(file graph_3_9.png written in PNG format)

.
. ttest TotalParticipantsincludingFHF, by(Resultspretaxeshigh)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    11.09877    .4099853    3.689868    10.28287    11.91466
       1 |      27    11.22222    .8205573    4.263741    9.535542     12.9089
---------+--------------------------------------------------------------------
combined |     108    11.12963    .3676736    3.820977    10.40076     11.8585
---------+--------------------------------------------------------------------
    diff |           -.1234568    .8530174               -1.814647    1.567733
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.1447
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.4426         Pr(|T| > |t|) = 0.8852          Pr(T > t) = 0.5574

. histogram TotalParticipantsincludingFHF, percent fcolor("183 218 169") lcolor(
> black) addlabel addlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 16
> 2") lwidth(medthick)) by(Resultspretaxeshigh)

. graph export graph_3_10.png
(file graph_3_10.png written in PNG format)

.
. ttest TotalParticipantsincludingFHF, by(EarningsLow)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    11.24691    .3950039    3.555035    10.46083      12.033
       1 |      27    10.77778    .8824554    4.585373    8.963865    12.59169
```

```
---------+--------------------------------------------------------------------
combined |     108    11.12963    .3676736    3.820977    10.40076     11.8585
---------+--------------------------------------------------------------------
    diff |            .4691358    .8518839               -1.219807    2.158079
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   0.5507
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.7085         Pr(|T| > |t|) = 0.5830          Pr(T > t) = 0.2915

. histogram TotalParticipantsincludingFHF, percent fcolor("183 218 169") lcolor(
> black) addlabel addlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 16
> 2") lwidth(medthick)) by(EarningsLow)

. graph export graph_3_11.png
(file graph_3_11.png written in PNG format)

.
. ttest TotalParticipantsincludingFHF, by(EarningsHigh)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81     11.4321    .4547209    4.092488    10.52718    12.33702
       1 |      27    10.22222    .5238835    2.722179    9.145364    11.29908
---------+--------------------------------------------------------------------
combined |     108    11.12963    .3676736    3.820977    10.40076     11.8585
---------+--------------------------------------------------------------------
    diff |            1.209877    .8449693               -.4653572     2.88511
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   1.4319
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9224         Pr(|T| > |t|) = 0.1551          Pr(T > t) = 0.0776

. histogram TotalParticipantsincludingFHF, percent fcolor("183 218 169") lcolor(
> black) addlabel addlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 16
> 2") lwidth(medthick)) by(EarningsHigh)

. graph export graph_3_12.png
(file graph_3_12.png written in PNG format)

.
. *testing for the same things but on firm level*
.
. ttest success_firm, by(NumEmpLow) /* Testing for number of employees for both
> first, and fourth quartile*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    150.1358    4.268849    38.41964    141.6405    158.6311
       1 |      27    153.8889    7.096874    36.87644    139.3011    168.4767
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |           -3.753086     8.45487               -20.51569    13.00952
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.4439
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.3290         Pr(|T| > |t|) = 0.6580          Pr(T > t) = 0.6710

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(NumEmpLow)

. graph export graph_3_13.png
(file graph_3_13.png written in PNG format)

.
. ttest success_firm, by(NumEmpHigh)
```

```
Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81         154    4.063804    36.57424    145.9128    162.0872
       1 |      27    142.2963    7.911515    41.10944    126.0339    158.5586
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |            11.7037    8.386028               -4.922413    28.32982
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   1.3956
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9171         Pr(|T| > |t|) = 0.1657          Pr(T > t) = 0.0829

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(NumEmpHigh)

. graph export graph_3_14.png
(file graph_3_14.png written in PNG format)

.
. ttest success_firm, by(Resultspretaxeshigh) /* Testing for results pre taxes f
> or both lowest and highest quartile*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    153.6296    4.016073    36.14466    145.6374    161.6219
       1 |      27    143.4074    8.190791     42.5606     126.571    160.2438
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |            10.22222     8.40428               -6.44008    26.88452
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   1.2163
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.8867         Pr(|T| > |t|) = 0.2266          Pr(T > t) = 0.1133

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(Resultspretaxeshigh)

. graph export graph_3_15.png
(file graph_3_15.png written in PNG format)

.
. ttest success_firm, by(Resultspretaxeslow)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    150.5802     4.41888    39.76992    141.7864    159.3741
       1 |      27    152.5556    6.215121    32.29472    139.7802    165.3309
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |           -1.975309    8.460549               -18.74917    14.79855
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.2335
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.4079         Pr(|T| > |t|) = 0.8158          Pr(T > t) = 0.5921

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(Resultspretaxeslow)
```

```
. graph export graph_3_16.png
(file graph_3_16.png written in PNG format)

.
. ttest success_firm, by(EarningsLow) /* Testing for Earnings for both lowest an
> d highest quartile*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    150.3333    4.606055    41.45449     141.167    159.4997
       1 |      27    153.2963    4.784774    24.86241    143.4611    163.1315
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |           -2.962963     8.45783               -19.73143    13.80551
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.3503
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.3634         Pr(|T| > |t|) = 0.7268          Pr(T > t) = 0.6366

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(EarningsLow)

. graph export graph_3_17.png
(file graph_3_17.png written in PNG format)

.
. ttest success_firm, by(EarningsHigh)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    154.9753    3.970181    35.73163    147.0744    162.8762
       1 |      27    139.3704    8.152421    42.36122    122.6128    156.1279
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |            15.60494    8.325888               -.9019436    32.11182
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   1.8743
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9682         Pr(|T| > |t|) = 0.0636          Pr(T > t) = 0.0318

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(EarningsHigh)

. graph export graph_3_18.png
(file graph_3_18.png written in PNG format)

.
. * Testing proposition #4. "Proposition 4: The smaller the firm size, the stron
> ger level of speed/ acceleration of projects"
.
. ttest speed_ind, by(NumEmpLow) /* Testing for number of employees for both fir
> st, and fourth quartile*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    7.925926    .4005312    3.604781    7.128843    8.723008
       1 |      27    7.333333    .6979824    3.626823     5.89861    8.768057
---------+--------------------------------------------------------------------
combined |     108    7.777778    .3466532    3.602526    7.090578    8.464977
---------+--------------------------------------------------------------------
    diff |            .5925926    .8022666               -.997979    2.183164
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   0.7386
```

```
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.7691         Pr(|T| > |t|) = 0.4618          Pr(T > t) = 0.2309

. histogram speed_ind, percent fcolor("183 218 169") lcolor(black) addlabel addl
> abopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthick)
> ) by(NumEmpLow)

. graph export graph_4_1.png
(file graph_4_1.png written in PNG format)

.
. ttest speed_ind, by(NumEmpHigh)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81     7.45679    .4086448    3.677803    6.643561    8.270019
       1 |      27    8.740741     .623821    3.241469    7.458458    10.02302
---------+--------------------------------------------------------------------
combined |     108    7.777778    .3466532    3.602526    7.090578    8.464977
---------+--------------------------------------------------------------------
    diff |           -1.283951    .7946021               -2.859327    .2914253
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -1.6158
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0546         Pr(|T| > |t|) = 0.1091          Pr(T > t) = 0.9454

. histogram speed_ind, percent fcolor("183 218 169") lcolor(black) addlabel addl
> abopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthick)
> ) by(NumEmpHigh)

. graph export graph_4_2.png
(file graph_4_2.png written in PNG format)

.
. ttest speed_ind, by(Resultspretaxeshigh) /* Testing for results pre taxes for
> both lowest and highest quartile*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    7.530864    .4037197    3.633478    6.727436    8.334292
       1 |      27    8.518519    .6674576    3.468211     7.14654    9.890497
---------+--------------------------------------------------------------------
combined |     108    7.777778    .3466532    3.602526    7.090578    8.464977
---------+--------------------------------------------------------------------
    diff |           -.9876543    .7985876               -2.570932    .5956233
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -1.2368
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.1095         Pr(|T| > |t|) = 0.2189          Pr(T > t) = 0.8905

. histogram speed_ind, percent fcolor("183 218 169") lcolor(black) addlabel addl
> abopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthick)
> ) by(Resultspretaxeshigh)

. graph export graph_4_3.png
(file graph_4_3.png written in PNG format)

.
. ttest speed_ind, by(Resultspretaxeslow)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    7.753086    .3918659    3.526793    6.973248    8.532924
       1 |      27    7.851852     .748605    3.889866    6.313072    9.390631
---------+--------------------------------------------------------------------
```

```
combined |     108    7.777778    .3466532    3.602526    7.090578    8.464977
---------+--------------------------------------------------------------------
    diff |          -.0987654    .8042715               -1.693312    1.495781
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.1228
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.4512         Pr(|T| > |t|) = 0.9025          Pr(T > t) = 0.5488

. histogram speed_ind, percent fcolor("183 218 169") lcolor(black) addlabel addl
> abopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthick)
> ) by(Resultspretaxeslow)

. graph export graph_4_4.png
(file graph_4_4.png written in PNG format)

.
. ttest speed_ind, by(EarningsLow) /* Testing for Earnings for both lowest and h
> ighest quartile*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    7.728395    .3951919    3.556727    6.941938    8.514852
       1 |      27    7.925926    .7317113    3.802084    6.421872     9.42998
---------+--------------------------------------------------------------------
combined |     108    7.777778    .3466532    3.602526    7.090578    8.464977
---------+--------------------------------------------------------------------
    diff |          -.1975309    .8040998               -1.791737    1.396675
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.2457
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.4032         Pr(|T| > |t|) = 0.8064          Pr(T > t) = 0.5968

. histogram speed_ind, percent fcolor("183 218 169") lcolor(black) addlabel addl
> abopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthick)
> ) by(EarningsLow)

. graph export graph_4_5.png
(file graph_4_5.png written in PNG format)

.
. ttest speed_ind, by(EarningsHigh)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    7.703704    .4103012    3.692711    6.887178    8.520229
       1 |      27           8    .6493477     3.37411    6.665247    9.334753
---------+--------------------------------------------------------------------
combined |     108    7.777778    .3466532    3.602526    7.090578    8.464977
---------+--------------------------------------------------------------------
    diff |          -.2962963    .8038137               -1.889935    1.297342
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.3686
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.3566         Pr(|T| > |t|) = 0.7132          Pr(T > t) = 0.6434

. histogram speed_ind, percent fcolor("183 218 169") lcolor(black) addlabel addl
> abopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthick)
> ) by(EarningsHigh)

. graph export graph_4_6.png
(file graph_4_6.png written in PNG format)

.
. ttest speed_firm, by(NumEmpLow) /* Testing for number of employees for both fi
> rst, and fourth quartile*/

Two-sample t test with equal variances
```

```
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    6.111111     .393622    3.542598    5.327778    6.894444
       1 |      27           7    .7181013    3.731364    5.523922    8.476078
---------+--------------------------------------------------------------------
combined |     108    6.333333    .3458201    3.593868    5.647785    7.018881
---------+--------------------------------------------------------------------
    diff |          -.8888889    .7977373               -2.470481    .6927029
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -1.1143
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.1338         Pr(|T| > |t|) = 0.2677          Pr(T > t) = 0.8662

. histogram speed_firm, percent fcolor("183 218 169") lcolor(black) addlabel add
> labopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthick
> )) by(NumEmpLow)

. graph export graph_4_7.png
(file graph_4_7.png written in PNG format)

.
. ttest speed_firm, by(NumEmpHigh)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    6.123457    .3996073    3.596466    5.328213    6.918701
       1 |      27    6.962963    .6886989    3.578585    5.547322    8.378604
---------+--------------------------------------------------------------------
combined |     108    6.333333    .3458201    3.593868    5.647785    7.018881
---------+--------------------------------------------------------------------
    diff |          -.8395062    .7982418               -2.422098    .7430859
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -1.0517
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.1477         Pr(|T| > |t|) = 0.2953          Pr(T > t) = 0.8523

. histogram speed_firm, percent fcolor("183 218 169") lcolor(black) addlabel add
> labopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthick
> )) by(NumEmpHigh)

. graph export graph_4_8.png
(file graph_4_8.png written in PNG format)

.
. ttest speed_firm, by(Resultspretaxeshigh) /* Testing for results pre taxes for
>  both lowest and highest quartile*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    5.950617    .3848606    3.463745     5.18472    6.716514
       1 |      27    7.481481     .730629     3.79646    5.979652    8.983311
---------+--------------------------------------------------------------------
combined |     108    6.333333    .3458201    3.593868    5.647785    7.018881
---------+--------------------------------------------------------------------
    diff |          -1.530864    .7884985               -3.094139    .0324108
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -1.9415
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0274         Pr(|T| > |t|) = 0.0549          Pr(T > t) = 0.9726

. histogram speed_firm, percent fcolor("183 218 169") lcolor(black) addlabel add
> labopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthick
> )) by(Resultspretaxeshigh)

. graph export graph_4_9.png
(file graph_4_9.png written in PNG format)
```

```
.
. ttest speed_firm, by(Resultspretaxeslow)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    6.197531    .3922158    3.529942    5.416996    6.978065
       1 |      27    6.740741    .7349489    3.818906    5.230032     8.25145
---------+--------------------------------------------------------------------
combined |     108    6.333333    .3458201    3.593868    5.647785    7.018881
---------+--------------------------------------------------------------------
    diff |           -.5432099    .8006591               -2.130594    1.044175
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.6785
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.2495         Pr(|T| > |t|) = 0.4990          Pr(T > t) = 0.7505

. histogram speed_firm, percent fcolor("183 218 169") lcolor(black) addlabel add
> labopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthick
> )) by(Resultspretaxeslow)

. graph export graph_4_10.png
(file graph_4_10.png written in PNG format)

.
. ttest speed_firm, by(EarningsLow) /* Testing for Earnings for both lowest and
> highest quartile*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    6.296296    .3976957    3.579261    5.504857    7.087736
       1 |      27    6.444444    .7127918    3.703775     4.97928    7.909609
---------+--------------------------------------------------------------------
combined |     108    6.333333    .3458201    3.593868    5.647785    7.018881
---------+--------------------------------------------------------------------
    diff |           -.1481481    .8022666               -1.73872    1.442423
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.1847
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.4269         Pr(|T| > |t|) = 0.8538          Pr(T > t) = 0.5731

. histogram speed_firm, percent fcolor("183 218 169") lcolor(black) addlabel add
> labopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthick
> )) by(EarningsLow)

. graph export graph_4_11.png
(file graph_4_11.png written in PNG format)

.
. ttest speed_firm, by(EarningsHigh)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    6.222222    .4052129    3.646917    5.415823    7.028622
       1 |      27    6.666667       .6688    3.475187    5.291929    8.041405
---------+--------------------------------------------------------------------
combined |     108    6.333333    .3458201    3.593868    5.647785    7.018881
---------+--------------------------------------------------------------------
    diff |           -.4444444    .8012336               -2.032968    1.144079
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.5547
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.2901         Pr(|T| > |t|) = 0.5803          Pr(T > t) = 0.7099

. histogram speed_firm, percent fcolor("183 218 169") lcolor(black) addlabel add
```

```
> labopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthick
> )) by(EarningsHigh)

. graph export graph_4_12.png
(file graph_4_12.png written in PNG format)

.
. * Testing proposition #5. "Proposition 5: A firm that has previously been invo
> lved with R&D project will be more successful in collaborations "
.
. ttest collab_ind, by(highexperincegroup) /* Testing for collaborative success
> by total experience score for project participants for industry*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      80       12.65    .4730389    4.230989    11.70844    13.59156
       1 |      28    13.78571    .5279419    2.793606    12.70247    14.86896
---------+--------------------------------------------------------------------
combined |     108    12.94444    .3780571    3.928885    12.19499     13.6939
---------+--------------------------------------------------------------------
    diff |          -1.135714    .8597064               -2.840166    .5687373
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -1.3210
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0947         Pr(|T| > |t|) = 0.1893          Pr(T > t) = 0.9053

. histogram collab_ind, percent fcolor("183 218 169") lcolor(black) addlabel add
> labopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthick
> )) by(highexperincegroup)

. graph export graph_5_1.png
(file graph_5_1.png written in PNG format)

.
. ttest collab_ind, by(Lowexperiencegroup)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      80     12.8875    .4479184    4.006304    11.99594    13.77906
       1 |      28    13.10714    .7114693    3.764742    11.64733    14.56696
---------+--------------------------------------------------------------------
combined |     108    12.94444    .3780571    3.928885    12.19499     13.6939
---------+--------------------------------------------------------------------
    diff |          -.2196429     .866492               -1.937547    1.498262
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.2535
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.4002         Pr(|T| > |t|) = 0.8004          Pr(T > t) = 0.5998

. histogram collab_ind, percent fcolor("183 218 169") lcolor(black) addlabel add
> labopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthick
> )) by(Lowexperiencegroup)

. graph export graph_5_2.png
(file graph_5_2.png written in PNG format)

.
. ttest collab_firm, by(highexperincegroup) /* Testing for collaborative success
>  by total experience score for project participants for firm*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      80    127.9625     4.06449     36.3539    119.8723    136.0527
       1 |      28    137.4286     3.76085    19.90055    129.7119    145.1452
---------+--------------------------------------------------------------------
combined |     108    130.4167    3.181352    33.06158      124.11    136.7233
---------+--------------------------------------------------------------------
```

```
    diff |           -9.466071    7.235559               -23.81127    4.879129
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -1.3083
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0968         Pr(|T| > |t|) = 0.1936          Pr(T > t) = 0.9032

. histogram collab_firm, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(highexperincegroup)

. graph export graph_5_3.png
(file graph_5_3.png written in PNG format)

.
. ttest collab_firm, by(Lowexperiencegroup)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      80      129.75    3.840429    34.34984    122.1058    137.3942
       1 |      28    132.3214    5.588171    29.56982    120.8554    143.7874
---------+--------------------------------------------------------------------
combined |     108    130.4167    3.181352    33.06158      124.11    136.7233
---------+--------------------------------------------------------------------
    diff |           -2.571429    7.289464               -17.0235    11.88064
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.3528
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.3625         Pr(|T| > |t|) = 0.7250          Pr(T > t) = 0.6375

. histogram collab_firm, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(Lowexperiencegroup)

. graph export graph_5_4.png
(file graph_5_4.png written in PNG format)

.
. ttest collab_ind, by(Governingorglowexperience) /* Testing for collaborative s
> uccess by firm experience score for project participants for industry*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      77    12.92208    .4679642    4.106369    11.99005    13.85411
       1 |      31          13    .6307531    3.511885    11.71183    14.28817
---------+--------------------------------------------------------------------
combined |     108    12.94444    .3780571    3.928885    12.19499     13.6939
---------+--------------------------------------------------------------------
    diff |           -.0779221    .8396075               -1.742526    1.586681
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.0928
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.4631         Pr(|T| > |t|) = 0.9262          Pr(T > t) = 0.5369

. histogram collab_ind, percent fcolor("183 218 169") lcolor(black) addlabel add
> labopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthick
> )) by(Governingorglowexperience)

. graph export graph_5_5.png
(file graph_5_5.png written in PNG format)

.
. ttest collab_ind, by(Governingorghighexperience)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
```

```
       0 |      75       13.44    .4254261    3.684298    12.59232    14.28768
       1 |      33    11.81818      .74551    4.282629    10.29963    13.33674
---------+--------------------------------------------------------------------
combined |     108    12.94444    .3780571    3.928885    12.19499     13.6939
---------+--------------------------------------------------------------------
    diff |            1.621818    .8093932                .0171175    3.226519
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   2.0037
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9762         Pr(|T| > |t|) = 0.0476          Pr(T > t) = 0.0238

. histogram collab_ind, percent fcolor("183 218 169") lcolor(black) addlabel add
> labopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthick
> )) by(Governingorghighexperience)

. graph export graph_5_6.png
(file graph_5_6.png written in PNG format)

.
. ttest collab_firm, by(Governingorglowexperience) /* Testing for collaborative
> success by firm experience score for project participants for firm*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      77    129.7792    3.941759     34.5888    121.9285    137.6299
       1 |      31         132    5.279703    29.39614    121.2174    142.7826
---------+--------------------------------------------------------------------
combined |     108    130.4167    3.181352    33.06158      124.11    136.7233
---------+--------------------------------------------------------------------
    diff |           -2.220779    7.062292               -16.22246     11.7809
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.3145
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.3769         Pr(|T| > |t|) = 0.7538          Pr(T > t) = 0.6231

. histogram collab_firm, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(Governingorglowexperience)

. graph export graph_5_7.png
(file graph_5_7.png written in PNG format)

.
. ttest collab_firm, by(Governingorghighexperience)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      75      133.36    3.738846    32.37936    125.9102    140.8098
       1 |      33    123.7273    5.939128    34.11769    111.6297    135.8249
---------+--------------------------------------------------------------------
combined |     108    130.4167    3.181352    33.06158      124.11    136.7233
---------+--------------------------------------------------------------------
    diff |            9.632727    6.875471               -3.998563    23.26402
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   1.4010
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9179         Pr(|T| > |t|) = 0.1641          Pr(T > t) = 0.0821

. histogram collab_firm, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(Governingorghighexperience)

. graph export graph_5_8.png
(file graph_5_8.png written in PNG format)

.
.
```

```
. * Testing proposition #6. "Proposition 6: A firm that has previously been invo
> lved with R&D project will be more successful (in general)"
.
. ttest success_ind, by(Governingorghighexperience)/* Testing for success by fir
> m experience score for project participants for industry*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      75    25.46667    .9306267    8.059464    23.61235    27.32098
       1 |      33    25.18182    1.653425    9.498206     21.8139    28.54974
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |            .2848485    1.779654               -3.243488    3.813185
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   0.1601
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.5634         Pr(|T| > |t|) = 0.8731          Pr(T > t) = 0.4366

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(Governingorghighexperience)

. graph export graph_6_1.png
(file graph_6_1.png written in PNG format)

.
. ttest success_ind, by(Governingorglowexperience)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      77    25.71429    1.003558    8.806184    23.71553    27.71304
       1 |      31    24.54839    1.380228    7.684785    21.72959    27.36719
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |            1.165899    1.808839               -2.420301    4.752098
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   0.6446
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.7397         Pr(|T| > |t|) = 0.5206          Pr(T > t) = 0.2603

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(Governingorglowexperience)

. graph export graph_6_2.png
(file graph_6_2.png written in PNG format)

.
. ttest success_firm, by(Governingorghighexperience) /* Testing for success by f
> irm experience score for project participants for firm*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      75    153.7333     4.28302    37.09205    145.1992    162.2674
       1 |      33    145.0303    6.893465    39.59994    130.9888    159.0718
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |             8.70303    7.910086               -6.979484    24.38554
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   1.1002
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.8631         Pr(|T| > |t|) = 0.2737          Pr(T > t) = 0.1369
```

```
. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(Governingorghighexperience)

. graph export graph_6_3.png
(file graph_6_3.png written in PNG format)

.
. ttest success_firm, by(Governingorglowexperience)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      77    150.7532    4.464034    39.17174    141.8624    159.6441
       1 |      31     151.871    6.314643    35.15844    138.9747    164.7672
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |           -1.117721    8.099708               -17.17618    14.94074
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.1380
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.4453         Pr(|T| > |t|) = 0.8905          Pr(T > t) = 0.5547

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(Governingorglowexperience)

. graph export graph_6_4.png
(file graph_6_4.png written in PNG format)

.
. ttest success_ind, by(highexperincegroup) /* Testing for success by total expe
> rience score for project participants for industry*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      80     25.1625    .9752383    8.722797    23.22134    27.10366
       1 |      28          26    1.486269    7.864595    22.95043    29.04957
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |              -.8375    1.869135               -4.543242    2.868242
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.4481
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.3275         Pr(|T| > |t|) = 0.6550          Pr(T > t) = 0.6725

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(highexperincegroup)

. graph export graph_6_5.png
(file graph_6_5.png written in PNG format)

.
. ttest success_ind, by(Lowexperiencegroup)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      80     25.3125    .9752627    8.723014    23.37129    27.25371
       1 |      28    25.57143    1.491979    7.894811    22.51014    28.63272
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |           -.2589286    1.870735               -3.967843    3.449986
------------------------------------------------------------------------------
```

```
    diff = mean(0) - mean(1)                                      t =  -0.1384
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.4451         Pr(|T| > |t|) = 0.8902          Pr(T > t) = 0.5549

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(Lowexperiencegroup)

. graph export graph_6_6.png
(file graph_6_6.png written in PNG format)

.
. ttest success_firm, by(highexperincegroup) /* Testing for success by total exp
> erience score for project participants for firm*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      80    147.5625    4.576524    40.93367    138.4532    156.6718
       1 |      28    161.1071    4.818488    25.49704    151.2204    170.9939
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |           -13.54464    8.257872               -29.91668    2.827392
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -1.6402
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0520         Pr(|T| > |t|) = 0.1039          Pr(T > t) = 0.9480

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(highexperincegroup)

. graph export graph_6_7.png
(file graph_6_7.png written in PNG format)

.
. ttest success_firm, by(Lowexperiencegroup)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      80     150.925    4.396481    39.32332     142.174     159.676
       1 |      28       151.5    6.461219    34.18956    138.2427    164.7573
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |               -.575    8.361822               -17.15312    16.00312
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.0688
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.4727         Pr(|T| > |t|) = 0.9453          Pr(T > t) = 0.5273

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(Lowexperiencegroup)

. graph export graph_6_8.png
(file graph_6_8.png written in PNG format)

.
. *Testing proposition #7. "Proposition 7: The longer duration of a project, the
>  more successful "
.
. ttest success_ind, by(Projectdurationlow) /* Testing for succes by lowest quar
> tile duration*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
```

```
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    25.50617    .9830545     8.84749    23.54983    27.46251
       1 |      27          25     1.42625    7.411011     22.0683     27.9317
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |            .5061728      1.8928               -3.246487    4.258833
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   0.2674
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.6052         Pr(|T| > |t|) = 0.7897          Pr(T > t) = 0.3948

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(Projectdurationlow)

. graph export graph_7_1.png
(file graph_7_1.png written in PNG format)

.
. ttest success_ind, by(Projectdurationhigh) /* Testing for succes by highest qu
> artile duration*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81     24.7284    .8813942    7.932547    22.97436    26.48243
       1 |      27    27.33333    1.896165    9.852762    23.43571    31.23096
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |           -2.604938    1.876457               -6.325198    1.115321
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -1.3882
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0840         Pr(|T| > |t|) = 0.1680          Pr(T > t) = 0.9160

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(Projectdurationhigh)

. graph export graph_7_2.png
(file graph_7_2.png written in PNG format)

.
. ttest success_firm, by(Projectdurationlow) /* Testing for succes by lowest qua
> rtile duration*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    150.2469    4.447795    40.03015    141.3955    159.0983
       1 |      27    153.5556    6.004826    31.20199    141.2125    165.8987
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |           -3.308642    8.456621               -20.07471    13.45743
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.3912
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.3482         Pr(|T| > |t|) = 0.6964          Pr(T > t) = 0.6518

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(Projectdurationlow)

. graph export graph_7_3.png
(file graph_7_3.png written in PNG format)
```

```
.
. ttest success_firm, by(Projectdurationhigh) /* Testing for succes by highest q
> uartile duration*/

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      81    150.3333    3.921451    35.29306    142.5294    158.1373
       1 |      27    153.2963    8.762588    45.53174    135.2845    171.3081
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |           -2.962963     8.45783               -19.73143    13.80551
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.3503
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.3634         Pr(|T| > |t|) = 0.7268          Pr(T > t) = 0.6366

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(Projectdurationhigh)

. graph export graph_7_4.png
(file graph_7_4.png written in PNG format)

.
. *Testing proposition #8. "Proposition 8: A more substantial number of particip
> ants in a project will lead to a more successful result, however up to a certa
> in point".
. xtile quart_totalpart = TotalParticipantsincludingFHF, nq(4)

. gen low_totalpart = 1 if quart_totalpart == 1
(64 missing values generated)

. replace low_totalpart = 0 if quart_totalpart != 1
(64 real changes made)

. gen high_totalpart =1 if quart_totalpart == 4
(86 missing values generated)

. replace high_totalpart = 0 if quart_totalpart != 4
(86 real changes made)

.
. ttest success_ind, by(low_totalpart)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      64    25.32813    1.103982    8.831859    23.12199    27.53426
       1 |      46     24.6087    1.301236    8.825413    21.98787    27.22952
---------+--------------------------------------------------------------------
combined |     110    25.02727    .8386473    8.795807     23.3651    26.68944
---------+--------------------------------------------------------------------
    diff |            .7194293    1.706662               -2.663471    4.102329
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   0.4215
Ho: diff = 0                                     degrees of freedom =      108

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.6629         Pr(|T| > |t|) = 0.6742          Pr(T > t) = 0.3371

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(low_totalpart)

. graph export graph_8_1.png
(file graph_8_1.png written in PNG format)

.
. ttest success_ind, by(high_totalpart)
```

```
Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      86    25.15116     .962145    8.922566    23.23816    27.06416
       1 |      24    24.58333    1.734054    8.495097    20.99617     28.1705
---------+--------------------------------------------------------------------
combined |     110    25.02727    .8386473    8.795807     23.3651    26.68944
---------+--------------------------------------------------------------------
    diff |            .5678295    2.039214               -3.474246    4.609905
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   0.2785
Ho: diff = 0                                     degrees of freedom =      108

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.6094         Pr(|T| > |t|) = 0.7812          Pr(T > t) = 0.3906

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(high_totalpart)

. graph export graph_8_2.png
(file graph_8_2.png written in PNG format)

.
. ttest success_firm, by(low_totalpart)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      64    149.2813    5.346917    42.77533    138.5963    159.9662
       1 |      46     148.087    5.799702    39.33549    136.4058    159.7682
---------+--------------------------------------------------------------------
combined |     110    148.7818    3.927393    41.19085    140.9979    156.5658
---------+--------------------------------------------------------------------
    diff |            1.194293    7.998061               -14.65925    17.04784
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   0.1493
Ho: diff = 0                                     degrees of freedom =      108

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.5592         Pr(|T| > |t|) = 0.8816          Pr(T > t) = 0.4408

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(low_totalpart)

. graph export graph_8_3.png
(file graph_8_3.png written in PNG format)

.
. ttest success_firm, by(high_totalpart)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      86    146.1163    4.573145     42.4096    137.0236    155.2089
       1 |      24    158.3333    7.280525    35.66714    143.2724    173.3942
---------+--------------------------------------------------------------------
combined |     110    148.7818    3.927393    41.19085    140.9979    156.5658
---------+--------------------------------------------------------------------
    diff |           -12.21705    9.480475                -31.009    6.574892
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -1.2887
Ho: diff = 0                                     degrees of freedom =      108

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.1001         Pr(|T| > |t|) = 0.2003          Pr(T > t) = 0.8999

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(high_totalpart)

. graph export graph_8_4.png
(file graph_8_4.png written in PNG format)
```

```
.
. *Testing propositon #9. "Proposition 9: Projects consisting of most partners f
> rom the industry will be more successful".
.
. gen part_ind_high = 1 if Industryparticipants > researchinstitutionparticipant
(45 missing values generated)

. replace part_ind_high = 0 if Industryparticipants < researchinstitutionpartici
> pant
(35 real changes made)

.
. ttest success_ind, by(part_ind_high)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      35    23.65714    1.371954    8.116587      20.869    26.44529
       1 |      65    26.78462    1.017985    8.207261    24.75096    28.81828
---------+--------------------------------------------------------------------
combined |     100       25.69    .8271522    8.271522    24.04875    27.33125
---------+--------------------------------------------------------------------
    diff |           -3.127473    1.714138               -6.529123    .2741784
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -1.8245
Ho: diff = 0                                     degrees of freedom =       98

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0356         Pr(|T| > |t|) = 0.0711          Pr(T > t) = 0.9644

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(part_ind_high)

. graph export graph_9_1.png
(file graph_9_1.png written in PNG format)

.
. ttest success_firm, by(part_ind_high)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      35    141.0286    8.514396    50.37184    123.7252    158.3319
       1 |      65    159.1538    2.929478    23.61821    153.3015    165.0062
---------+--------------------------------------------------------------------
combined |     100      152.81    3.615949    36.15949    145.6352    159.9848
---------+--------------------------------------------------------------------
    diff |           -18.12527    7.396423               -32.80324   -3.447313
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -2.4505
Ho: diff = 0                                     degrees of freedom =       98

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0080         Pr(|T| > |t|) = 0.0160          Pr(T > t) = 0.9920

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(part_ind_high)

. graph export graph_9_2.png
(file graph_9_2.png written in PNG format)

.
. *Testing proposition #10. "Proposition 10: If the project leader of the FHF pr
> oject comes from the industry, the project is more successful.".
.
. ttest success_ind, by(BackgroundprojectmanagerIndu)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      90    24.88889    .9042064    8.578055    23.09225    26.68553
```

```
       1 |      18    27.83333    1.822607    7.732666    23.98797     31.6787
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |           -2.944444    2.181308                -7.2691    1.380212
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -1.3499
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0900         Pr(|T| > |t|) = 0.1799          Pr(T > t) = 0.9100

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(BackgroundprojectmanagerIndu)

. graph export graph_10_1.png
(file graph_10_1.png written in PNG format)

.
. ttest success_firm, by(BackgroundprojectmanagerIndu)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      90    147.8333    4.227673    40.10723     139.433    156.2336
       1 |      18    167.2778    3.998207    16.96295    158.8423    175.7133
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |           -19.44444    9.649718               -38.57595   -.3129406
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -2.0150
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0232         Pr(|T| > |t|) = 0.0464          Pr(T > t) = 0.9768

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(BackgroundprojectmanagerIndu)

. graph export graph_10_2.png
(file graph_10_2.png written in PNG format)

.
. *Testing propostion #11. "
.
. ttest success_ind, by(s_351)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
     NEI |      43    22.67442     1.48515    9.738781    19.67726    25.67157
      JA |      65    27.16923    .8755683    7.059057    25.42008    28.91838
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |           -4.494812    1.616984               -7.70064   -1.288984
------------------------------------------------------------------------------
    diff = mean(NEI) - mean(JA)                                   t =  -2.7798
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0032         Pr(|T| > |t|) = 0.0064          Pr(T > t) = 0.9968

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(s_351)

. graph export graph_11_1.png
(file graph_11_1.png written in PNG format)

.
. ttest success_firm, by(s_351)
```

```
Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
     NEI |      43    130.5349    7.507276     49.2285    115.3846    145.6852
      JA |      65    164.6615    2.289323    18.45711    160.0881     169.235
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |           -34.12665    6.712045               -47.43394   -20.81937
------------------------------------------------------------------------------
    diff = mean(NEI) - mean(JA)                                   t =  -5.0844
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(s_351)

. graph export graph_11_2.png
(file graph_11_2.png written in PNG format)

.
. *Testing proposition #12.
.
. ttest success_ind, by(s_170_1) /* project idea concieved by Research instituti
> on */

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
Ikke val |      72    25.97222    1.013402    8.599005    23.95156    27.99289
   Valgt |      36    24.19444    1.371374    8.228242    21.41041    26.97848
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |            1.777778    1.730641               -1.653387    5.208942
------------------------------------------------------------------------------
    diff = mean(Ikke val) - mean(Valgt)                           t =   1.0272
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.8467         Pr(|T| > |t|) = 0.3066          Pr(T > t) = 0.1533

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(s_170_1)

. graph export graph_12_1.png
(file graph_12_1.png written in PNG format)

.
. ttest success_ind, by(s_170_2) /* project idea concieved by industry/firm */

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
Ikke val |      40      21.975     1.53985    9.738866    18.86036    25.08964
   Valgt |      68    27.38235    .8459036      6.9755    25.69392    29.07078
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |           -5.407353    1.614541               -8.608337   -2.206369
------------------------------------------------------------------------------
    diff = mean(Ikke val) - mean(Valgt)                           t =  -3.3492
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0006         Pr(|T| > |t|) = 0.0011          Pr(T > t) = 0.9994

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
```

```
> k)) by(s_170_2)

. graph export graph_12_2.png
(file graph_12_2.png written in PNG format)

.
. ttest success_ind, by(s_170_3) /* project idea concieved by FHF */

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
Ikke val |      93    25.02151    .9211527    8.883275    23.19202    26.85099
   Valgt |      15        27.6    1.290257    4.997142    24.83267    30.36733
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |           -2.578495    2.357499               -7.252466    2.095477
------------------------------------------------------------------------------
    diff = mean(Ikke val) - mean(Valgt)                           t =  -1.0937
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.1383         Pr(|T| > |t|) = 0.2765          Pr(T > t) = 0.8617

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(s_170_3)

. graph export graph_12_3.png
(file graph_12_3.png written in PNG format)

.
. ttest success_ind, by(s_170_4) /* project idea concieved by unknown */

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
Ikke val |      92    25.84783    .8212035    7.876708    24.21661    27.47905
   Valgt |      16     22.6875    2.823589    11.29436    16.66916    28.70584
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |            3.160326    2.287421               -1.374708     7.69536
------------------------------------------------------------------------------
    diff = mean(Ikke val) - mean(Valgt)                           t =   1.3816
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9150         Pr(|T| > |t|) = 0.1700          Pr(T > t) = 0.0850

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(s_170_4)

. graph export graph_12_4.png
(file graph_12_4.png written in PNG format)

.
. ttest success_firm, by(s_170_1)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
Ikke val |      72    152.3472    4.463298    37.87234    143.4477    161.2468
   Valgt |      36    148.5278    6.395743    38.37446    135.5437    161.5118
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |            3.819444    7.764652               -11.57473    19.21362
------------------------------------------------------------------------------
    diff = mean(Ikke val) - mean(Valgt)                           t =   0.4919
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
```

```
 Pr(T < t) = 0.6881         Pr(|T| > |t|) = 0.6238          Pr(T > t) = 0.3119

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(s_170_1)

. graph export graph_12_5.png
(file graph_12_5.png written in PNG format)

.
. ttest success_firm, by(s_170_2)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
Ikke val |      40     132.025    7.941007    50.22334    115.9628    148.0872
   Valgt |      68    162.2794    2.662691    21.95711    156.9647    167.5942
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |           -30.25441    6.996328               -44.12531   -16.38351
------------------------------------------------------------------------------
    diff = mean(Ikke val) - mean(Valgt)                           t =  -4.3243
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(s_170_2)

. graph export graph_12_6.png
(file graph_12_6.png written in PNG format)

.
. ttest success_firm, by(s_170_3)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
Ikke val |      93    150.4839    4.147909    40.00098    142.2458     158.722
   Valgt |      15    154.7333    5.471543    21.19119     142.998    166.4686
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |           -4.249462    10.58809               -25.24139    16.74246
------------------------------------------------------------------------------
    diff = mean(Ikke val) - mean(Valgt)                           t =  -0.4013
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.3445         Pr(|T| > |t|) = 0.6890          Pr(T > t) = 0.6555

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(s_170_3)

. graph export graph_12_7.png
(file graph_12_7.png written in PNG format)

.
. ttest success_firm, by(s_170_4)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
Ikke val |      92    154.8478      3.3645    32.27115    148.1647     161.531
   Valgt |      16     129.375    14.45017    57.80066     98.5752    160.1748
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |            25.47283    10.01416                5.618773    45.32688
------------------------------------------------------------------------------
```

```
    diff = mean(Ikke val) - mean(Valgt)                           t =   2.5437
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9938         Pr(|T| > |t|) = 0.0124          Pr(T > t) = 0.0062

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(s_170_4)

. graph export graph_12_8.png
(file graph_12_8.png written in PNG format)

.
. *testing proposition #13*
.
. ttest success_ind, by(FHFexperiencelow)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      76    26.36842    .9801257    8.544538    24.41591    28.32093
       1 |      32    23.03125    1.408846    7.969637    20.15789    25.90461
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |            3.337171    1.766035               -.1641658    6.838508
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   1.8896
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9692         Pr(|T| > |t|) = 0.0615          Pr(T > t) = 0.0308

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(FHFexperiencelow)

. graph export graph_13_1.png
(file graph_13_1.png written in PNG format)

.
. ttest success_firm, by(FHFexperiencelow)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      76    154.0132     4.42812    38.60345    145.1919    162.8344
       1 |      32    144.0938    6.329711    35.80625    131.1842    157.0033
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |            9.919408      7.9671               -5.876142    25.71496
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   1.2450
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.8921         Pr(|T| > |t|) = 0.2159          Pr(T > t) = 0.1079

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(FHFexperiencelow)

. graph export graph_13_2.png
(file graph_13_2.png written in PNG format)

.
. ttest success_ind, by(FHFexperiencehigh)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      70    24.95714    1.029067    8.609795    22.90421    27.01008
```

```
       1 |      38    26.15789    1.345413    8.293685    23.43183    28.88396
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |           -1.200752    1.712893               -4.59673    2.195226
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.7010
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.2424         Pr(|T| > |t|) = 0.4848          Pr(T > t) = 0.7576

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(FHFexperiencehigh)

. graph export graph_13_3.png
(file graph_13_3.png written in PNG format)

.
. ttest success_firm, by(FHFexperiencehigh)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      70    150.3857    4.482092    37.49987    141.4442    159.3272
       1 |      38    152.3421    6.344908    39.11264    139.4861    165.1981
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |           -1.956391    7.671152               -17.1652    13.25241
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.2550
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.3996         Pr(|T| > |t|) = 0.7992          Pr(T > t) = 0.6004

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(FHFexperiencehigh)

. graph export graph_13_4.png
(file graph_13_4.png written in PNG format)

.
. ttest success_ind, by(RepOrgLowExp)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      79    24.74684    .9569555    8.505607    22.84168    26.65199
       1 |      29    27.10345    1.543575    8.312404    23.94158    30.26532
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |           -2.356613    1.835748               -5.996161    1.282936
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -1.2837
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.1010         Pr(|T| > |t|) = 0.2020          Pr(T > t) = 0.8990

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(RepOrgLowExp)

. graph export graph_13_5.png
(file graph_13_5.png written in PNG format)

.
. ttest success_firm, by(RepOrgLowExp)

Two-sample t test with equal variances
```

```
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      79    154.1646    4.117727    36.59916    145.9668    162.3623
       1 |      29    142.6552    7.562266    40.72405    127.1646    158.1458
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |            11.50938    8.192493               -4.73303     27.7518
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   1.4049
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9185         Pr(|T| > |t|) = 0.1630          Pr(T > t) = 0.0815

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(RepOrgLowExp)

. graph export graph_13_6.png
(file graph_13_6.png written in PNG format)

.
. ttest success_ind, by(RepOrgHighExp)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      62    25.74194    1.064284    8.380179    23.61377     27.8701
       1 |      46     24.8913    1.280183    8.682622    22.31288    27.46972
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |            .8506311    1.656002              -2.432554    4.133817
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   0.5137
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.6957         Pr(|T| > |t|) = 0.6086          Pr(T > t) = 0.3043

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(RepOrgHighExp)

. graph export graph_13_7.png
(file graph_13_7.png written in PNG format)

.
. ttest success_firm, by(RepOrgHighExp)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      62    148.1935    5.077341    39.97903    138.0408    158.3463
       1 |      46    154.9565    5.155641    34.96726    144.5725    165.3405
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |           -6.762973     7.38154               -21.3976    7.871648
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.9162
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.1808         Pr(|T| > |t|) = 0.3616          Pr(T > t) = 0.8192

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(RepOrgHighExp)

. graph export graph_13_8.png
(file graph_13_8.png written in PNG format)
```

```
.
. ttest success_ind, by(ProjectmanagerexperienceLow)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      37    24.27027    1.225142     7.45225    21.78557    26.75497
       1 |      71    25.95775    1.064034    8.965707     23.8356    28.07989
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |           -1.687476    1.719817               -5.09718    1.722228
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.9812
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.1644         Pr(|T| > |t|) = 0.3287          Pr(T > t) = 0.8356

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(ProjectmanagerexperienceLow)

. graph export graph_13_9.png
(file graph_13_9.png written in PNG format)

.
. ttest success_firm, by(ProjectmanagerexperienceLow)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      37    151.3784    5.544165    33.72384    140.1343    162.6225
       1 |      71    150.9155    4.763617    40.13895    141.4148    160.4162
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |            .4628854     7.72142               -14.84558    15.77135
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   0.0599
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.5238         Pr(|T| > |t|) = 0.9523          Pr(T > t) = 0.4762

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(ProjectmanagerexperienceLow)

. graph export graph_13_10.png
(file graph_13_10.png written in PNG format)

.
.
. ttest success_ind, by(Projectmanagerexperiencehigh)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      71    25.95775    1.064034    8.965707     23.8356    28.07989
       1 |      37    24.27027    1.225142     7.45225    21.78557    26.75497
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
    diff |            1.687476    1.719817               -1.722228     5.09718
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   0.9812
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.8356         Pr(|T| > |t|) = 0.3287          Pr(T > t) = 0.1644

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
```

```
> k)) by(Projectmanagerexperiencehigh)

. graph export graph_13_11.png
(file graph_13_11.png written in PNG format)

.
. ttest success_firm, by(Projectmanagerexperiencehigh)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      71    150.9155    4.763617    40.13895    141.4148    160.4162
       1 |      37    151.3784    5.544165    33.72384    140.1343    162.6225
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |           -.4628854     7.72142               -15.77135    14.84558
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.0599
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.4762         Pr(|T| > |t|) = 0.9523          Pr(T > t) = 0.5238

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(Projectmanagerexperiencehigh)

. graph export graph_13_12.png
(file graph_13_12.png written in PNG format)

.
. *Proposition 14.
.
. ttest Earnings, by(s_349)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
wouldn't |      90     1050500    240449.9     2281108    572731.1     1528269
   would |      18     3043135     1147918     4870205    621238.6     5465031
---------+--------------------------------------------------------------------
combined |     108     1382606      283058     2941625    821476.4     1943735
---------+--------------------------------------------------------------------
    diff |            -1992635    738146.9               -3456083   -529186.8
------------------------------------------------------------------------------
    diff = mean(wouldn't) - mean(would)                           t =  -2.6995
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0040         Pr(|T| > |t|) = 0.0081          Pr(T > t) = 0.9960

. histogram Earnings, percent fcolor("183 218 169") lcolor(black) addlabel addla
> bopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthick))
>  by(s_349)

. graph export graph_14_1.png
(file graph_14_1.png written in PNG format)

.
. ttest Resultspretaxes, by(s_349)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
wouldn't |      90    202177.7    54329.47    515414.6     94226.2    310129.2
   would |      18    820134.9    284817.6     1208379    219222.3     1421048
---------+--------------------------------------------------------------------
combined |     108    305170.6    68481.37    711679.3    169414.2    440926.9
---------+--------------------------------------------------------------------
    diff |           -617957.3    174590.4               -964099.8   -271814.8
------------------------------------------------------------------------------
    diff = mean(wouldn't) - mean(would)                           t =  -3.5395
Ho: diff = 0                                     degrees of freedom =      106
```

```
    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0003         Pr(|T| > |t|) = 0.0006          Pr(T > t) = 0.9997

. histogram Resultspretaxes, percent fcolor("183 218 169") lcolor(black) addlabe
> l addlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(med
> thick)) by(s_349)

. graph export graph_14_2.png
(file graph_14_2.png written in PNG format)

.
. ttest Numberofemployees, by(s_349)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
wouldn't |      90    239.4111    56.79464    538.8012    126.5614    352.2608
   would |      18    570.6111    235.2699    998.1656    74.23503    1066.987
---------+--------------------------------------------------------------------
combined |     108    294.6111    61.99939    644.3166    171.7045    417.5177
---------+--------------------------------------------------------------------
    diff |             -331.2    164.0198               -656.3853   -6.014705
------------------------------------------------------------------------------
    diff = mean(wouldn't) - mean(would)                           t =  -2.0193
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0230         Pr(|T| > |t|) = 0.0460          Pr(T > t) = 0.9770

. histogram Numberofemployees, percent fcolor("183 218 169") lcolor(black) addla
> bel addlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(m
> edthick)) by(s_349)

. graph export graph_14_3.png
(file graph_14_3.png written in PNG format)

.
. ttest success_firm, by(s_349)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
wouldn't |      90    149.2889    4.220018     40.0346    140.9038     157.674
   would |      18         160    5.530663    23.46462    148.3313    171.6687
---------+--------------------------------------------------------------------
combined |     108    151.0741    3.647303    37.90389    143.8437    158.3044
---------+--------------------------------------------------------------------
    diff |           -10.71111    9.777605               -30.09616    8.673942
------------------------------------------------------------------------------
    diff = mean(wouldn't) - mean(would)                           t =  -1.0955
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.1379         Pr(|T| > |t|) = 0.2758          Pr(T > t) = 0.8621

. histogram success_firm, percent fcolor("183 218 169") lcolor(black) addlabel a
> ddlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthi
> ck)) by(s_349)

. graph export graph_14_4.png
(file graph_14_4.png written in PNG format)

.
. ttest success_ind, by(s_349)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
wouldn't |      90    25.23333    .8799401    8.347845    23.48491    26.98176
   would |      18    26.11111    2.200548    9.336134    21.46836    30.75386
---------+--------------------------------------------------------------------
combined |     108    25.37963    .8160426    8.480563    23.76192    26.99734
---------+--------------------------------------------------------------------
```

```
    diff |          -.8777778    2.198324               -5.236169    3.480613
------------------------------------------------------------------------------
    diff = mean(wouldn't) - mean(would)                           t =  -0.3993
Ho: diff = 0                                     degrees of freedom =      106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.3452         Pr(|T| > |t|) = 0.6905          Pr(T > t) = 0.6548

. histogram success_ind, percent fcolor("183 218 169") lcolor(black) addlabel ad
> dlabopts(mlabsize(vsmall)) normal normopts(lcolor("63 125 162") lwidth(medthic
> k)) by(s_349)

. graph export graph_14_5.png
(file graph_14_5.png written in PNG format)

.
. graph box  success_firm success_ind know_firm know_ind speed_firm speed_ind co
> llab_firm collab_ind Governingorganisationexperienc TotalParticipantsincluding
> FHF

. graph export box-measure.png
(file box-measure.png written in PNG format)

.
. graph box  success_firm success_ind know_firm know_ind speed_firm speed_ind co
> llab_firm collab_ind Governingorganisationexperienc TotalParticipantsincluding
> FHF, noout

. graph export box-measure-noout.png
(file box-measure-noout.png written in PNG format)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(Lessthan5yearsoldatproject)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> --------------------------------
success_firm | -10.70707        108   13.21769   -.810056        106   .2098614
>   .4197228   .7901386         99
 success_ind | -2.131313        108   2.959216   -.720229        106   .2364846
>   .4729692   .7635154         99
   know_firm | -1.464646        108   3.004848  -.4874278        106   .3134809
>   .6269618   .6865191         99
    know_ind | -.4949495        108   1.308067  -.3783825        106   .3529516
>   .7059032   .6470484         99
  speed_firm |  .3636364        108   1.256616   .2893774        106   .6135711
>   .7728578   .3864289         99
   speed_ind | -.1212121        108   1.260086  -.0961935        106   .4617742
>   .9235485   .5382258         99
 collab_firm | -9.606061        108   11.52703  -.8333507        106   .2032604
>   .4065208   .7967396         99
  collab_ind | -1.515152        108   1.366397  -1.108866        106   .1349987
>   .2699974   .8650013         99
Governingo~c |  8.212121        108    4.13714   1.984975        106   .9751346
>   .0497307   .0248654         99
TotalParti~F |  1.474747        108   1.328856   1.109787        106    .865199
>   .2696019    .134801         99

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+---------------------------------
success_firm |  150.1818          9   160.8889
 success_ind |  25.20202          9   27.33333
   know_firm |  14.20202          9   15.66667
    know_ind |  4.616162          9   5.111111
  speed_firm |  6.363636          9          6
   speed_ind |  7.767677          9   7.888889
 collab_firm |  129.6162          9   139.2222
  collab_ind |  12.81818          9   14.33333
Governingo~c |  9.767677          9   1.555556
TotalParti~F |  11.25253          9   9.777778

. esttab using ttest1.rtf,        wide nonumber    mtitle("diff. ") star(+ 0.10
> * 0.05) label title(by new firm)
(output written to ttest1.rtf)
```

```
.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(NumEmpLow)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> --------------------------------
success_firm | -3.753086        108    8.45487  -.4438964        106   .3290112
>   .6580223   .6709888         81
 success_ind |  1.345679        108   1.888922    .712406        106   .7611107
>   .4777786   .2388893         81
   know_firm |   1.17284        108   1.916715   .6119009        106   .7290432
>   .5419136   .2709568         81
    know_ind |  .6296296        108   .8332414   .7556389        106   .7742292
>   .4515416   .2257708         81
  speed_firm | -.8888889        108   .7977373  -1.114263        106   .1338433
>   .2676866   .8661567         81
   speed_ind |  .5925926        108   .8022666   .7386479        106   .7691234
>   .4617532   .2308766         81
 collab_firm | -4.037037        108   7.371169  -.5476793        106   .2925318
>   .5850635   .7074682         81
  collab_ind |  .1234568        108   .8771122   .1407537        106   .5558342
>   .8883317   .4441658         81
Governingo~c |  8.506173        108    2.55925   3.323697        106   .9993899
>   .0012203   .0006101         81
TotalParti~F |  .0740741        108   .8530714   .0868322        106   .5345157
>   .9309687   .4654843         81

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+---------------------------------
success_firm |  150.1358         27   153.8889
 success_ind |  25.71605         27   24.37037
   know_firm |  14.61728         27   13.44444
    know_ind |  4.814815         27   4.185185
  speed_firm |  6.111111         27          7
   speed_ind |  7.925926         27   7.333333
 collab_firm |  129.4074         27   133.4444
  collab_ind |  12.97531         27   12.85185
Governingo~c |  11.20988         27   2.703704
TotalParti~F |  11.14815         27   11.07407

. esttab using ttest2.rtf,        wide nonumber    mtitle("diff. ") star(+ 0.10
> * 0.05) label title(by low # employees )
(output written to ttest2.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(NumEmpHigh)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> --------------------------------
success_firm |   11.7037        108   8.386028   1.395619        106   .9171271
>   .1657458   .0828729         81
 success_ind | -.5308642        108   1.892736  -.2804745        106   .3898301
>   .7796602   .6101699         81
   know_firm | -.1604938        108   1.920034  -.0835891        106   .4667704
>   .9335408   .5332296         81
    know_ind |  .4814815        108   .8341728   .5771963        106   .7174846
>   .5650307   .2825154         81
  speed_firm | -.8395062        108   .7982418  -1.051694        106   .1476658
>   .2953316   .8523342         81
   speed_ind | -1.283951        108   .7946021  -1.615841        106   .0545506
>   .1091013   .9454494         81
 collab_firm |   12.7037        108   7.277733   1.745558        106   .9581073
>   .0837854   .0418927         81
  collab_ind |  .2716049        108   .8767974   .3097693        106   .6213277
>   .7573445   .3786723         81
Governingo~c | -6.209877        108   2.620793  -2.369465        106   .0098117
>   .0196234   .9901883         81
TotalParti~F |   .962963        108    .847959   1.135624        106   .8706625
>   .2586749   .1293375         81
```

```
             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+---------------------------------
success_firm |       154         27   142.2963
 success_ind |  25.24691         27   25.77778
   know_firm |  14.28395         27   14.44444
    know_ind |  4.777778         27   4.296296
  speed_firm |  6.123457         27   6.962963
   speed_ind |   7.45679         27   8.740741
 collab_firm |  133.5926         27   120.8889
  collab_ind |  13.01235         27   12.74074
Governingo~c |  7.530864         27   13.74074
TotalParti~F |  11.37037         27   10.40741

. esttab using ttest3.rtf,        wide nonumber    mtitle("diff. ") star(+ 0.10
> * 0.05) label title(by high # employees)
(output written to ttest3.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(Resultspretaxeslow)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> ---------------------------------
success_firm | -1.975309        108   8.460549  -.2334729        106   .4079223
>   .8158445   .5920777         81
 success_ind | -.1358025        108   1.893392  -.0717244        106   .4714782
>   .9429564   .5285218         81
   know_firm |  2.506173        108   1.904605   1.315849        106   .9044683
>   .1910633   .0955317         81
    know_ind |  .1358025        108   .8353785    .162564        106   .5644144
>   .8711712   .4355856         81
  speed_firm | -.5432099        108   .8006591  -.6784533        106   .2494814
>   .4989628   .7505186         81
   speed_ind | -.0987654        108   .8042715  -.1228011        106   .4512486
>   .9024971   .5487514         81
 collab_firm | -3.938272        108   7.371673  -.5342439        106   .2971458
>   .5942915   .7028542         81
  collab_ind | -.1728395        108   .8770336  -.1970729        106    .422074
>   .8441479    .577926         81
Governingo~c |  8.703704        108   2.552977   3.409237        106   .9995388
>   .0009224   .0004612         81
TotalParti~F | -.1234568        108   .8530174  -.1447295        106   .4425996
>   .8851993   .5574004         81

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+---------------------------------
success_firm |  150.5802         27   152.5556
 success_ind |  25.34568         27   25.48148
   know_firm |  14.95062         27   12.44444
    know_ind |  4.691358         27   4.555556
  speed_firm |  6.197531         27   6.740741
   speed_ind |  7.753086         27   7.851852
 collab_firm |  129.4321         27   133.3704
  collab_ind |  12.90123         27   13.07407
Governingo~c |  11.25926         27   2.555556
TotalParti~F |  11.09877         27   11.22222

. esttab using ttest4.rtf,        wide nonumber    mtitle("diff. ") star(+ 0.10
> * 0.05) label title(by low results pre-tax)
(output written to ttest4.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(Resultspretaxeshigh)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> ---------------------------------
success_firm |  10.22222        108    8.40428   1.216312        106   .8867161
>   .2265678   .1132839         81
 success_ind | -.4320988        108   1.892973  -.2282646        106   .4099401
```

```
>   .8198803   .5900599         81
   know_firm | -2.037037        108   1.909876  -1.066581        106   .1442922
>   .2885844   .8557078         81
    know_ind |  .2839506        108   .8350273   .3400495        106   .6327539
>   .7344922   .3672461         81
  speed_firm | -1.530864        108   .7884985  -1.941493        106   .0274266
>   .0548532   .9725734         81
   speed_ind | -.9876543        108   .7985876  -1.236751        106   .1094563
>   .2189125   .8905437         81
 collab_firm |  13.79012        108   7.259053   1.899714        106   .9699058
>   .0601885   .0300942         81
  collab_ind |  .2716049        108   .8767974   .3097693        106   .6213277
>   .7573445   .3786723         81
Governingo~c | -19.49383        108   1.909807  -10.20723        106   9.52e-18
>   1.90e-17          1         81
TotalParti~F | -.1234568        108   .8530174  -.1447295        106   .4425996
>   .8851993   .5574004         81

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+---------------------------------
success_firm |  153.6296         27   143.4074
 success_ind |   25.2716         27    25.7037
   know_firm |  13.81481         27   15.85185
    know_ind |  4.728395         27   4.444444
  speed_firm |  5.950617         27   7.481481
   speed_ind |  7.530864         27   8.518519
 collab_firm |  133.8642         27   120.0741
  collab_ind |  13.01235         27   12.74074
Governingo~c |  4.209877         27    23.7037
TotalParti~F |  11.09877         27   11.22222

. esttab using ttest5.rtf,        wide nonumber    mtitle("diff.") star(+ 0.10 *
>  0.05) label title(by high results pre tax)
(output written to ttest5.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(EarningsLow)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> --------------------------------
success_firm | -2.962963        108    8.45783  -.3503219        106   .3633962
>   .7267923   .6366038         81
 success_ind | -.1358025        108   1.893392  -.0717244        106   .4714782
>   .9429564   .5285218         81
   know_firm |  3.197531        108   1.894813   1.687518        106   .9527778
>   .0944444   .0472222         81
    know_ind |  .2345679        108   .8351719   .2808618        106   .6103181
>   .7793639   .3896819         81
  speed_firm | -.1481481        108   .8022666   -.184662        106   .4269235
>    .853847   .5730765         81
   speed_ind | -.1975309        108   .8040998  -.2456547        106   .4032123
>   .8064246   .5967877         81
 collab_firm | -6.012346        108   7.358455  -.8170663        106   .2078616
>   .4157232   .7921384         81
  collab_ind | -.1728395        108   .8770336  -.1970729        106    .422074
>   .8441479    .577926         81
Governingo~c |  5.296296        108   2.639645   2.006443        106   .9763222
>   .0473556   .0236778         81
TotalParti~F |  .4691358        108   .8518839   .5507039        106   .7085023
>   .5829955   .2914977         81

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+---------------------------------
success_firm |  150.3333         27   153.2963
 success_ind |  25.34568         27   25.48148
   know_firm |  15.12346         27   11.92593
    know_ind |  4.716049         27   4.481481
  speed_firm |  6.296296         27   6.444444
   speed_ind |  7.728395         27   7.925926
 collab_firm |  128.9136         27   134.9259
  collab_ind |  12.90123         27   13.07407
Governingo~c |  10.40741         27   5.111111
TotalParti~F |  11.24691         27   10.77778
```

```
. esttab using ttest6.rtf,        wide nonumber    mtitle("diff.") star(+ 0.10 *
>  0.05) label title(by low revenue)
(output written to ttest6.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(EarningsHigh)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> --------------------------------
success_firm |  15.60494        108   8.325888   1.874267        106   .9681765
>   .0636471   .0318235         81
 success_ind |  1.641975        108    1.88671   .8702851        106   .8069444
>   .3861112   .1930556         81
   know_firm |  .2345679        108   1.919962   .1221732        106   .5485034
>   .9029932   .4514966         81
    know_ind |  .4814815        108   .8341728   .5771963        106   .7174846
>   .5650307   .2825154         81
  speed_firm | -.4444444        108   .8012336  -.5547002        106   .2901342
>   .5802683   .7098658         81
   speed_ind | -.2962963        108   .8038137  -.3686132        106   .3565756
>   .7131513   .6434244         81
 collab_firm |  15.81481        108   7.219998   2.190418        106   .9846576
>   .0306847   .0153424         81
  collab_ind |   1.45679        108    .865707   1.682775        106    .952319
>    .095362    .047681         81
Governingo~c | -7.888889        108   2.577836  -3.060276        106   .0014007
>   .0028014   .9985993         81
TotalParti~F |  1.209877        108   .8449693   1.431859        106   .9224368
>   .1551264   .0775632         81

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+--------------------------------
success_firm |  154.9753         27   139.3704
 success_ind |  25.79012         27   24.14815
   know_firm |  14.38272         27   14.14815
    know_ind |  4.777778         27   4.296296
  speed_firm |  6.222222         27   6.666667
   speed_ind |  7.703704         27          8
 collab_firm |  134.3704         27   118.5556
  collab_ind |  13.30864         27   11.85185
Governingo~c |  7.111111         27         15
TotalParti~F |   11.4321         27   10.22222

. esttab using ttest7.rtf,        wide nonumber    mtitle("diff.") star(+ 0.10 *
>  0.05) label title(by high revenue)
(output written to ttest7.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(highexperincegroup)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> --------------------------------
success_firm | -13.54464        108   8.257872   -1.64021        106   .0519629
>   .1039259   .9480371         80
 success_ind |    -.8375        108   1.869135  -.4480683        106   .3275092
>   .6550184   .6724908         80
   know_firm | -3.323214        108   1.869587  -1.777513        106   .0391759
>   .0783518   .9608241         80
    know_ind |  .7910714        108    .821956   .9624256        106   .8309869
>   .3380263   .1690131         80
  speed_firm | -.7553571        108   .7894444  -.9568212        106   .1704173
>   .3408347   .8295827         80
   speed_ind | -.4928571        108   .7933132  -.6212642        106   .2678798
>   .5357595   .7321202         80
 collab_firm | -9.466071        108   7.235559  -1.308271        106   .0968056
>   .1936113   .9031944         80
  collab_ind | -1.135714        108   .8597064  -1.321049        106   .0946649
>   .1893297   .9053351         80
```

```
Governingo~c |  -13.3875        108   2.317419  -5.776902        106   3.85e-08
>   7.70e-08          1         80
TotalParti~F | -1.994643        108   .8203833  -2.431355        106   .0083597
>   .0167195   .9916403         80

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+--------------------------------
success_firm |  147.5625         28   161.1071
 success_ind |   25.1625         28         26
   know_firm |   13.4625         28   16.78571
    know_ind |    4.8625         28   4.071429
  speed_firm |    6.1375         28   6.892857
   speed_ind |      7.65         28   8.142857
 collab_firm |  127.9625         28   137.4286
  collab_ind |     12.65         28   13.78571
Governingo~c |    5.6125         28         19
TotalParti~F |   10.6125         28   12.60714

. esttab  using ttest8.rtf,       wide nonumber    mtitle("diff.") star(+ 0.10 *
>  0.05) label title(by high experience group)
(output written to ttest8.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(Lowexperiencegroup)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> ----------------------------------
success_firm |     -.575        108   8.361822  -.0687649        106   .4726531
>   .9453063   .5273469         80
 success_ind | -.2589286        108   1.870735  -.1384101        106   .4450895
>   .8901789   .5549105         80
   know_firm |  1.401786        108   1.892354    .740763        106   .7697625
>    .460475   .2302375         80
    know_ind | -.7035714        108   .8227061  -.8551917        106    .197187
>   .3943739    .802813         80
  speed_firm |  .5946429        108   .7907397   .7520084        106   .7731437
>   .4537126   .2268563         80
   speed_ind |  .6642857        108   .7921329   .8386039        106   .7982106
>   .4035788   .2017894         80
 collab_firm | -2.571429        108   7.289464  -.3527596        106   .3624846
>   .7249691   .6375154         80
  collab_ind | -.2196429        108    .866492  -.2534852        106   .4001922
>   .8003843   .5998078         80
Governingo~c |  8.405357        108   2.528779    3.32388        106   .9993902
>   .0012196   .0006098         80
TotalParti~F |  1.669643        108   .8272022   2.018422        106   .9769636
>   .0460728   .0230364         80

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+--------------------------------
success_firm |   150.925         28      151.5
 success_ind |   25.3125         28   25.57143
   know_firm |   14.6875         28   13.28571
    know_ind |     4.475         28   5.178571
  speed_firm |    6.4875         28   5.892857
   speed_ind |      7.95         28   7.285714
 collab_firm |    129.75         28   132.3214
  collab_ind |   12.8875         28   13.10714
Governingo~c |   11.2625         28   2.857143
TotalParti~F |   11.5625         28   9.892857

. esttab using ttest9.rtf,        wide nonumber    mtitle("diff.") star(+ 0.10 *
>  0.05) label title(by low experience group)
(output written to ttest9.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(Governingorglowexperience)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
```

```
> ---------------------------------
success_firm | -1.117721        108   8.099708  -.1379952        106    .445253
>    .890506    .554747         77
 success_ind |  1.165899        108   1.808839   .6445563        106   .7396964
>   .5206072   .2603036         77
   know_firm |  1.223712        108   1.834051   .6672181        106   .7469586
>   .5060827   .2530414         77
    know_ind |  .5148722        108   .7981505   .6450816        106    .739866
>   .5202681    .260134         77
  speed_firm | -.1206535        108   .7679558    -.15711        106   .4377285
>    .875457   .5622715         77
   speed_ind |  .7289485        108    .766633   .9508442        106   .8280767
>   .3438465   .1719233         77
 collab_firm | -2.220779        108   7.062292  -.3144559        106   .3768965
>   .7537929   .6231035         77
  collab_ind | -.0779221        108   .8396075  -.0928077        106   .4631157
>   .9262315   .5368843         77
Governingo~c |  11.33766        108   2.326738   4.872771        106   .9999981
>   3.87e-06   1.94e-06         77
TotalParti~F |   .634269        108   .8142533   .7789578        106   .7811299
>   .4377401   .2188701         77

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+---------------------------------
success_firm |  150.7532         31    151.871
 success_ind |  25.71429         31   24.54839
   know_firm |  14.67532         31   13.45161
    know_ind |  4.805195         31   4.290323
  speed_firm |  6.298701         31   6.419355
   speed_ind |  7.987013         31   7.258065
 collab_firm |  129.7792         31        132
  collab_ind |  12.92208         31         13
Governingo~c |  12.33766         31          1
TotalParti~F |  11.31169         31   10.67742

. esttab using ttest10.rtf,       wide nonumber    mtitle("diff. ") star(+ 0.10
> * 0.05) label title(by by gov. org low experience)
(output written to ttest10.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(Governingorghighexperience)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> ---------------------------------
success_firm |   8.70303        108   7.910086   1.100245        106   .8631411
>   .2737179   .1368589         75
 success_ind |  .2848485        108   1.779654   .1600584        106   .5634302
>   .8731397   .4365698         75
   know_firm | -.6678788        108   1.803762  -.3702699        106   .3559601
>   .7119203   .6440399         75
    know_ind |  .0739394        108    .785337   .0941499        106   .5374161
>   .9251678   .4625839         75
  speed_firm | -.2618182        108   .7538386  -.3473133        106   .3645223
>   .7290446   .6354777         75
   speed_ind | -1.410909        108   .7435617  -1.897501        106   .0302414
>   .0604828   .9697586         75
 collab_firm |  9.632727        108   6.875471   1.401028        106   .9179367
>   .1641266   .0820633         75
  collab_ind |  1.621818        108   .8093932   2.003746        106   .9761757
>   .0476486   .0238243         75
Governingo~c | -21.13091        108   1.475928  -14.31703        106   7.98e-27
>   1.60e-26          1         75
TotalParti~F | -.1187879        108   .8018491  -.1481424        106   .4412559
>   .8825118   .5587441         75

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+---------------------------------
success_firm |  153.7333         33   145.0303
 success_ind |  25.46667         33   25.18182
   know_firm |      14.12         33   14.78788
    know_ind |       4.68         33   4.606061
  speed_firm |  6.253333         33   6.515152
   speed_ind |  7.346667         33   8.757576
```

```
 collab_firm |    133.36         33   123.7273
  collab_ind |     13.44         33   11.81818
Governingo~c |  2.626667         33   23.75758
TotalParti~F |  11.09333         33   11.21212

. esttab using ttest11.rtf,       wide nonumber    mtitle("diff. ") star(+ 0.10
> * 0.05) label title(by gov. org high experience)
(output written to ttest11.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(Projectdurationlow)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> ---------------------------------
success_firm | -3.308642        108   8.456621  -.3912487        106   .3481994
>   .6963987   .6518006         81
 success_ind |  .5061728        108     1.8928   .2674202        106   .6051673
>   .7896653   .3948327         81
   know_firm |  .7777778        108    1.91861    .405386        106   .6569946
>   .6860108   .3430054         81
    know_ind |  .5802469        108   .8335796   .6960906        106   .7560522
>   .4878956   .2439478         81
  speed_firm | -1.185185        108   .7940952  -1.492498        106   .0692696
>   .1385392   .9307304         81
   speed_ind | -.2962963        108   .8038137  -.3686132        106   .3565756
>   .7131513   .6434244         81
 collab_firm | -2.901235        108    7.37621  -.3933232        106   .3474354
>   .6948708   .6525646         81
  collab_ind |  .2222222        108   .8769286   .2534097        106   .5997788
>   .8004425   .4002212         81
Governingo~c |  .5061728        108   2.688854   .1882485        106   .5744791
>   .8510418   .4255209         81
TotalParti~F |  1.308642        108   .8435795   1.551296        106   .9380943
>   .1238113   .0619057         81

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+--------------------------------
success_firm |  150.2469         27   153.5556
 success_ind |  25.50617         27         25
   know_firm |  14.51852         27   13.74074
    know_ind |  4.802469         27   4.222222
  speed_firm |  6.037037         27   7.222222
   speed_ind |  7.703704         27          8
 collab_firm |  129.6914         27   132.5926
  collab_ind |         13         27   12.77778
Governingo~c |  9.209877         27   8.703704
TotalParti~F |  11.45679         27   10.14815

. esttab using ttest12.rtf,       wide nonumber    mtitle("diff. ") star(+ 0.10
> * 0.05) label title(by low project duration)
(output written to ttest12.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(Projectdurationhigh)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> ---------------------------------
success_firm | -2.962963        108    8.45783  -.3503219        106   .3633962
>   .7267923   .6366038         81
 success_ind | -2.604938        108   1.876457  -1.388221        106   .0839902
>   .1679803   .9160098         81
   know_firm |  -2.62963        108   1.903034  -1.381809        106   .0849678
>   .1699356   .9150322         81
    know_ind | -1.691358        108   .8191725  -2.064715        106   .0206953
>   .0413906   .9793047         81
  speed_firm | -.6419753        108   .7999692     -.8025        106   .2120297
>   .4240594   .7879703         81
   speed_ind |         0        108   .8043287          0        106         .5
>          1         .5         81
```

```
 collab_firm |   .308642        108    7.38153   .0418127        106   .5166367
>   .9667266   .4833633         81
  collab_ind | -.9135802        108   .8726946   -1.04685        106    .148775
>     .29755    .851225         81
Governingo~c | -2.950617        108    2.67399  -1.103451        106    .136165
>   .2723301    .863835         81
TotalParti~F |  -.962963        108    .847959  -1.135624        106   .1293375
>   .2586749   .8706625         81

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+--------------------------------
success_firm |  150.3333         27   153.2963
 success_ind |   24.7284         27   27.33333
   know_firm |  13.66667         27    16.2963
    know_ind |  4.234568         27   5.925926
  speed_firm |   6.17284         27   6.814815
   speed_ind |  7.777778         27   7.777778
 collab_firm |  130.4938         27   130.1852
  collab_ind |  12.71605         27   13.62963
Governingo~c |  8.345679         27    11.2963
TotalParti~F |  10.88889         27   11.85185

. esttab using ttest13.rtf,       wide nonumber    mtitle("diff.") star(+ 0.10 *
>  0.05) label title(by high project duration)
(output written to ttest13.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(low_totalpart)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> ---------------------------------
success_firm |  1.194293        110   7.998061   .1493229        108   .5592113
>   .8815773   .4407887         64
 success_ind |  .7194293        110   1.706662   .4215418        108   .6629013
>   .6741973   .3370987         64
   know_firm |  2.743886        110   1.659893    1.65305        108   .9493875
>   .1012249   .0506125         64
    know_ind |  .0441576        110   .7262477   .0608024        108   .5241855
>   .9516289   .4758145         64
  speed_firm | -.3158967        110   .6962376  -.4537197        108   .3254705
>    .650941   .6745295         64
   speed_ind |  .3654891        110   .7033489   .5196413        108   .6978115
>    .604377   .3021885         64
 collab_firm | -1.233696        110     6.9916   -.176454        108   .4301339
>   .8602678   .5698661         64
  collab_ind |  .3097826        110   .8074044   .3836772        108    .649014
>    .701972    .350986         64
Governingo~c |  .6374474        108   2.354178   .2707728        106   .6064538
>   .7870923   .3935462         62
TotalParti~F |  5.451613        108   .5269796   10.34502        106          1
>   9.31e-18   4.65e-18         62

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+--------------------------------
success_firm |  149.2813         46    148.087
 success_ind |  25.32813         46    24.6087
   know_firm |  15.26563         46   12.52174
    know_ind |  4.609375         46   4.565217
  speed_firm |  6.140625         46   6.456522
   speed_ind |   7.84375         46   7.478261
 collab_firm |   127.875         46   129.1087
  collab_ind |    12.875         46   12.56522
Governingo~c |  9.354839         46   8.717391
TotalParti~F |  13.45161         46          8

. esttab using ttest14.rtf,       wide nonumber    mtitle("diff.") star(+ 0.10 *
>  0.05) label title(by low total participants)
(output written to ttest14.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(high_totalpart)
```

```
             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> ---------------------------------
success_firm | -12.21705        110   9.480475  -1.288654        108    .100136
>    .200272    .899864         86
 success_ind |  .5678295        110   2.039214   .2784551        108   .6094023
>   .7811955   .3905977         86
   know_firm | -1.554264        110   2.001757  -.7764498        108   .2195903
>   .4391806   .7804097         86
    know_ind |  .6492248        110   .8651211   .7504438        108   .7726904
>   .4546193   .2273096         86
  speed_firm | -.3439922        110   .8316514  -.4136255        108   .3399843
>   .6799686   .6600157         86
   speed_ind |  .1375969        110    .840956   .1636196        108   .5648318
>   .8703364   .4351682         86
 collab_firm |  -10.3188        110   8.292047  -1.244421        108   .1080192
>   .2160384   .8919808         86
  collab_ind | -.2189922        110   .9647112  -.2270029        108   .4104253
>   .8208506   .5895747         86
Governingo~c | -.3214286        108   2.800864  -.1147605        106    .454426
>   .9088521    .545574         84
TotalParti~F | -7.547619        108   .5020894  -15.03242        106   2.46e-28
>   4.93e-28          1         84

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+--------------------------------
success_firm |  146.1163         24   158.3333
 success_ind |  25.15116         24   24.58333
   know_firm |  13.77907         24   15.33333
    know_ind |  4.732558         24   4.083333
  speed_firm |  6.197674         24   6.541667
   speed_ind |   7.72093         24   7.583333
 collab_firm |  126.1395         24   136.4583
  collab_ind |  12.69767         24   12.91667
Governingo~c |  9.011905         24   9.333333
TotalParti~F |  9.452381         24         17

. esttab using ttest15.rtf,       wide nonumber    mtitle("diff.") star(+ 0.10 *
>  0.05) label title(by high total participants)
(output written to ttest15.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(part_ind_high)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> ---------------------------------
success_firm | -18.12527        100   7.396423  -2.450546         98   .0080183
>   .0160366   .9919817         35
 success_ind | -3.127473        100   1.714138  -1.824516         98   .0355605
>   .0711209   .9644395         35
   know_firm | -1.318681        100   1.828046   -.721361         98   .2362025
>   .4724049   .7637975         35
    know_ind | -1.050549        100   .7845022  -1.339129         98   .0918133
>   .1836265   .9081867         35
  speed_firm |  .6527473        100   .7502401   .8700512         98   .8068007
>   .3863986   .1931993         35
   speed_ind | -.4725275        100   .7570171  -.6241966         98   .2669744
>   .5339489   .7330256         35
 collab_firm | -17.45934        100   6.409783  -2.723858         98   .0038204
>   .0076408   .9961796         35
  collab_ind | -1.604396        100   .7742317  -2.072242         98   .0204343
>   .0408686   .9795657         35
Governingo~c |  .8967033        100   2.620391   .3422021         98   .6335342
>   .7329316   .3664658         35
TotalParti~F |  2.756044        100   .7798643   3.534004         98   .9996868
>   .0006264   .0003132         35

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+--------------------------------
success_firm |  141.0286         65   159.1538
 success_ind |  23.65714         65   26.78462
```

```
   know_firm |  13.54286         65   14.86154
     know_ind |  4.057143         65   5.107692
  speed_firm |  6.714286         65   6.061538
    speed_ind |  7.542857         65   8.015385
 collab_firm |  120.7714         65   138.2308
  collab_ind |  12.05714         65   13.66154
Governingo~c |  9.942857         65   9.046154
TotalParti~F |  12.97143         65   10.21538

. esttab using ttest16.rtf,       wide nonumber    mtitle("diff. ") star(+ 0.10
> * 0.05) label title(by majority of participants with industry background)
(output written to ttest16.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(Backgroundprojectmanager Indu)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> --------------------------------
success_firm | -19.44444        108   9.649718  -2.015027        106   .0232166
>   .0464332   .9767834         90
 success_ind | -2.944444        108   2.181308  -1.349852        106   .0899694
>   .1799389   .9100306         90
   know_firm | -2.477778        108   2.217932  -1.117157        106   .1332266
>   .2664532   .8667734         90
    know_ind | -.7444444        108   .9680464  -.7690173        106   .2217966
>   .4435932   .7782034         90
  speed_firm | -.3333333        108   .9317372  -.3577547        106   .3606191
>   .7212383   .6393809         90
   speed_ind |       -.8        108   .9313096  -.8590054        106    .196138
>   .3922759    .803862         90
 collab_firm | -16.63333        108   8.423098  -1.974729        106   .0254499
>   .0508997   .9745501         90
  collab_ind |      -1.4        108   1.010096  -1.386007        106   .0843268
>   .1686536   .9156732         90
Governingo~c | -1.233333        108   3.122392  -.3949964        106   .3468196
>   .6936393   .6531804         90
TotalParti~F |  3.022222        108   .9467514   3.192203        106   .9990707
>   .0018586   .0009293         90

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+--------------------------------
success_firm |  147.8333         18   167.2778
 success_ind |  24.88889         18   27.83333
   know_firm |  13.91111         18   16.38889
    know_ind |  4.533333         18   5.277778
  speed_firm |  6.277778         18   6.611111
   speed_ind |  7.644444         18   8.444444
 collab_firm |  127.6444         18   144.2778
  collab_ind |  12.71111         18   14.11111
Governingo~c |  8.877778         18   10.11111
TotalParti~F |  11.63333         18   8.611111

. esttab using ttest17.rtf,       wide nonumber    mtitle("diff.") star(+ 0.10 *
>  0.05) label title(by project manager with industry background)
(output written to ttest17.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(s_351)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> --------------------------------
success_firm | -34.12665        108   6.712045   -5.08439        106   7.99e-07
>   1.60e-06   .9999992         43
 success_ind | -4.494812        108   1.616984   -2.77975        106   .0032189
>   .0064379   .9967811         43
   know_firm | -4.441145        108   1.642775   -2.70344        106   .0039976
>   .0079951   .9960024         43
    know_ind |  -1.32415        108   .7277681  -1.819467        106   .0358314
>   .0716627   .9641686         43
```

```
  speed_firm | -1.481216        108   .6950436  -2.131113        106   .0176957
>   .0353915   .9823043         43
   speed_ind | -1.060465        108   .7039919   -1.50636        106   .0674746
>   .1349492   .9325254         43
 collab_firm | -28.20429        108     5.9271  -4.758532        106   3.10e-06
>   6.19e-06   .9999969         43
  collab_ind | -2.110197        108    .748383  -2.819675        106   .0028692
>   .0057384   .9971308         43
Governingo~c |  .5957066        108   2.378181   .2504884        106   .5986527
>   .8026946   .4013473         43
TotalParti~F | -.4085868        108   .7535862  -.5421898        106   .2944129
>   .5888258   .7055871         43

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+---------------------------------
success_firm |  130.5349         65   164.6615
 success_ind |  22.67442         65   27.16923
   know_firm |  11.65116         65   16.09231
    know_ind |  3.860465         65   5.184615
  speed_firm |   5.44186         65   6.923077
   speed_ind |  7.139535         65        8.2
 collab_firm |  113.4419         65   141.6462
  collab_ind |  11.67442         65   13.78462
Governingo~c |   9.44186         65   8.846154
TotalParti~F |  10.88372         65   11.29231

. esttab using ttest18.rtf,       wide nonumber    mtitle("diff.") star(+ 0.10 *
>  0.05) label title(by Firm being part of making project description)
(output written to ttest18.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(s_170_1)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> ---------------------------------
success_firm |  3.819444        108   7.764652   .4919016        106    .688097
>   .6238061    .311903         72
 success_ind |  1.777778        108   1.730641   1.027236        106   .8466762
>   .3066476   .1533238         72
   know_firm |  1.361111        108    1.75876   .7739038        106   .7796449
>   .4407103   .2203551         72
    know_ind |  .1111111        108   .7673639   .1447958        106   .5574265
>    .885147   .4425735         72
  speed_firm |  1.083333        108   .7294979    1.48504        106   .9297494
>   .1405012   .0702506         72
   speed_ind |      1.25        108   .7287791   1.715197        106   .9553845
>   .0892309   .0446155         72
 collab_firm |     1.375        108   6.779109    .202829        106   .5801713
>   .8396575   .4198287         72
  collab_ind |  .4166667        108   .8047373   .5177673        106   .6971502
>   .6056996   .3028498         72
Governingo~c | -3.083333        108   2.452063  -1.257445        106    .105678
>    .211356    .894322         72
TotalParti~F | -.6805556        108    .780831  -.8715785        106   .1927041
>   .3854082   .8072959         72

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+---------------------------------
success_firm |  152.3472         36   148.5278
 success_ind |  25.97222         36   24.19444
   know_firm |  14.77778         36   13.41667
    know_ind |  4.694444         36   4.583333
  speed_firm |  6.694444         36   5.611111
   speed_ind |  8.194444         36   6.944444
 collab_firm |   130.875         36      129.5
  collab_ind |  13.08333         36   12.66667
Governingo~c |  8.055556         36   11.13889
TotalParti~F |  10.90278         36   11.58333

. esttab using ttest19.rtf,       wide nonumber    mtitle("diff. ") star(+ 0.10
> * 0.05) label title(by Origin of Idea: Research institution/university/college
> )
(output written to ttest19.rtf)
```

```
.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(s_170_2)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> --------------------------------
success_firm | -30.25441        108   6.996328  -4.324327        106   .0000173
>   .0000347   .9999827         40
 success_ind | -5.407353        108   1.614541  -3.349159        106   .0005616
>   .0011233   .9994384         40
    know_firm | -6.430882        108   1.604423   -4.00822        106    .000057
>    .000114    .999943         40
     know_ind | -1.560294        108   .7336762  -2.126679        106   .0178836
>   .0357672   .9821164         40
  speed_firm | -2.038235        108   .6917242  -2.946601        106   .0019755
>   .0039511   .9980245         40
   speed_ind | -1.394118        108   .7084042  -1.967969        106   .0258418
>   .0516836   .9741582         40
 collab_firm | -21.78529        108   6.271628  -3.473627        106   .0003724
>   .0007448   .9996276         40
  collab_ind | -2.452941        108    .749616  -3.272264        106   .0007203
>   .0014406   .9992797         40
Governingo~c |  2.369118        108   2.400455   .9869454        106   .8370416
>   .3259169   .1629584         40
TotalParti~F | -.2455882        108   .7645916  -.3212019        106   .3743449
>   .7486899   .6256551         40

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+---------------------------------
success_firm |   132.025         68   162.2794
 success_ind |    21.975         68   27.38235
   know_firm |    10.275         68   16.70588
    know_ind |     3.675         68   5.235294
  speed_firm |      5.05         68   7.088235
   speed_ind |       6.9         68   8.294118
 collab_firm |     116.7         68   138.4853
  collab_ind |      11.4         68   13.85294
Governingo~c |    10.575         68   8.205882
TotalParti~F |    10.975         68   11.22059

. esttab using ttest20.rtf,       wide nonumber    mtitle("diff.") star(+ 0.10 *
>  0.05) label title(by Origin of Idea: Industry/Firm)
(output written to ttest20.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(s_170_3)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> --------------------------------
success_firm | -4.249462        108   10.58809  -.4013435        106   .3444876
>   .6889752   .6555124         93
 success_ind | -2.578495        108   2.357499  -1.093742        106   .1382738
>   .2765476   .8617262         93
    know_firm |  2.931183        108   2.387227   1.227861        106   .8888906
>   .2222188   .1111094         93
     know_ind |  -1.55914        108   1.035084  -1.506292        106   .0674832
>   .1349664   .9325168         93
  speed_firm |  .3870968        108   1.003972   .3855654        106   .6497044
>   .7005913   .3502956         93
   speed_ind |  .0516129        108   1.007083   .0512499        106   .5203886
>   .9592229   .4796114         93
 collab_firm | -7.567742        108   9.213178   -.821404        106   .2066299
>   .4132598   .7933701         93
  collab_ind | -1.070968        108   1.093394  -.9794897        106   .1647842
>   .3295683   .8352158         93
Governingo~c |  3.193548        108   3.352947   .9524602        106   .8284848
>   .3430305   .1715152         93
TotalParti~F |   2.31828        108   1.044161   2.220231        106   .9857342
>   .0285316   .0142658         93
```

```
             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+--------------------------------
success_firm |  150.4839         15   154.7333
 success_ind |  25.02151         15       27.6
   know_firm |  14.73118         15       11.8
    know_ind |   4.44086         15          6
  speed_firm |  6.387097         15          6
   speed_ind |  7.784946         15   7.733333
 collab_firm |  129.3656         15   136.9333
  collab_ind |   12.7957         15   13.86667
Governingo~c |  9.526882         15   6.333333
TotalParti~F |  11.45161         15   9.133333

. esttab using ttest21.rtf,       wide nonumber    mtitle("diff.") star(+ 0.10 *
>  0.05) label title(by Origin of Idea: FHF)
(output written to ttest21.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(s_170_4)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> --------------------------------
success_firm |  25.47283        108   10.01416    2.54368        106   .9937942
>   .0124116   .0062058         92
 success_ind |  3.160326        108   2.287421   1.381611        106   .9150019
>   .1699962   .0849981         92
   know_firm |  4.855978        108   2.292401   2.118293        106   .9817563
>   .0364874   .0182437         92
    know_ind |  .9184783        108    1.01446    .905386        106   .8163429
>   .3673143   .1836571         92
  speed_firm |      1.125        108   .9719224     1.1575        106   .8751651
>   .2496698   .1248349         92
   speed_ind | -.0407609        108   .9803937   -.041576        106   .4834575
>   .9669149   .5165425         92
 collab_firm |  19.49185        108   8.796035   2.215981        106   .9855849
>   .0288303   .0144151         92
  collab_ind |  2.282609        108    1.04598   2.182269        106   .9843513
>   .0312974   .0156487         92
Governingo~c | -3.423913        108   3.261098  -1.049927        106   .1480699
>   .2961397   .8519301         92
TotalParti~F |   .298913        108   1.039446   .2875696        106   .6128811
>   .7742377   .3871189         92

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+--------------------------------
success_firm |  154.8478         16    129.375
 success_ind |  25.84783         16    22.6875
   know_firm |  15.04348         16    10.1875
    know_ind |  4.793478         16      3.875
  speed_firm |        6.5         16      5.375
   speed_ind |  7.771739         16     7.8125
 collab_firm |  133.3043         16   113.8125
  collab_ind |  13.28261         16         11
Governingo~c |  8.576087         16         12
TotalParti~F |  11.17391         16     10.875

. esttab using ttest22.rtf,       wide nonumber    mtitle("diff.") star(+ 0.10 *
>  0.05) label title(by Origin of Idea: Don’t know)
(output written to ttest22.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(FHFexperiencelow)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> --------------------------------
success_firm |  9.919408        108     7.9671   1.245046        106   .8920699
>   .2158602   .1079301         76
 success_ind |  3.337171        108   1.766035    1.88964        106   .9692309
```

```
>   .0615383   .0307691         76
   know_firm |  5.123355        108   1.751496   2.925132        106    .997894
>   .0042119    .002106         76
    know_ind |  1.245066        108   .7829988   1.590125        106   .9426076
>   .1147848   .0573924         76
  speed_firm |  2.649671        108    .716062   3.700337        106   .9998283
>   .0003434   .0001717         76
   speed_ind |  .9720395        108   .7568735   1.284283        106   .8990785
>    .201843   .1009215         76
 collab_firm |  2.146382        108   6.996807   .3067659        106   .6201883
>   .7596234   .3798117         76
  collab_ind |  1.120066        108   .8246926   1.358162        106   .9113519
>   .1772962   .0886481         76
Governingo~c |  6.069079        108   2.481185   2.446041        106   .9919554
>   .0160893   .0080446         76
TotalParti~F |  1.116776        108   .8016855   1.393035        106   .9167382
>   .1665237   .0832618         76

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+---------------------------------
success_firm |  154.0132         32   144.0938
 success_ind |  26.36842         32   23.03125
   know_firm |  15.84211         32   10.71875
    know_ind |  5.026316         32    3.78125
  speed_firm |  7.118421         32    4.46875
   speed_ind |  8.065789         32    7.09375
 collab_firm |  131.0526         32   128.9063
  collab_ind |  13.27632         32   12.15625
Governingo~c |  10.88158         32     4.8125
TotalParti~F |  11.46053         32   10.34375

. esttab using ttest23.rtf,       wide nonumber    mtitle("diff.") star(+ 0.10 *
>  0.05) label title(by low experience project responsible in FHF)
(output written to ttest23.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(FHFexperiencehigh)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> --------------------------------
success_firm | -1.956391        108   7.671152  -.2550322        106   .3995962
>   .7991924   .6004038         70
 success_ind | -1.200752        108   1.712893  -.7010079        106   .2424171
>   .4848341   .7575829         70
   know_firm |  -2.46391        108   1.724506  -1.428763        106   .0780063
>   .1560126   .9219937         70
    know_ind |  .0804511        108   .7575266   .1062024        106   .5421887
>   .9156225   .4578113         70
  speed_firm | -.5413534        108   .7256631   -.746012        106   .2286557
>   .4573114   .7713443         70
   speed_ind | -1.033083        108   .7223827  -1.430104        106    .077814
>   .1556281    .922186         70
 collab_firm |  1.048872        108   6.692421   .1567254        106   .5621203
>   .8757594   .4378797         70
  collab_ind | -.2481203        108   .7950234  -.3120918        106   .3777919
>   .7555838   .6222081         70
Governingo~c | -7.057895        108   2.340162  -3.015985        106   .0016032
>   .0032065   .9983968         70
TotalParti~F | -.5308271        108   .7718227  -.6877578        106   .2465538
>   .4931075   .7534462         70

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+---------------------------------
success_firm |  150.3857         38   152.3421
 success_ind |  24.95714         38   26.15789
   know_firm |  13.45714         38   15.92105
    know_ind |  4.685714         38   4.605263
  speed_firm |  6.142857         38   6.684211
   speed_ind |  7.414286         38   8.447368
 collab_firm |  130.7857         38   129.7368
  collab_ind |  12.85714         38   13.10526
Governingo~c |       6.6         38   13.65789
TotalParti~F |  10.94286         38   11.47368
```

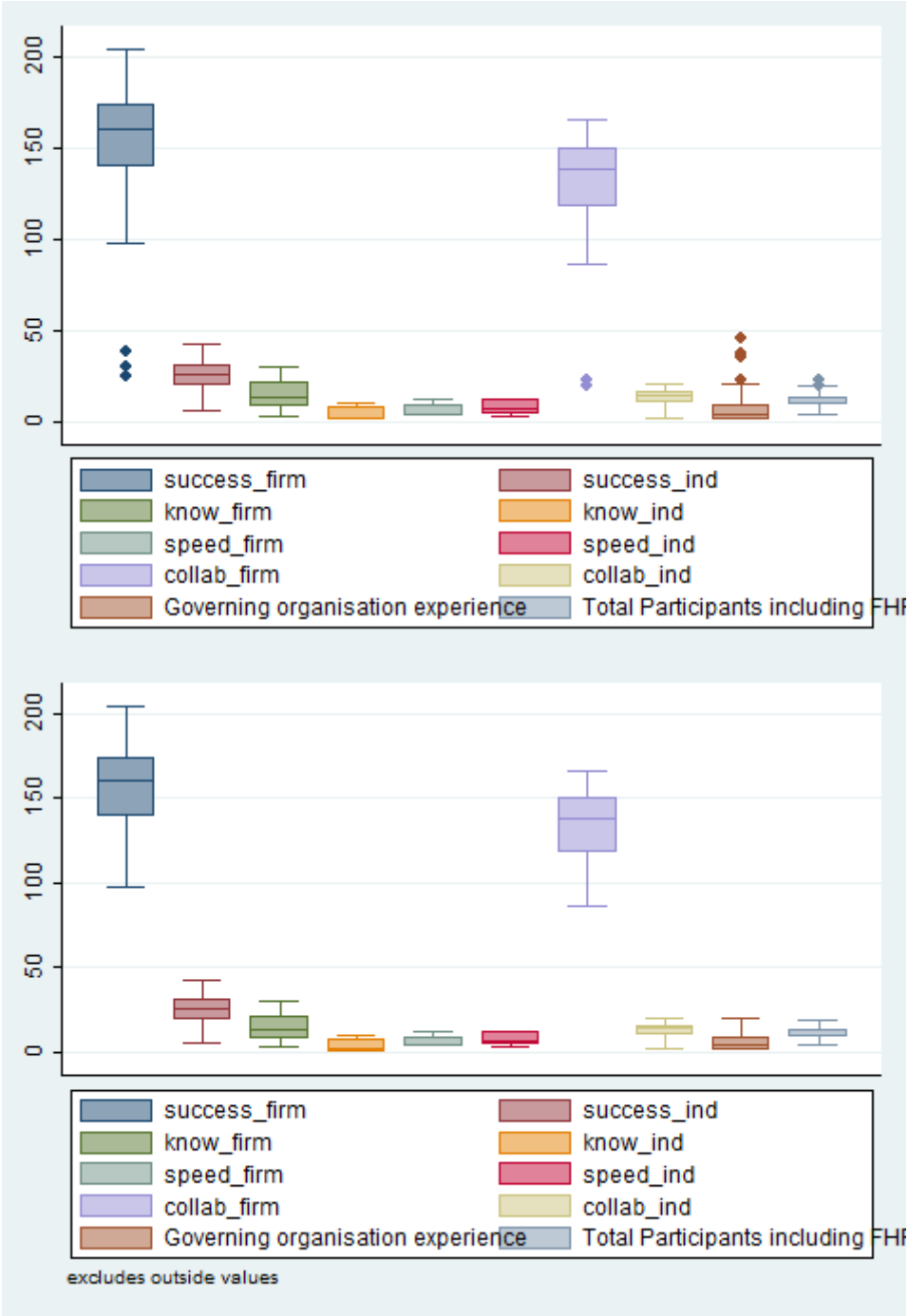
```
. esttab using ttest24.rtf,       wide nonumber    mtitle("diff. ") star(+ 0.10
> * 0.05) label title(by high experience project responsible in FHF)
(output written to ttest24.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(RepOrgLowExp)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> --------------------------------
success_firm |  11.50938        108   8.192493    1.40487        106   .9185081
>   .1629838   .0814919         79
 success_ind | -2.356613        108   1.835748  -1.283735        106    .101017
>    .202034    .898983         79
   know_firm |  .8201659        108   1.874317   .4375811        106   .6687099
>   .6625803   .3312901         79
    know_ind | -1.505456        108   .8030959  -1.874566        106   .0318028
>   .0636055   .9681972         79
  speed_firm |  .4085552        108   .7829668    .521804        106   .6985523
>   .6028955   .3014477         79
   speed_ind | -1.293758        108   .7757486  -1.667754        106   .0491581
>   .0983162   .9508419         79
 collab_firm |  10.28066        108   7.142641   1.439337        106   .9234991
>   .1530018   .0765009         79
  collab_ind |  .4426015        108    .855974   .5170735        106   .6969089
>   .6061821   .3030911         79
Governingo~c | -2.761676        108   2.613827  -1.056564        106   .1465563
>   .2931125   .8534437         79
TotalParti~F |   .695766        108   .8307695   .8374959        106   .7979009
>   .4041982   .2020991         79

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+--------------------------------
success_firm |  154.1646         29   142.6552
 success_ind |  24.74684         29   27.10345
   know_firm |   14.5443         29   13.72414
    know_ind |  4.253165         29   5.758621
  speed_firm |  6.443038         29   6.034483
   speed_ind |   7.43038         29   8.724138
 collab_firm |  133.1772         29   122.8966
  collab_ind |  13.06329         29   12.62069
Governingo~c |  8.341772         29   11.10345
TotalParti~F |  11.31646         29   10.62069

. esttab using ttest25.rtf,       wide nonumber    mtitle("diff.") star(+ 0.10 *
>  0.05) label title(by Responsible org. low experience)
(output written to ttest25.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(RepOrgHighExp)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> --------------------------------
success_firm | -6.762973        108    7.38154  -.9162008        106   .1808206
>   .3616413   .8191794         62
 success_ind |  .8506311        108   1.656002   .5136654        106   .6957225
>    .608555   .3042775         62
   know_firm | -.8744741        108    1.67926  -.5207496        106   .3018137
>   .6036273   .6981863         62
    know_ind |  .9558205        108   .7257084   1.317086        106    .904675
>   .1906499    .095325         62
  speed_firm | -.1009818        108   .7025802  -.1437299        106   .4429933
>   .8859867   .5570067         62
   speed_ind |  .1051893        108   .7042673     .14936        106   .5592233
>   .8815534   .4407767         62
 collab_firm | -5.787518        108   6.439485  -.8987547        106   .1854102
>   .3708204   .8145898         62
  collab_ind | -.2103787        108    .767877  -.2739744        106   .3923187
>   .7846374   .6076813         62
```

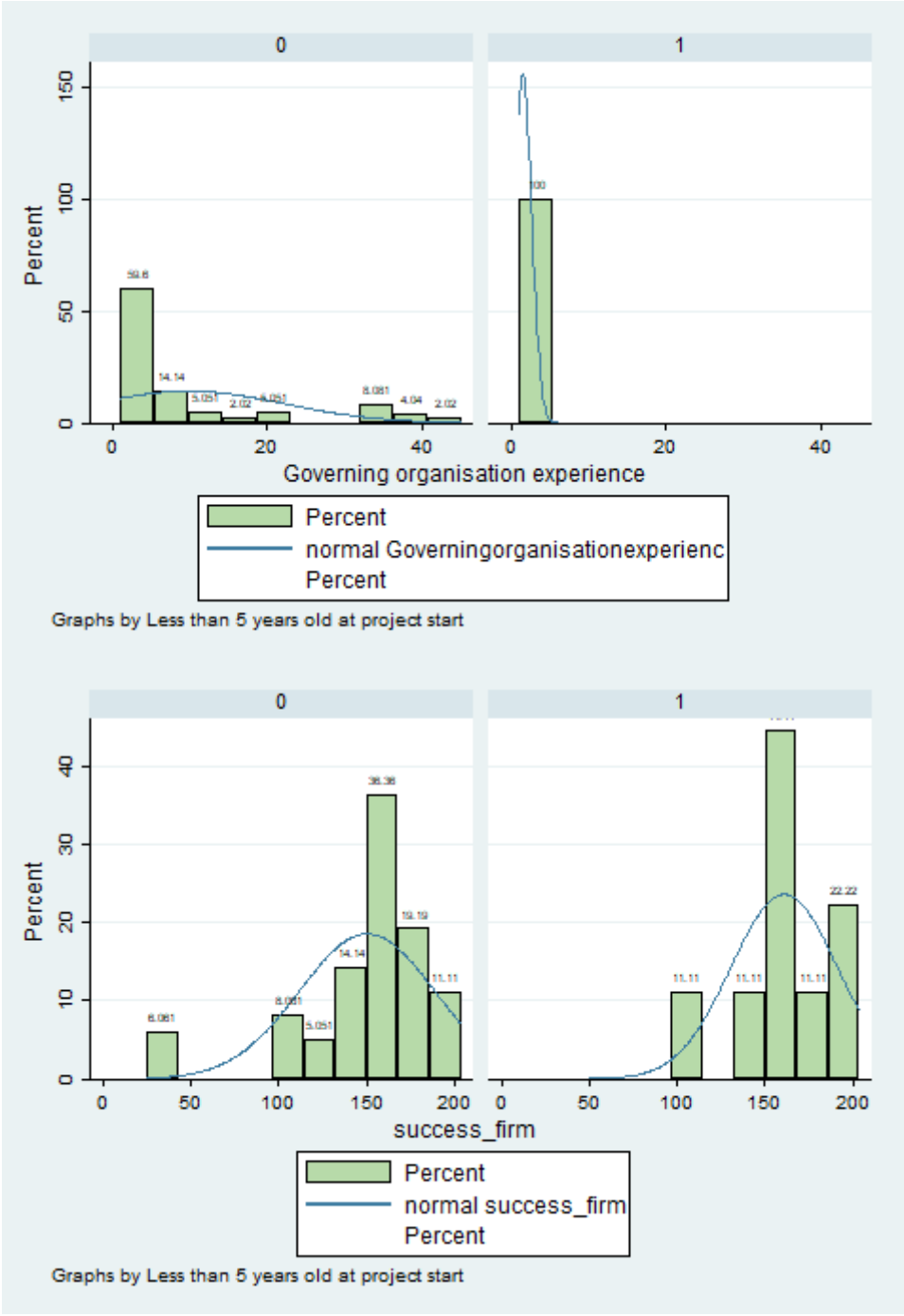
```
Governingo~c |  1.735624        108   2.348951   .7388933        106   .7691976
>   .4616048   .2308024         62
TotalParti~F | -.7966339        108   .7430334  -1.072137        106   .1430466
>   .2860932   .8569534         62

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+--------------------------------
success_firm |  148.1935         46   154.9565
 success_ind |  25.74194         46    24.8913
   know_firm |  13.95161         46   14.82609
    know_ind |  5.064516         46   4.108696
  speed_firm |  6.290323         46   6.391304
   speed_ind |  7.822581         46   7.717391
 collab_firm |  127.9516         46   133.7391
  collab_ind |  12.85484         46   13.06522
Governingo~c |  9.822581         46   8.086957
TotalParti~F |  10.79032         46   11.58696

. esttab using ttest26.rtf,       wide nonumber    mtitle("diff.") star(+ 0.10 *
>  0.05) label title(by Responsible org. high experience)
(output written to ttest26.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(ProjectmanagerexperienceLow)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> ---------------------------------
success_firm |  .4628854        108    7.72142   .0599482        106   .5238451
>   .9523098   .4761549         37
 success_ind | -1.687476        108   1.719817  -.9811954        106   .1643653
>   .3287306   .8356347         37
   know_firm | -2.548534        108   1.734357   -1.46944        106   .0723376
>   .1446752   .9276624         37
    know_ind | -1.246669        108    .752632  -1.656413        106   .0502978
>   .1005956   .9497022         37
  speed_firm | -.1370384        108   .7320001   -.187211        106   .4259265
>   .8518531   .5740735         37
   speed_ind | -.7719833        108   .7300443  -1.057447        106   .1463558
>   .2927115   .8536442         37
 collab_firm |  3.148458        108   6.728158   .4679525        106   .6796103
>   .6407793   .3203897         37
  collab_ind |  .3311762        108   .7997221   .4141142        106   .6601864
>   .6796273   .3398136         37
Governingo~c | -3.744576        108   2.426668  -1.543094        106   .0628941
>   .1257883   .9371059         37
TotalParti~F | -1.512752        108   .7643928  -1.979025        106   .0252034
>   .0504068   .9747966         37

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+--------------------------------
success_firm |  151.3784         71   150.9155
 success_ind |  24.27027         71   25.95775
   know_firm |  12.64865         71   15.19718
    know_ind |  3.837838         71   5.084507
  speed_firm |  6.243243         71   6.380282
   speed_ind |   7.27027         71   8.042254
 collab_firm |  132.4865         71    129.338
  collab_ind |  13.16216         71   12.83099
Governingo~c |  6.621622         71    10.3662
TotalParti~F |  10.13514         71   11.64789

. esttab using ttest27.rtf,       wide nonumber    mtitle("diff. ") star(+ 0.10
> * 0.05) label title(by Project manager low experience)
(output written to ttest27.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF, by(Projectmanagerexperiencehigh)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
```

```
> ---------------------------------
success_firm | -.4628854        108    7.72142  -.0599482        106   .4761549
>   .9523098   .5238451         71
 success_ind |  1.687476        108   1.719817   .9811954        106   .8356347
>   .3287306   .1643653         71
   know_firm |  2.548534        108   1.734357    1.46944        106   .9276624
>   .1446752   .0723376         71
    know_ind |  1.246669        108    .752632   1.656413        106   .9497022
>   .1005956   .0502978         71
  speed_firm |  .1370384        108   .7320001    .187211        106   .5740735
>   .8518531   .4259265         71
   speed_ind |  .7719833        108   .7300443   1.057447        106   .8536442
>   .2927115   .1463558         71
 collab_firm | -3.148458        108   6.728158  -.4679525        106   .3203897
>   .6407793   .6796103         71
  collab_ind | -.3311762        108   .7997221  -.4141142        106   .3398136
>   .6796273   .6601864         71
Governingo~c |  3.744576        108   2.426668   1.543094        106   .9371059
>   .1257883   .0628941         71
TotalParti~F |  1.512752        108   .7643928   1.979025        106   .9747966
>   .0504068   .0252034         71

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+---------------------------------
success_firm |  150.9155         37   151.3784
 success_ind |  25.95775         37   24.27027
   know_firm |  15.19718         37   12.64865
    know_ind |  5.084507         37   3.837838
  speed_firm |  6.380282         37   6.243243
   speed_ind |  8.042254         37    7.27027
 collab_firm |   129.338         37   132.4865
  collab_ind |  12.83099         37   13.16216
Governingo~c |   10.3662         37   6.621622
TotalParti~F |  11.64789         37   10.13514

. esttab using ttest28.rtf,       wide nonumber    mtitle("diff.") star(+ 0.10 *
>  0.05) label title(by Project manager high experience)
(output written to ttest28.rtf)

.
. estpost ttest success_firm success_ind know_firm know_ind speed_firm speed_ind
>  collab_firm collab_ind Governingorganisationexperienc TotalParticipantsinclud
> ingFHF Earnings Resultspretaxes Numberofemployees, by(s_349)

             |      e(b)   e(count)      e(se)       e(t)    e(df_t)     e(p_l)
>       e(p)     e(p_u)     e(N_1)
-------------+------------------------------------------------------------------
> ---------------------------------
success_firm | -10.71111        108   9.777605  -1.095474        106   .1378959
>   .2757919   .8621041         90
 success_ind | -.8777778        108   2.198324  -.3992941        106   .3452399
>   .6904798   .6547601         90
   know_firm | -1.744444        108   2.224508  -.7841935        106   .2173378
>   .4346755   .7826622         90
    know_ind |  .2555556        108   .9704257   .2633438        106   .6036016
>   .7927969   .3963984         90
  speed_firm |      -1.4        108   .9223296  -1.517896        106   .0660088
>   .1320176   .9339912         90
   speed_ind |       -.8        108   .9313096  -.8590054        106    .196138
>   .3922759    .803862         90
 collab_firm | -7.566667        108   8.545087  -.8854991        106   .1889459
>   .3778919   .8110541         90
  collab_ind | -.3333333        108   1.018693  -.3272166        106   .3720747
>   .7441494   .6279253         90
Governingo~c |      -8.9        108   3.002735  -2.963965        106   .0018756
>   .0037511   .9981244         90
TotalParti~F | -.7777778        108   .9883316  -.7869603        106   .2165305
>   .4330611   .7834695         90
    Earnings |  -1992635        108   738146.9   -2.69951        106   .0040419
>   .0080839   .9959581         90
Resultspre~s | -617957.3        108   174590.4  -3.539468        106   .0002984
>   .0005968   .9997016         90
Numberofem~s |    -331.2        108   164.0198  -2.019268        106   .0229916
>   .0459833   .9770084         90

             |   e(mu_1)     e(N_2)    e(mu_2)
-------------+---------------------------------
```

```
success_firm |  149.2889         18        160
 success_ind |  25.23333         18   26.11111
   know_firm |  14.03333         18   15.77778
    know_ind |        4.7         18   4.444444
  speed_firm |        6.1         18        7.5
   speed_ind |  7.644444         18   8.444444
 collab_firm |  129.1556         18   136.7222
  collab_ind |  12.88889         18   13.22222
Governingo~c |        7.6         18       16.5
TotalParti~F |         11         18   11.77778
    Earnings |    1050500         18    3043135
Resultspre~s |  202177.7         18   820134.9
Numberofem~s |  239.4111         18   570.6111

. esttab using ttest29.rtf,       wide nonumber    mtitle("diff.") star(+ 0.10 *
>  0.05) label title(by Would project be independently financed without FHF fund
> ing)
(output written to ttest29.rtf)

.
.
end of do-file
```

Stata Graphs

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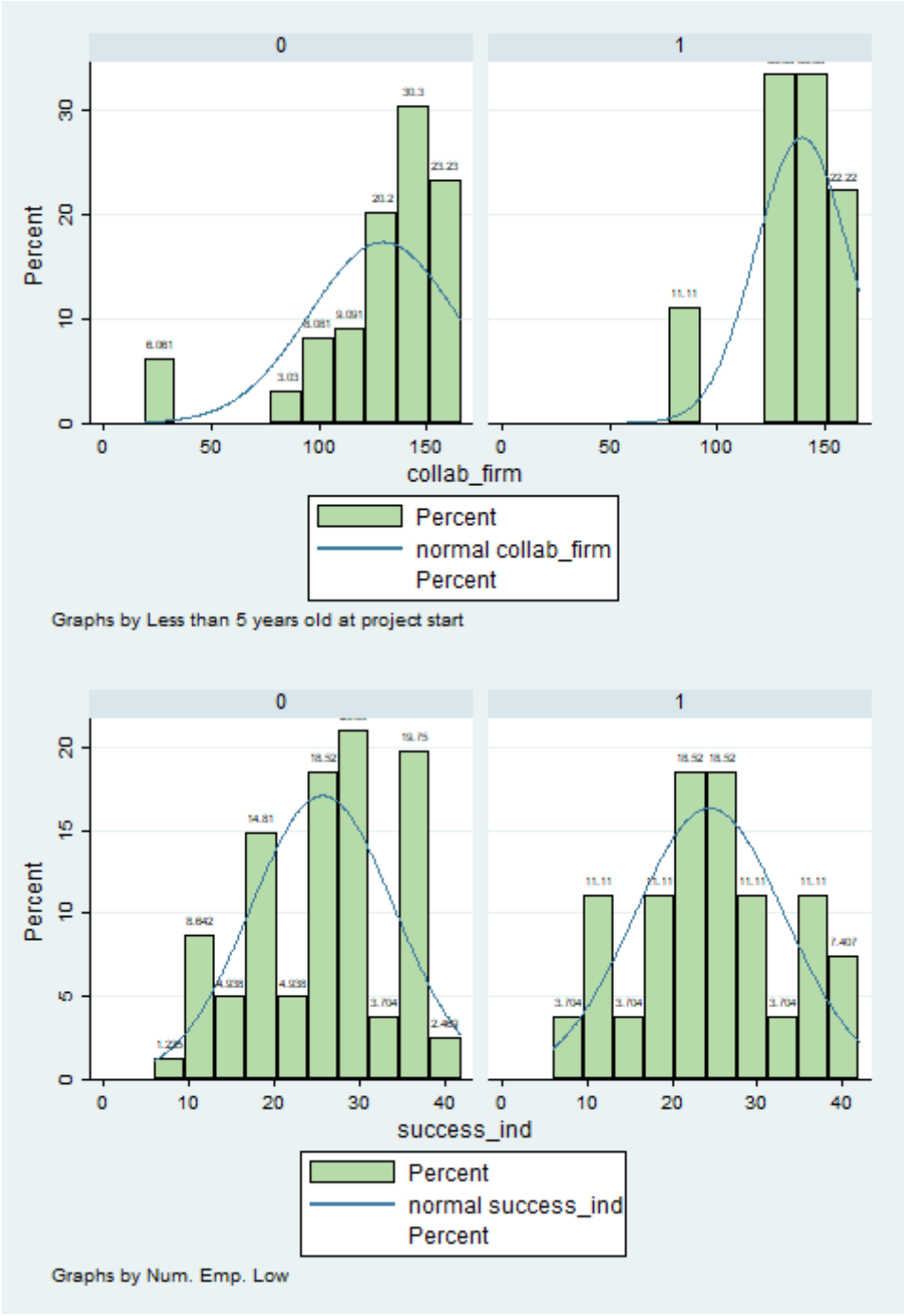
1
Percent
0
50
100
150
0
20
40
Governing organisation experience
Percent
normal Governingorganisationexperienc
Percent
Graphs by Less than 5 years old at project start
0
1
Percent
0
10
20
30
40
0
50
100
150
200
success_firm
Percent
normal success_firm
Percent
Graphs by Less than 5 years old at project start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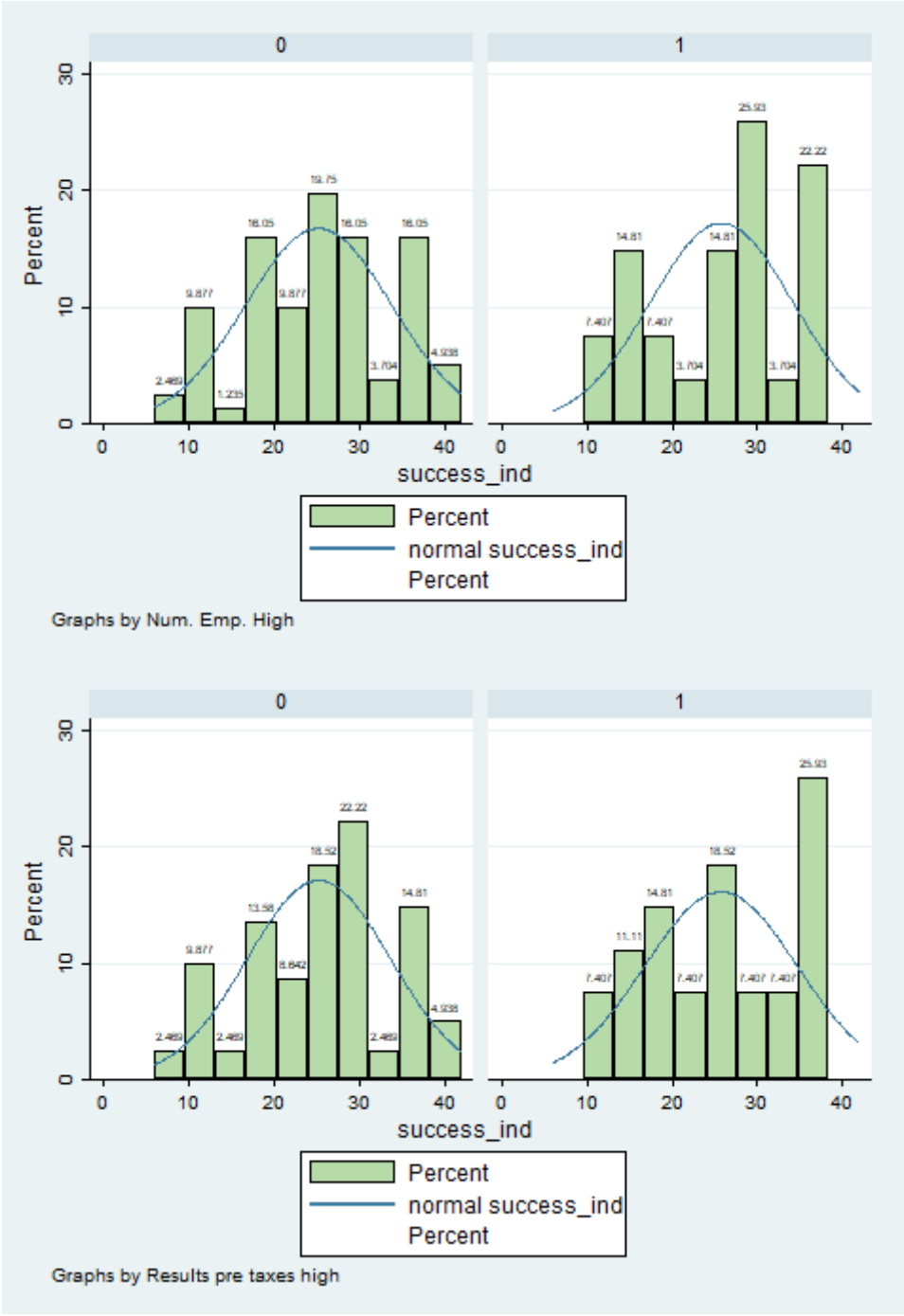
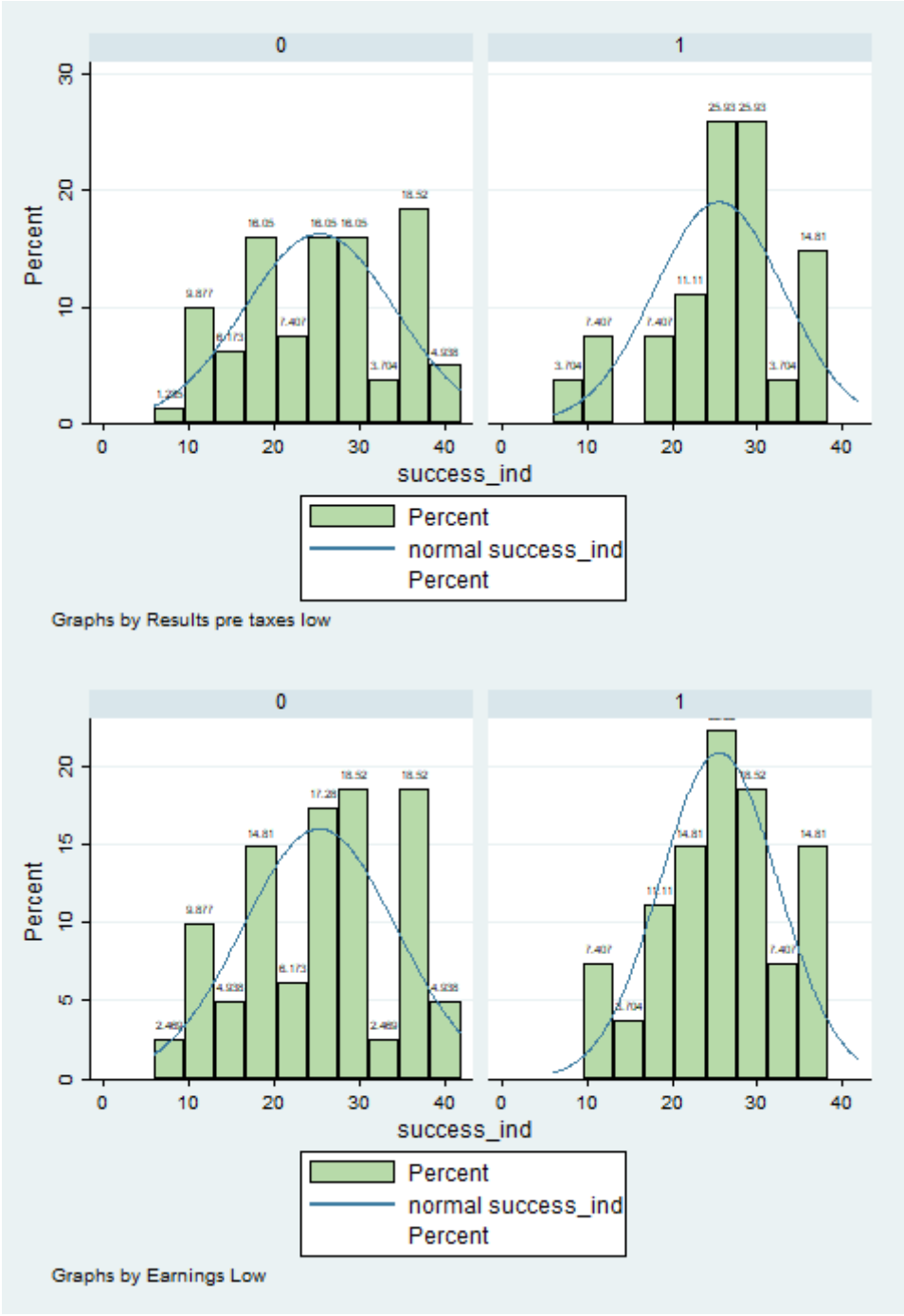
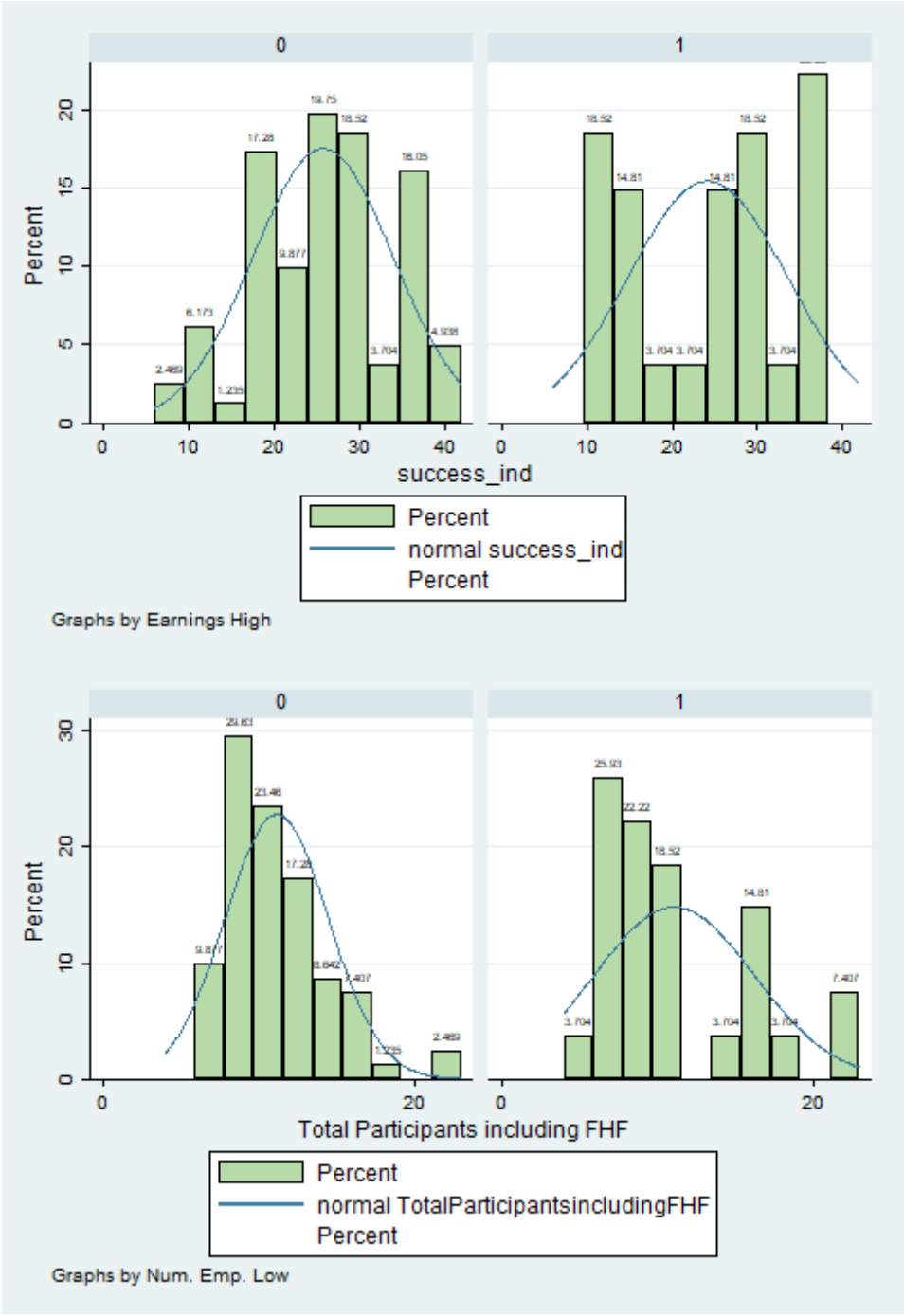
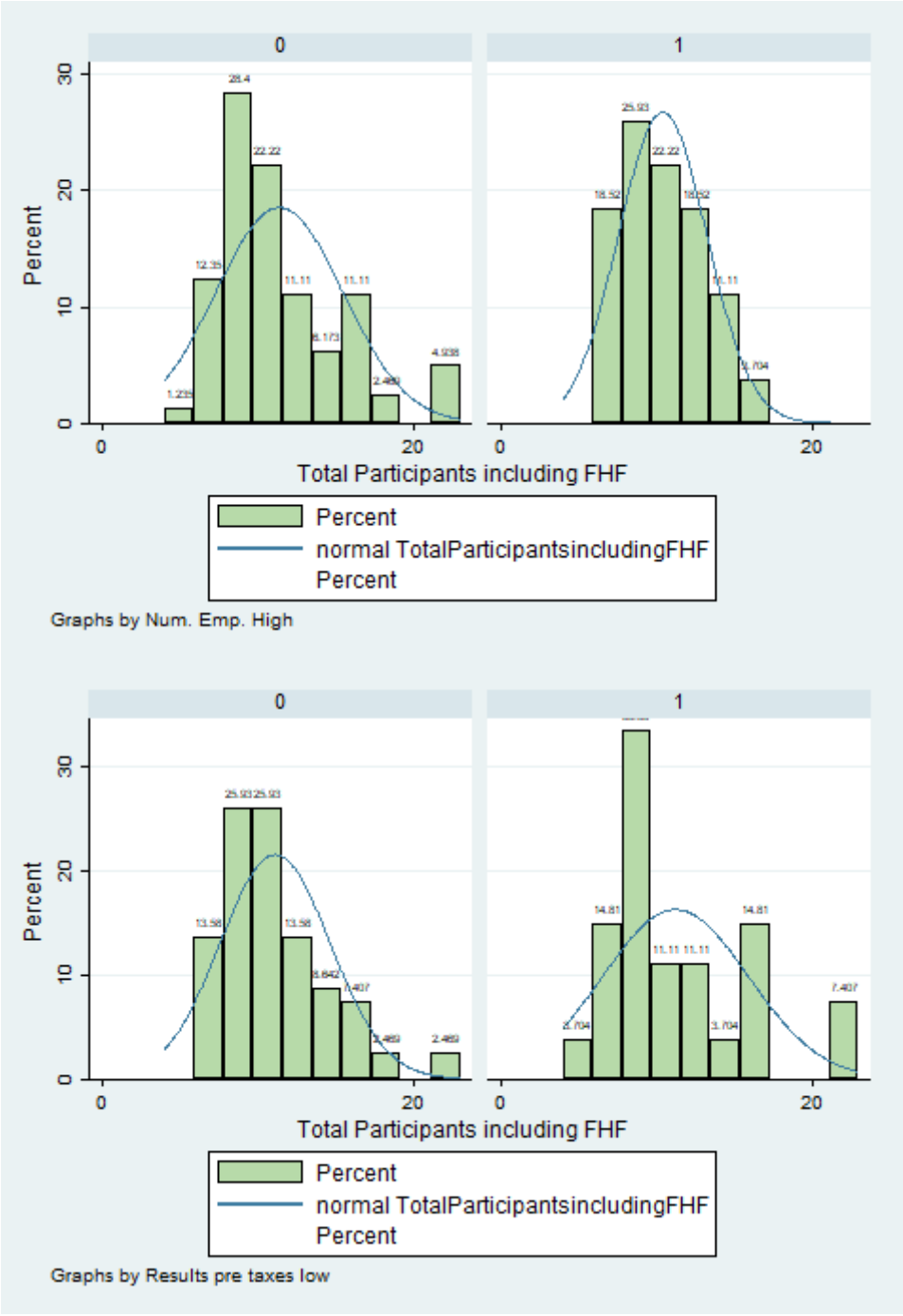
3.03
9.091
20.2
30.3
23.23
11.11
22.22
0
50
100
150
collab_firm
Percent
normal collab_firm
Percent
Graphs by Less than 5 years old at project start
0
1
Percent
0
5
10
15
20
8.642
14.81
18.52
19.75
3.704
11.11
18.52
7.407
0
10
20
30
40
success_ind
Percent
normal success_ind
Percent
Graphs by Num. Emp. Low


0
1
Percent
success_ind
Percent
normal success_ind
Percent
Graphs by Num. Emp. High
0
1
Percent
success_ind
Percent
normal success_ind
Percent
Graphs by Results pre taxes high


0
1
Percent
success_ind
Percent
normal success_ind
Percent
Graphs by Results pre taxes low
0
1
Percent
success_ind
Percent
normal success_ind
Percent
Graphs by Earnings Low


0
1
Percent
success_ind
Percent
normal success_ind
Percent
Graphs by Earnings High
0
1
Percent
Total Participants including FHF
Percent
normal TotalParticipantsincludingFHF
Percent
Graphs by Num. Emp. Low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Percent
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10
20
30
0
20
Total Participants including FHF
Percent
normal TotalParticipantsincludingFHF
Percent
Graphs by Num. Emp. High
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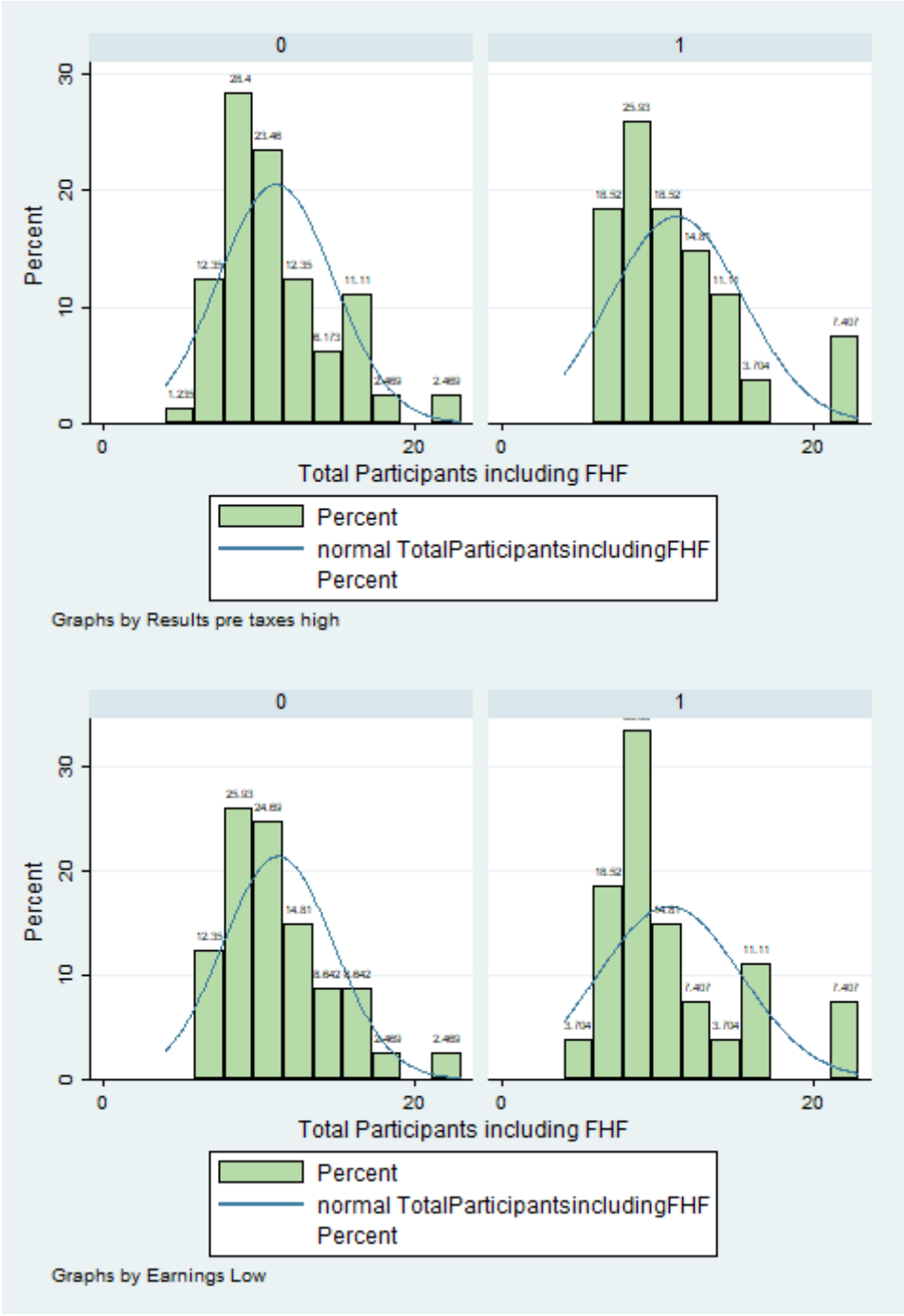
Percent
0
10
20
30
0
20
Total Participants including FHF
Percent
normal TotalParticipantsincludingFHF
Percent
Graphs by Results pre taxes low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Percent
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Total Participants including FHF
Percent
normal TotalParticipantsincludingFHF
Percent
Graphs by Results pre taxes high
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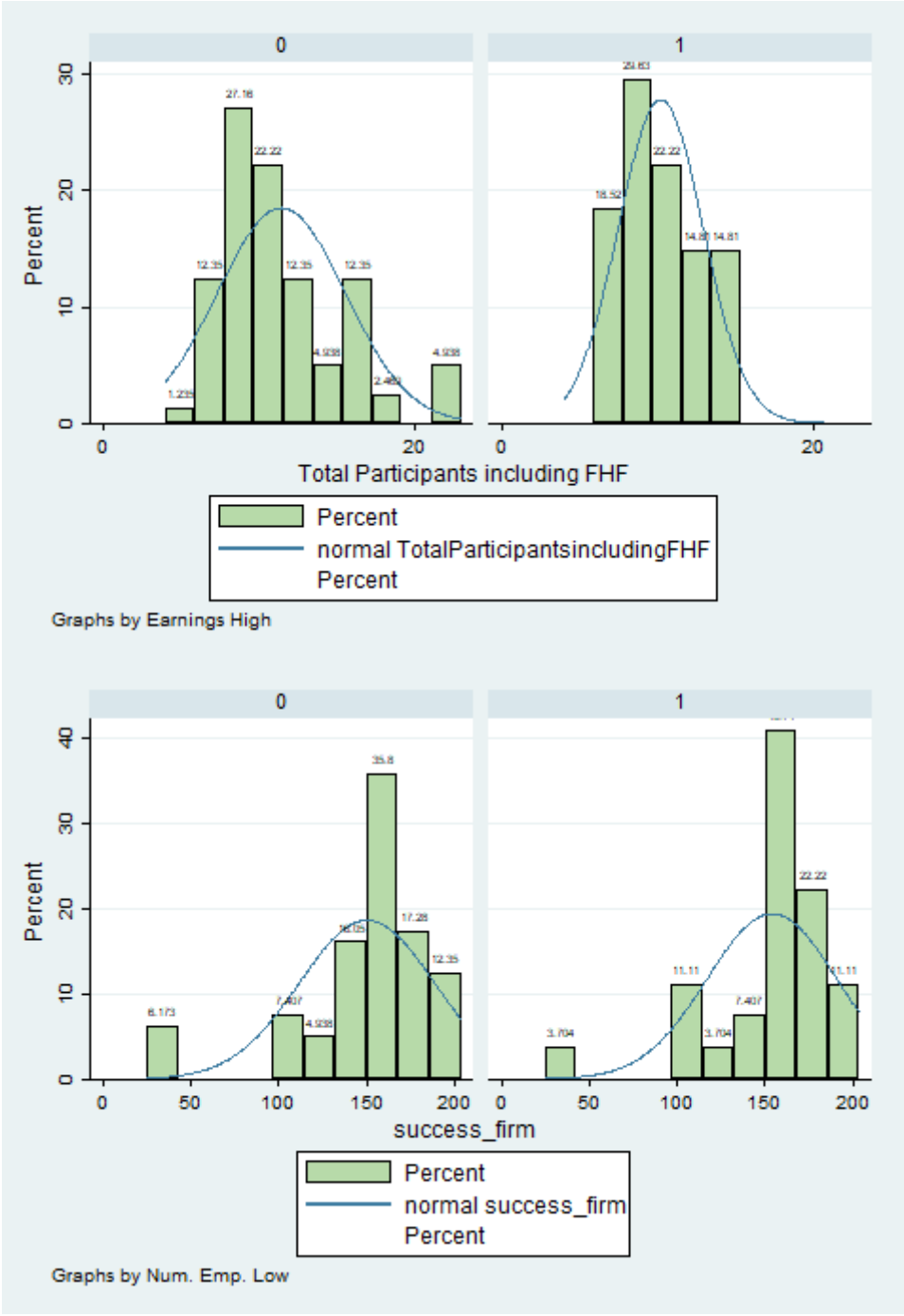
Percent
0
10
20
30
0
20
Total Participants including FHF
Percent
normal TotalParticipantsincludingFHF
Percent
Graphs by Earnings Low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12.35
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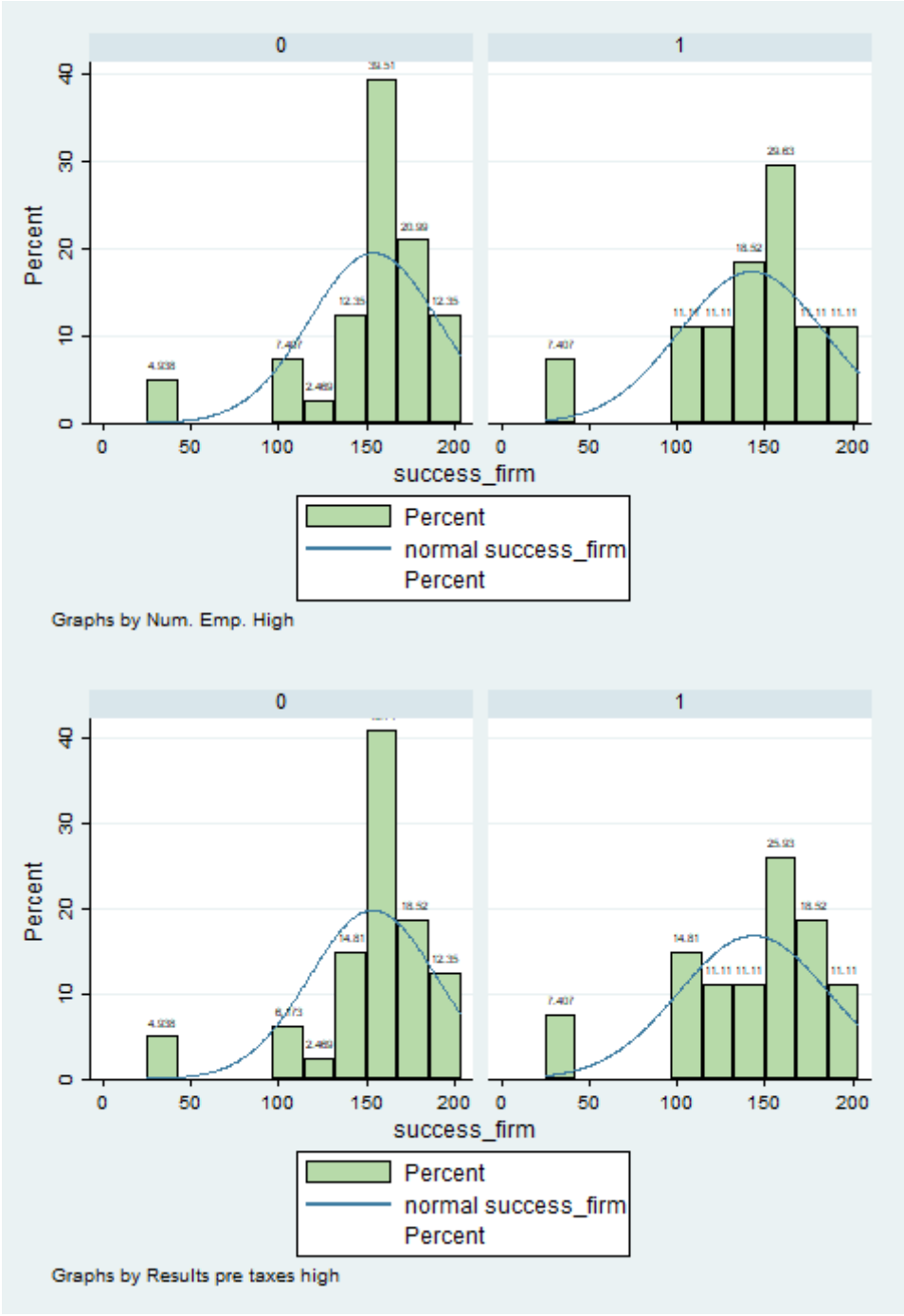
4.938
1.235
2.469
29.63
22.22
18.52
14.81
14.81
0
20
Total Participants including FHF
Percent
normal TotalParticipantsincludingFHF
Percent
Graphs by Earnings High
0
1
Percent
0
10
20
30
40
35.8
17.28
12.35
8.173
7.407
4.938
3.704
11.11
3.704
7.407
22.22
11.11
0
50
100
150
200
success_firm
Percent
normal success_firm
Percent
Graphs by Num. Emp. Low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1
Percent
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10
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30
40
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100
150
200
success_firm
Percent
normal success_firm
Percent
Graphs by Num. Emp. High
0
1
Percent
0
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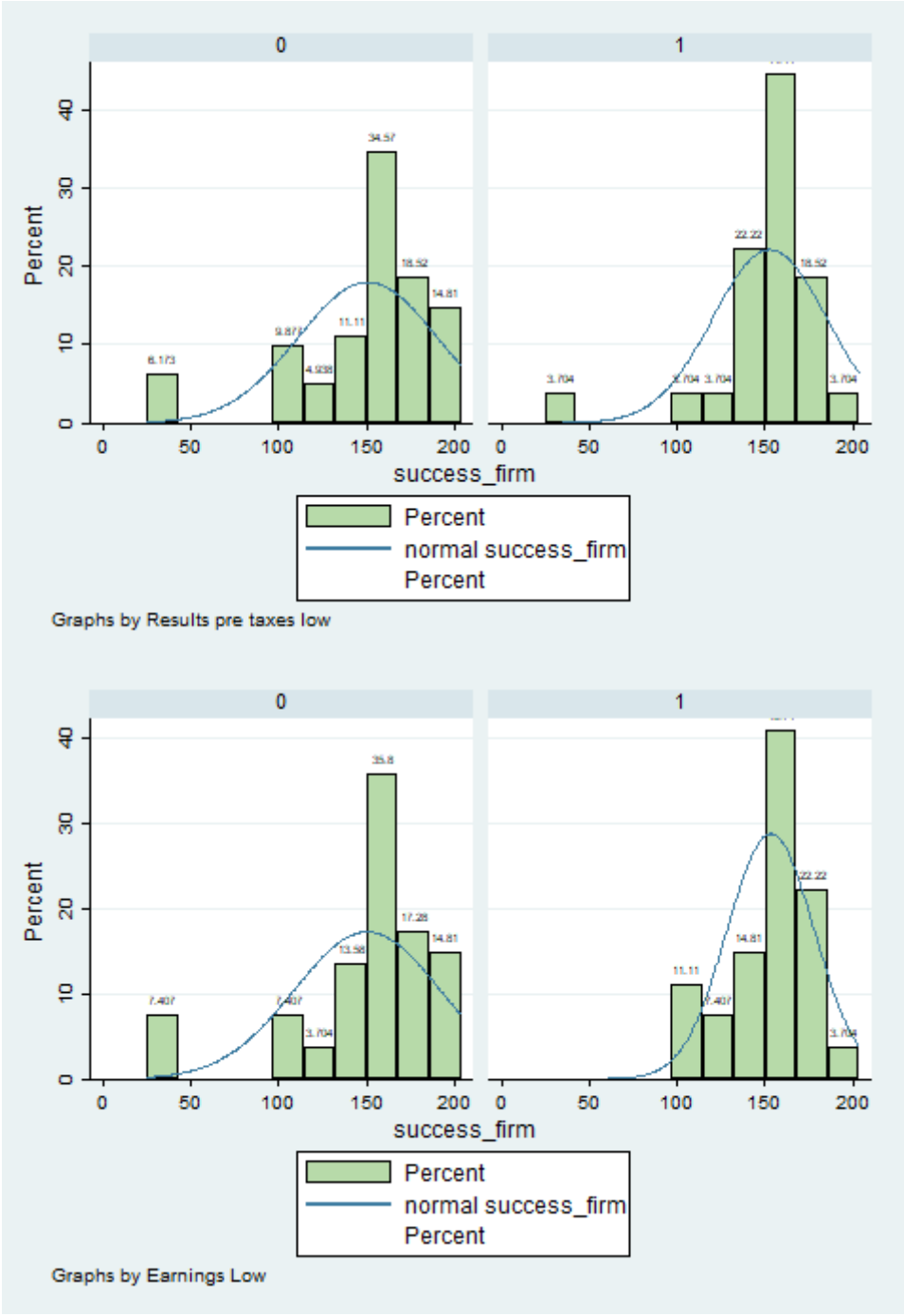
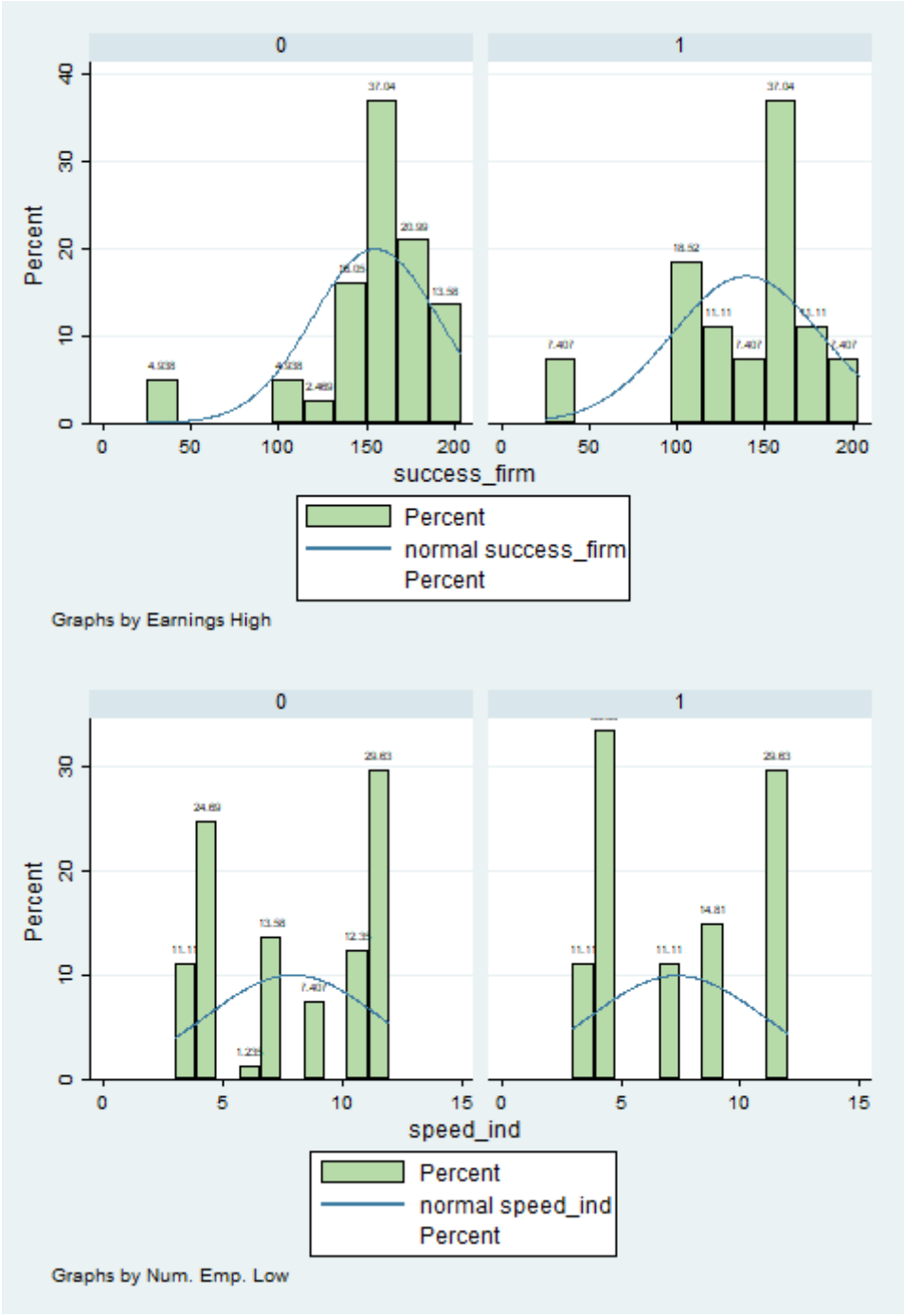
20
30
40
0
50
100
150
200
success_firm
Percent
normal success_firm
Percent
Graphs by Results pre taxes high



Graphs by Results pre taxes low

Graphs by Earnings Low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Percent
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150
200
success_firm
Percent
normal success_firm
Percent
Graphs by Earnings High
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Percent
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10
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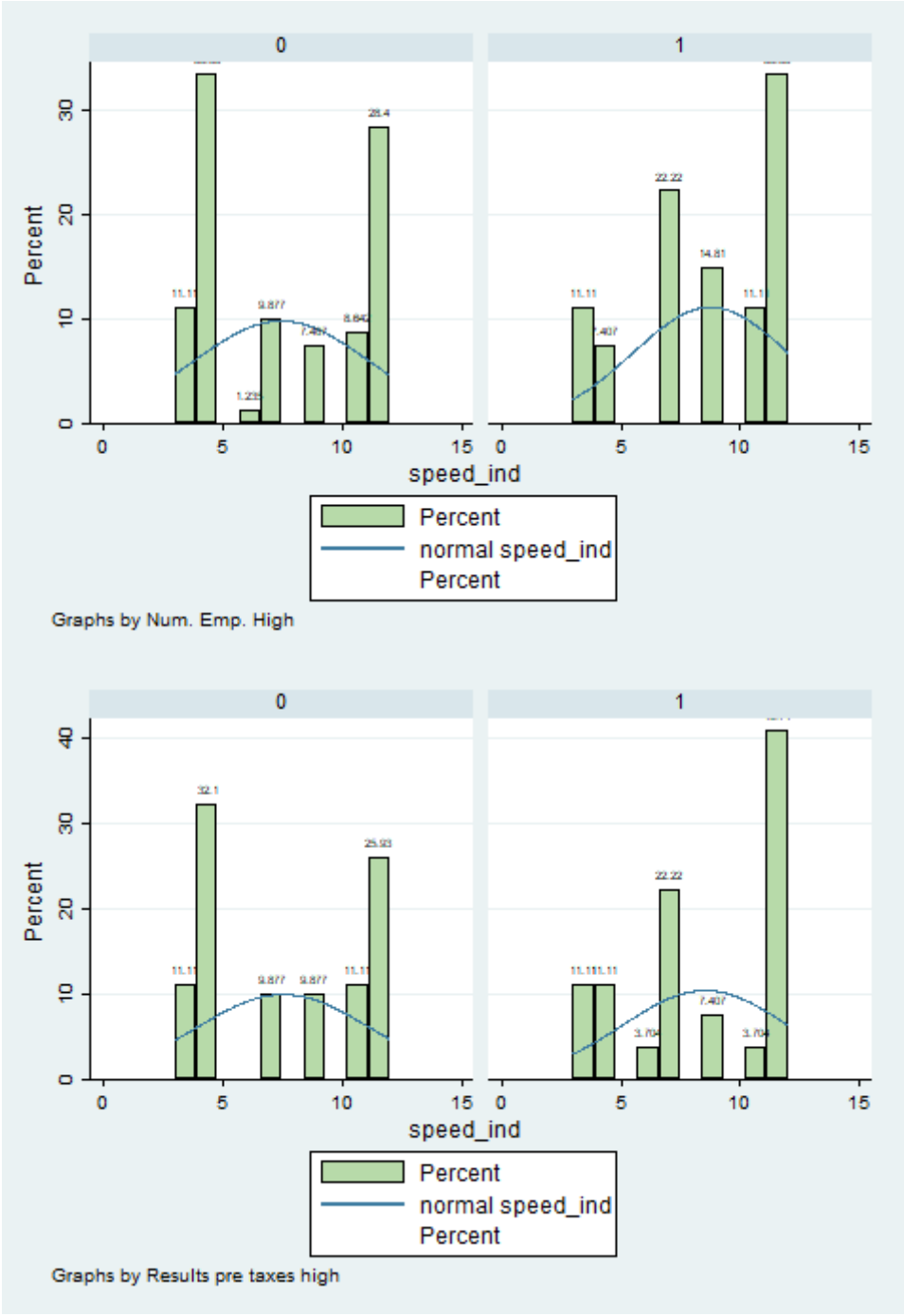
30
0
5
10
15
speed_ind
Percent
normal speed_ind
Percent
Graphs by Num. Emp. Low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Percent
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10
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1.235
7.407
8.642
28.4
11.11
7.407
22.22
14.81
11.11
Percent
normal speed_ind
Percent
Graphs by Num. Emp. High
0
1
Percent
0
10
20
30
40
0
5
10
15
speed_ind
11.11
32.1
9.877
9.877
11.11
25.93
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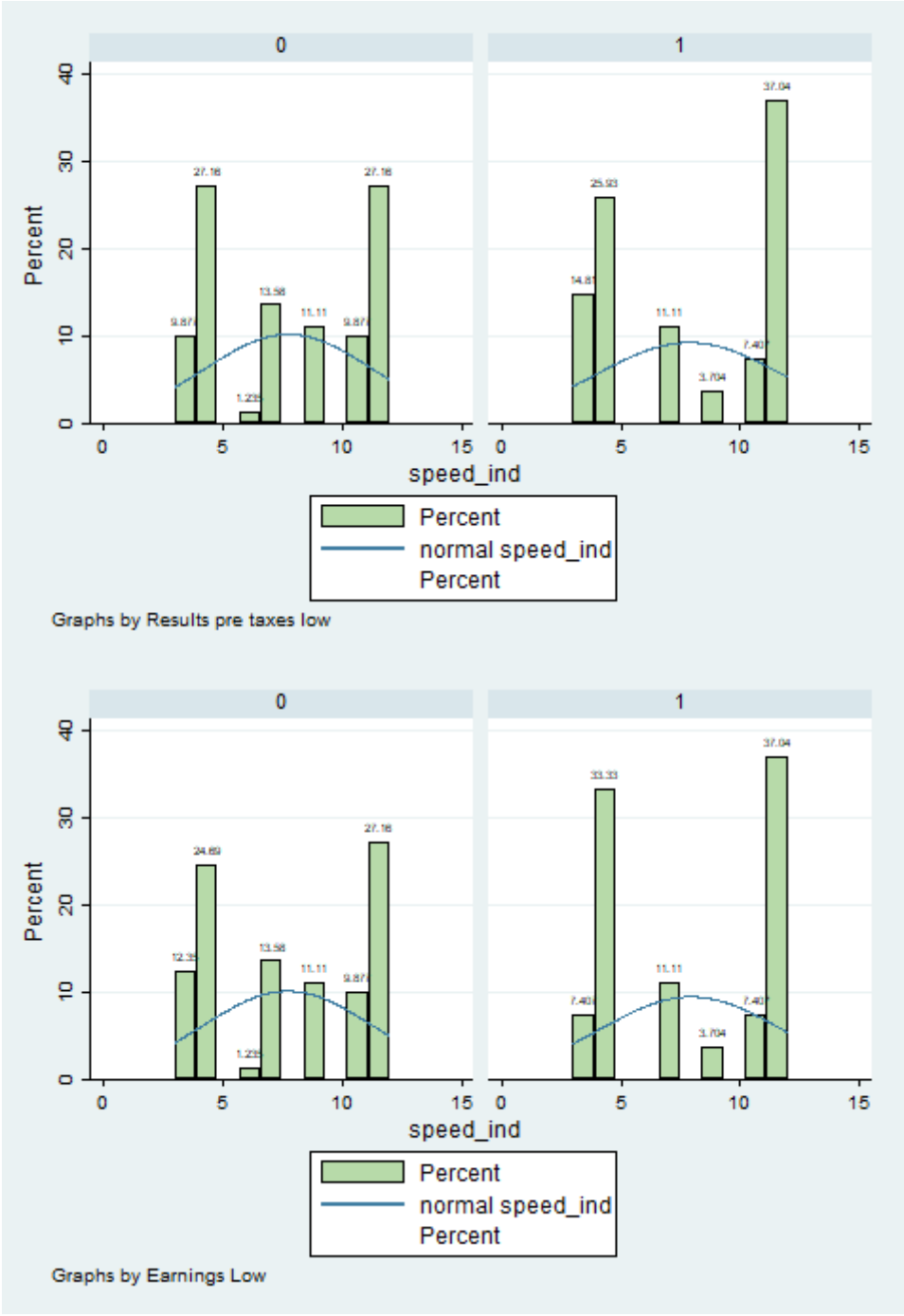
11.11
3.704
22.22
7.407
3.704
Percent
normal speed_ind
Percent
Graphs by Results pre taxes high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speed_ind
Percent
normal speed_ind
Percent
Graphs by Results pre taxes low
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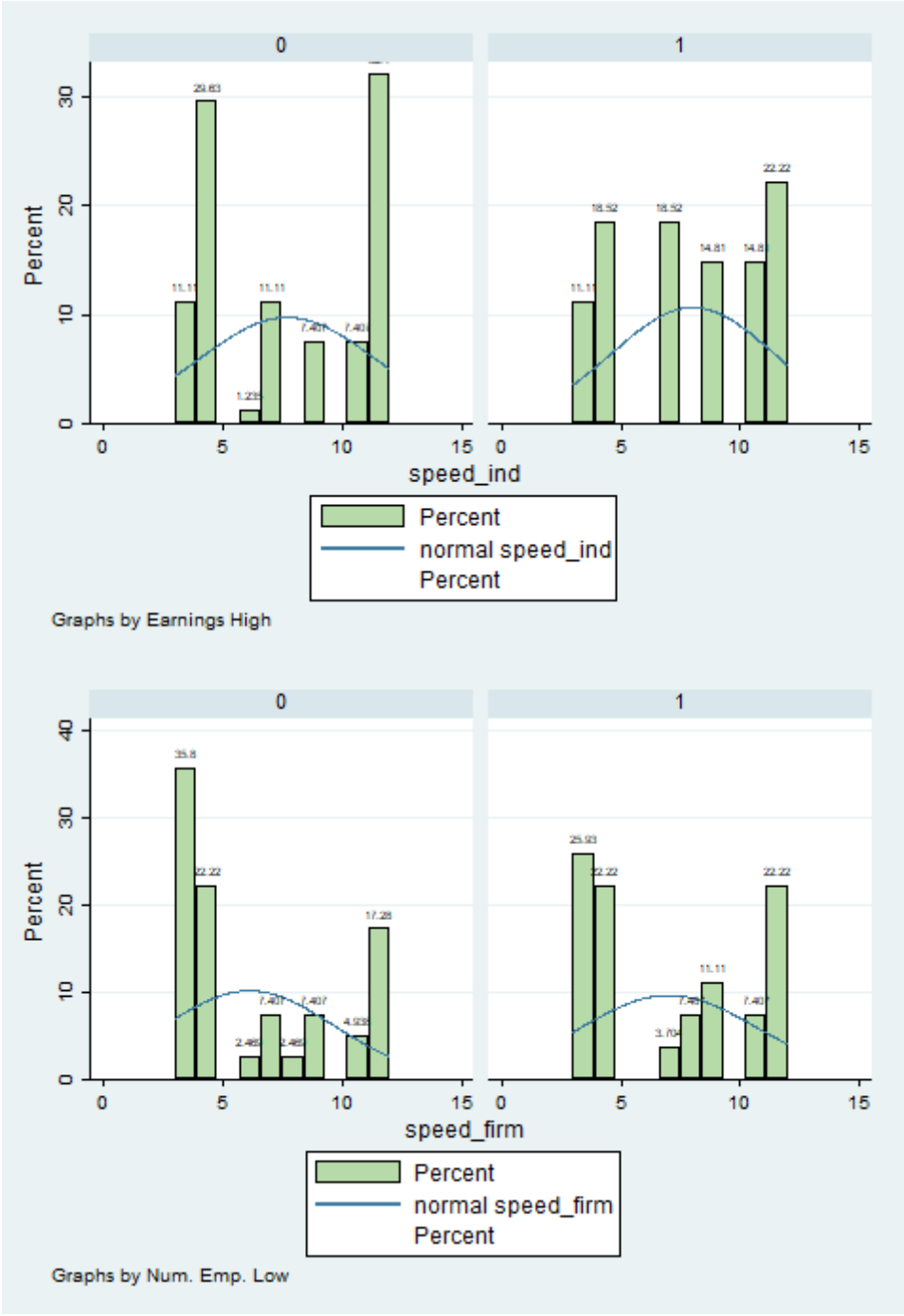
speed_ind
Percent
normal speed_ind
Percent
Graphs by Earnings Low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Percent
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15
speed_ind
Percent
normal speed_ind
Percent
Graphs by Earnings High
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Percent
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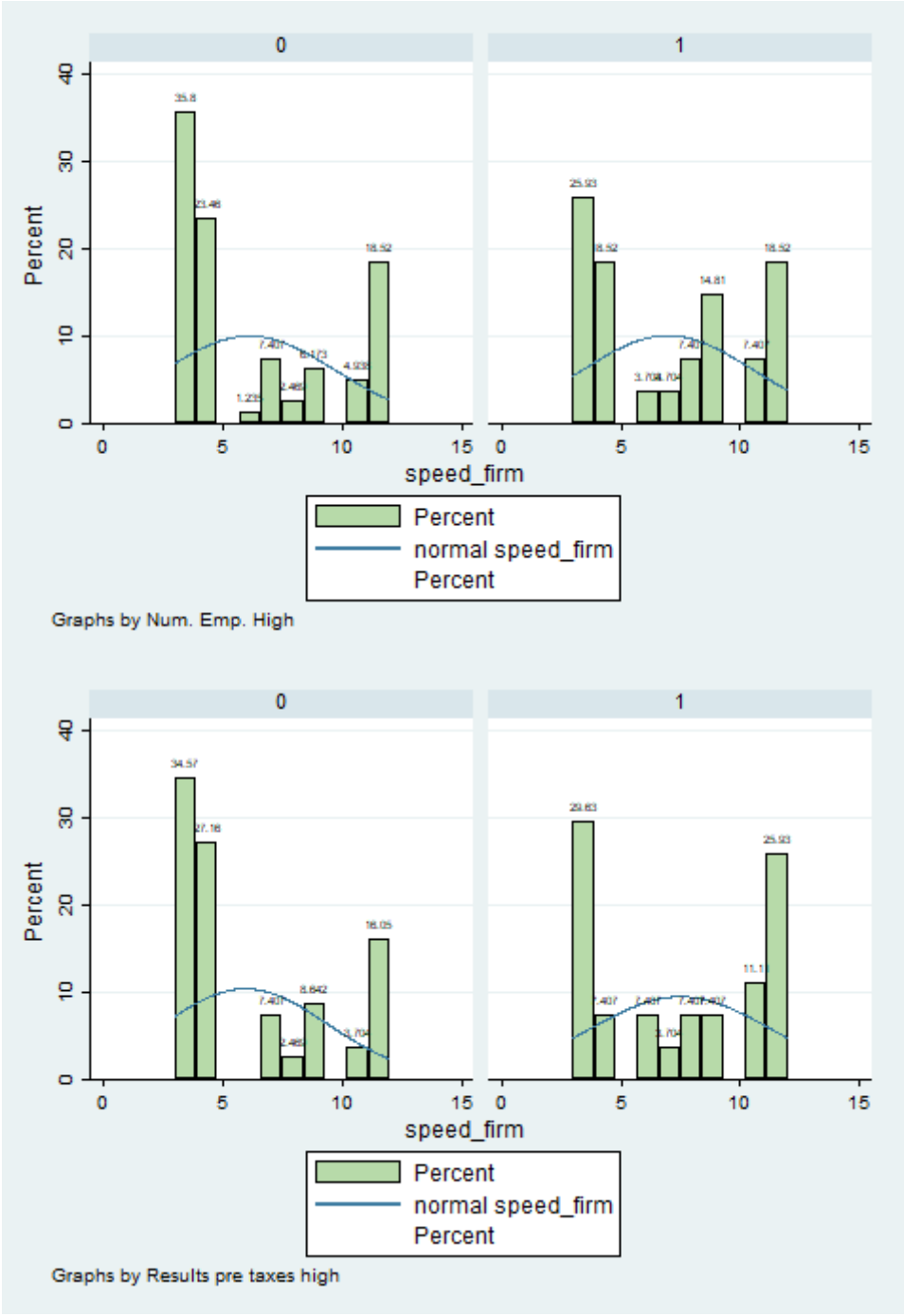
30
40
0
5
10
15
speed_firm
Percent
normal speed_firm
Percent
Graphs by Num. Emp. Low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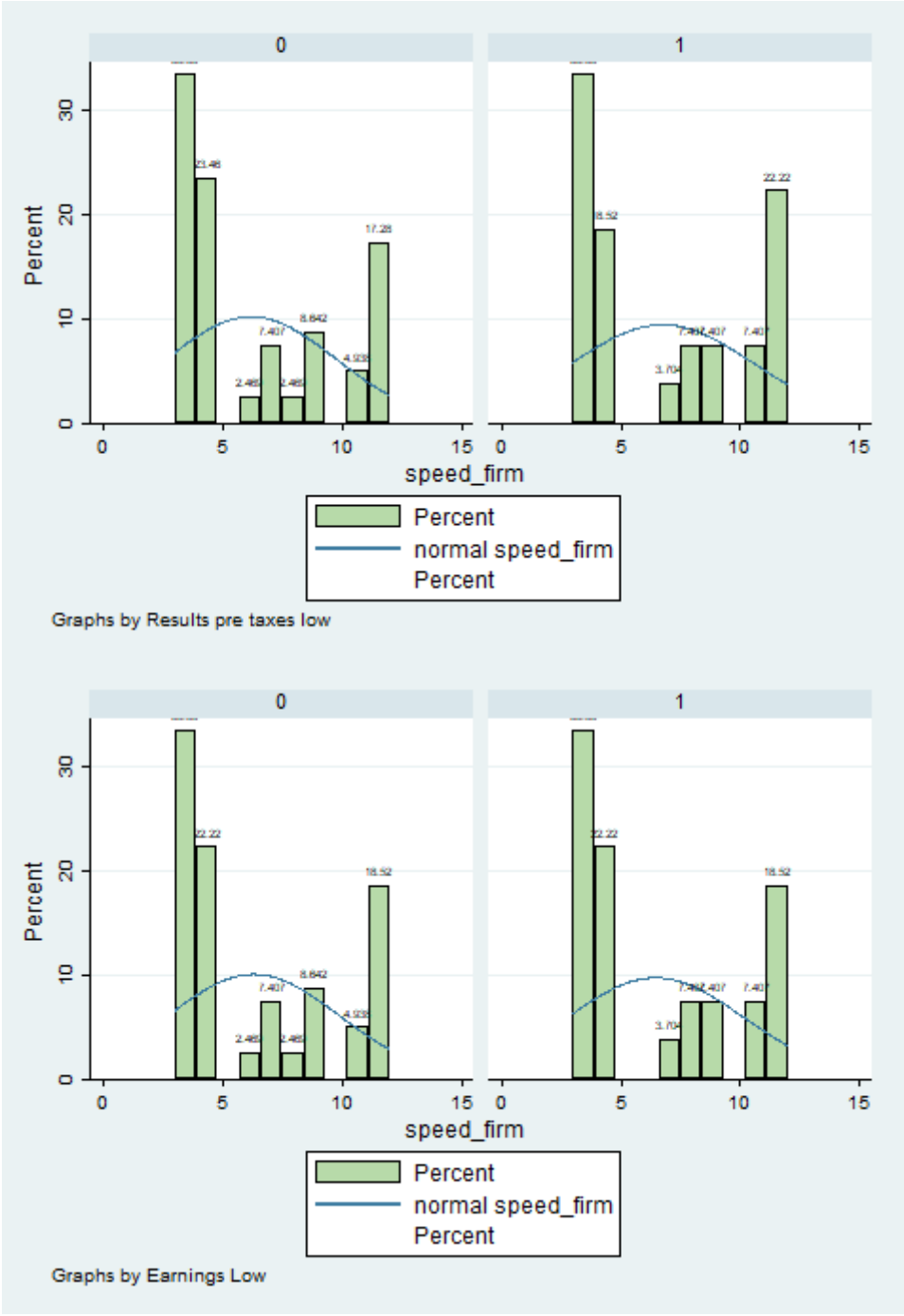
Percent
0
10
20
30
40
0
5
10
15
speed_firm
Percent
normal speed_firm
Percent
Graphs by Num. Emp. High
0
1
Percent
0
10
20
30
40
0
5
10
15
speed_firm
Percent
normal speed_firm
Percent
Graphs by Results pre taxes high


0
1
Percent
0
10
20
30
0
5
10
15
speed_firm
Percent
normal speed_firm
Percent
Graphs by Results pre taxes low
0
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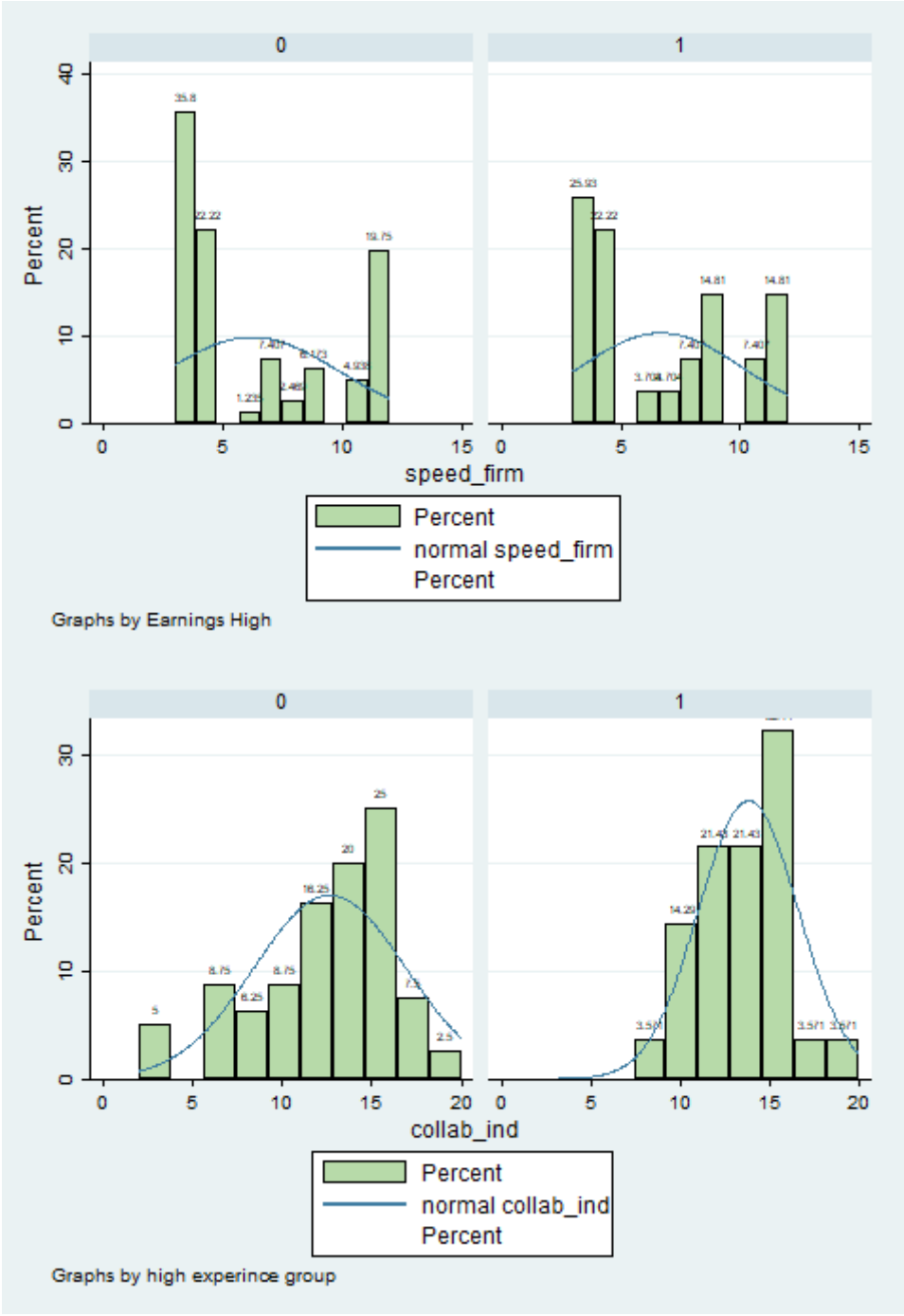
Percent
0
10
20
30
0
5
10
15
speed_firm
Percent
normal speed_firm
Percent
Graphs by Earnings Low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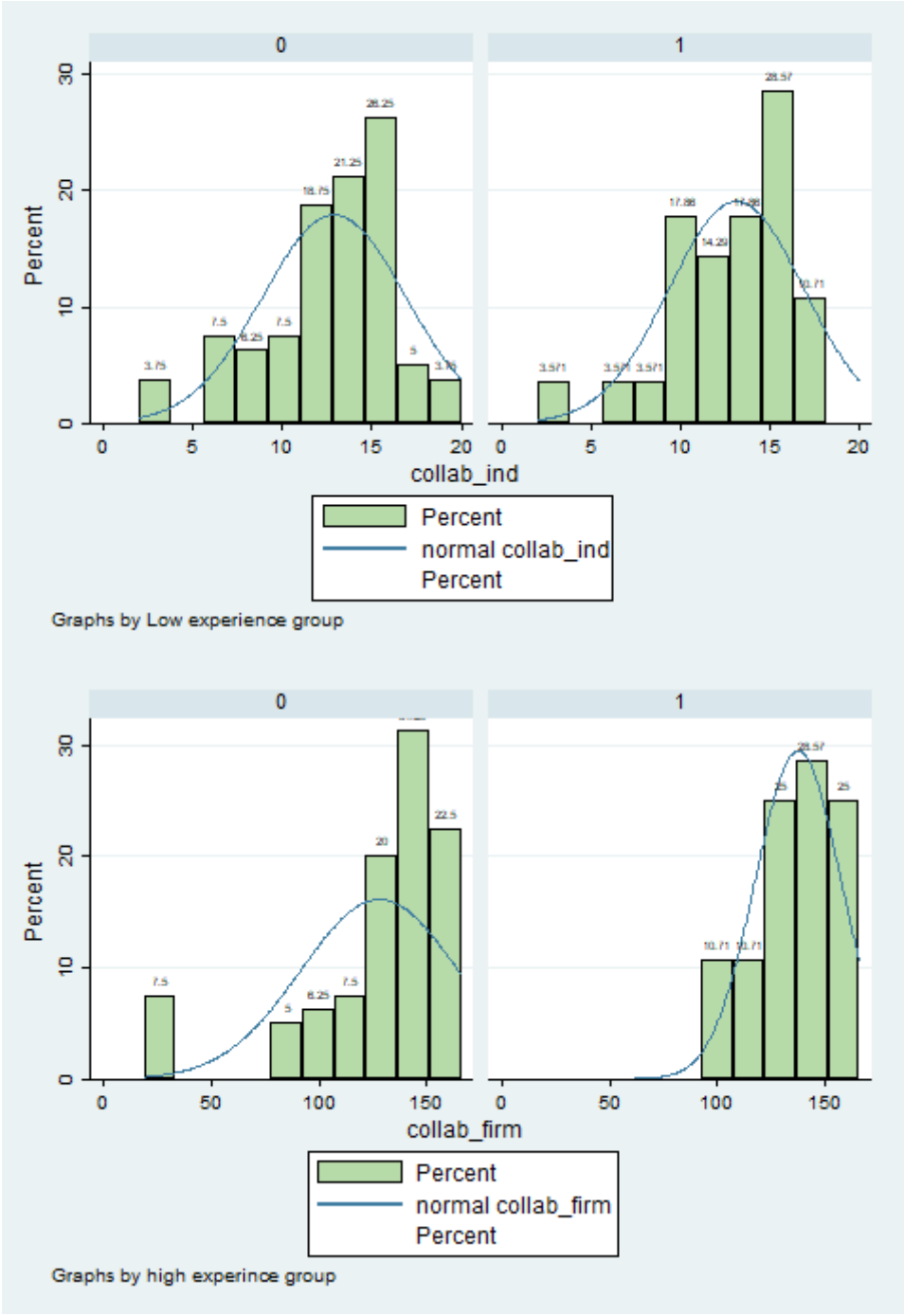
Percent
0
10
20
30
40
0
5
10
15
speed_firm
Percent
normal speed_firm
Percent
Graphs by Earnings High
0
1
Percent
0
10
20
30
0
5
10
15
20
collab_ind
Percent
normal collab_ind
Percent
Graphs by high experince group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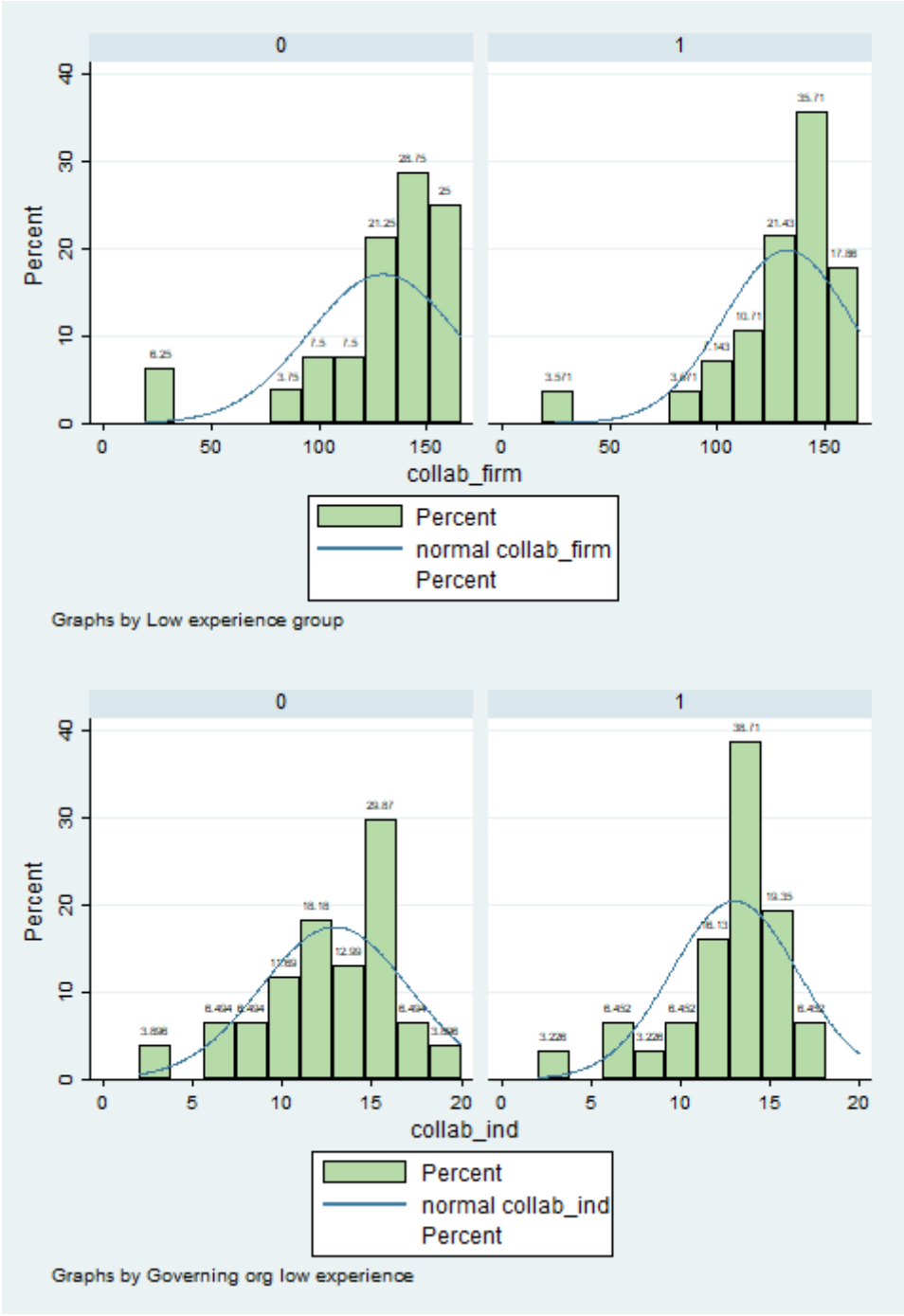
Percent
collab_ind
Percent
normal collab_ind
Percent
Graphs by Low experience group
0
1
Percent
collab_firm
Percent
normal collab_firm
Percent
Graphs by high experince group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normal collab_firm
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Graphs by Low experience group
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Percent
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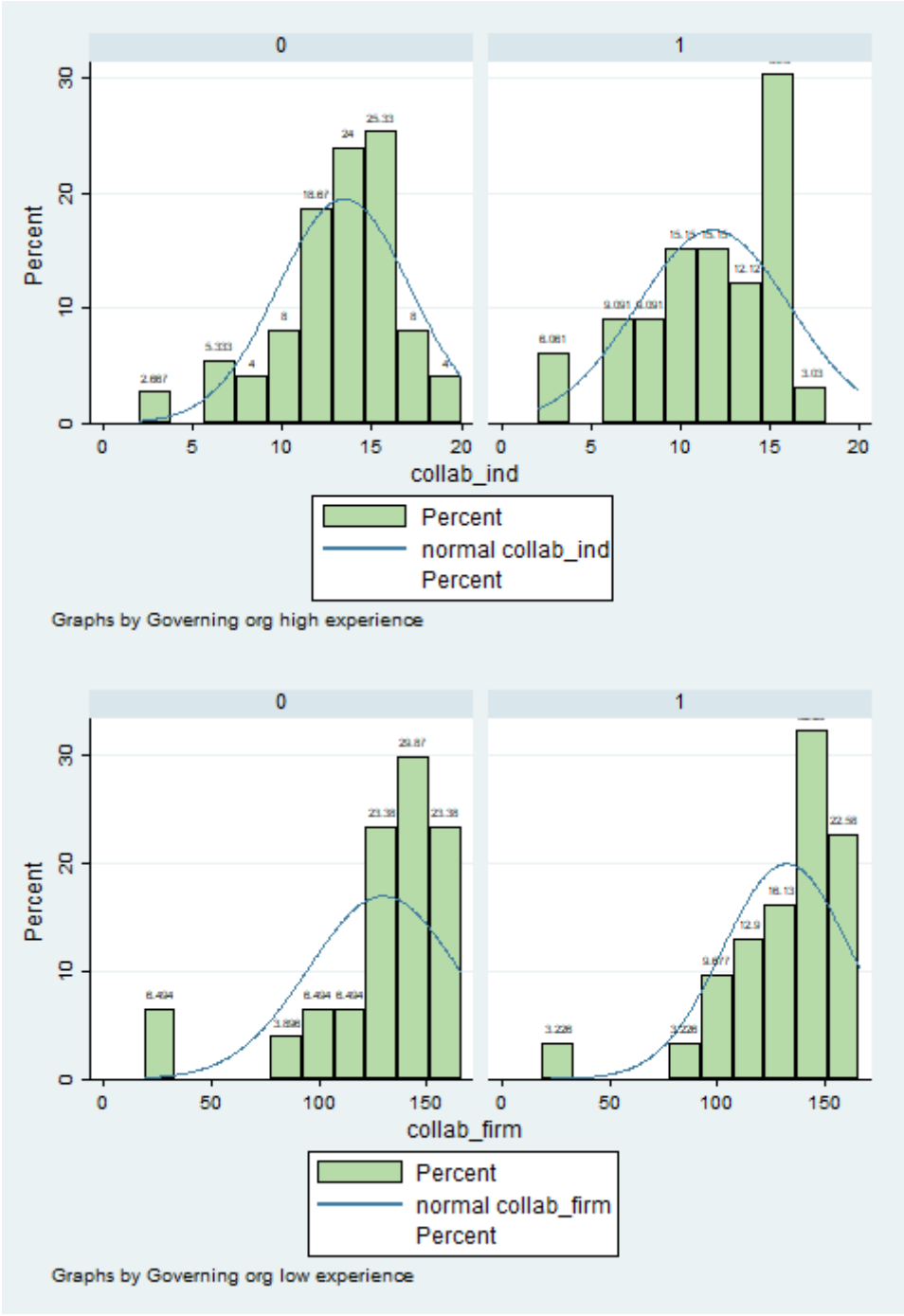
Graphs by Governing org low experience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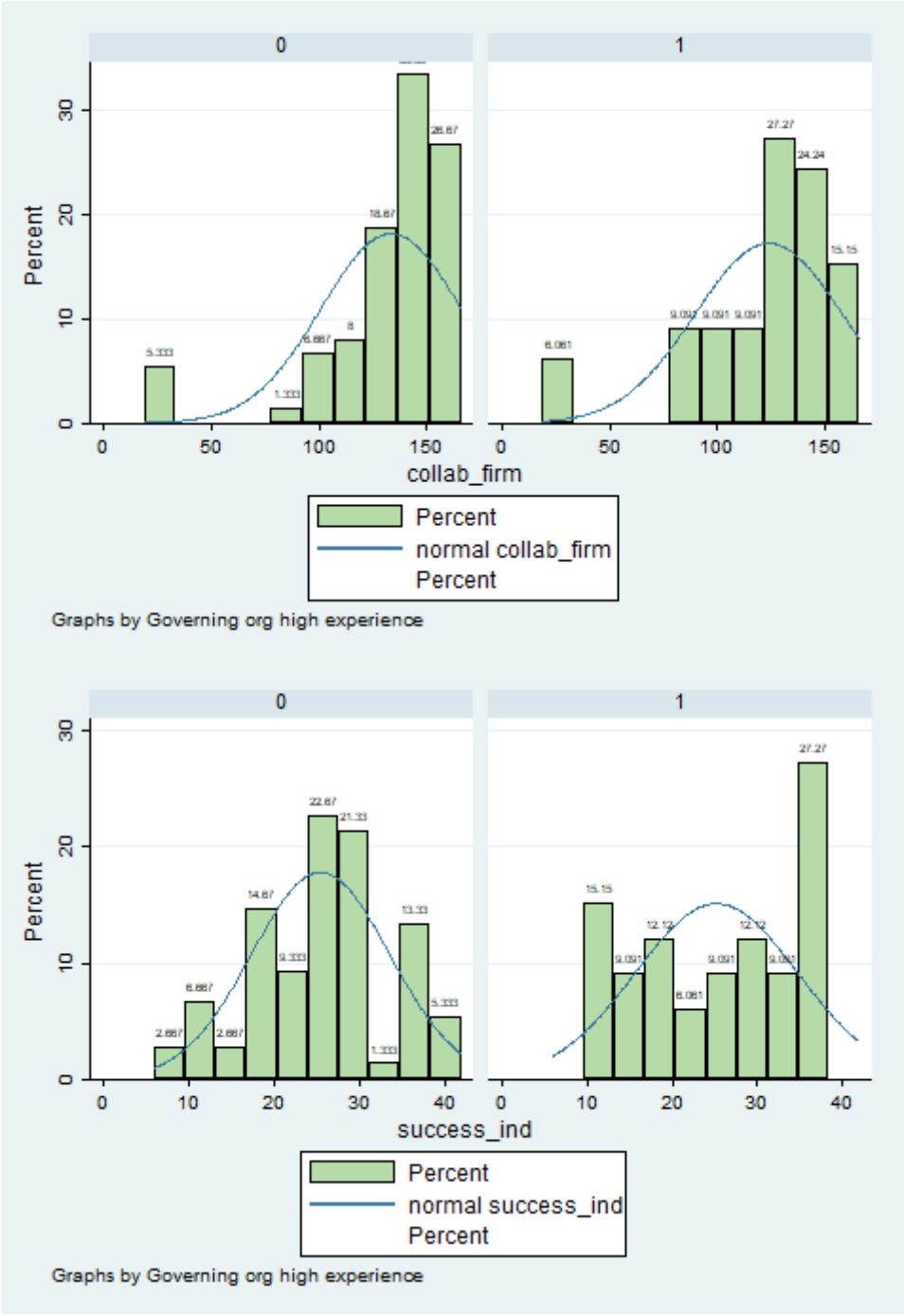
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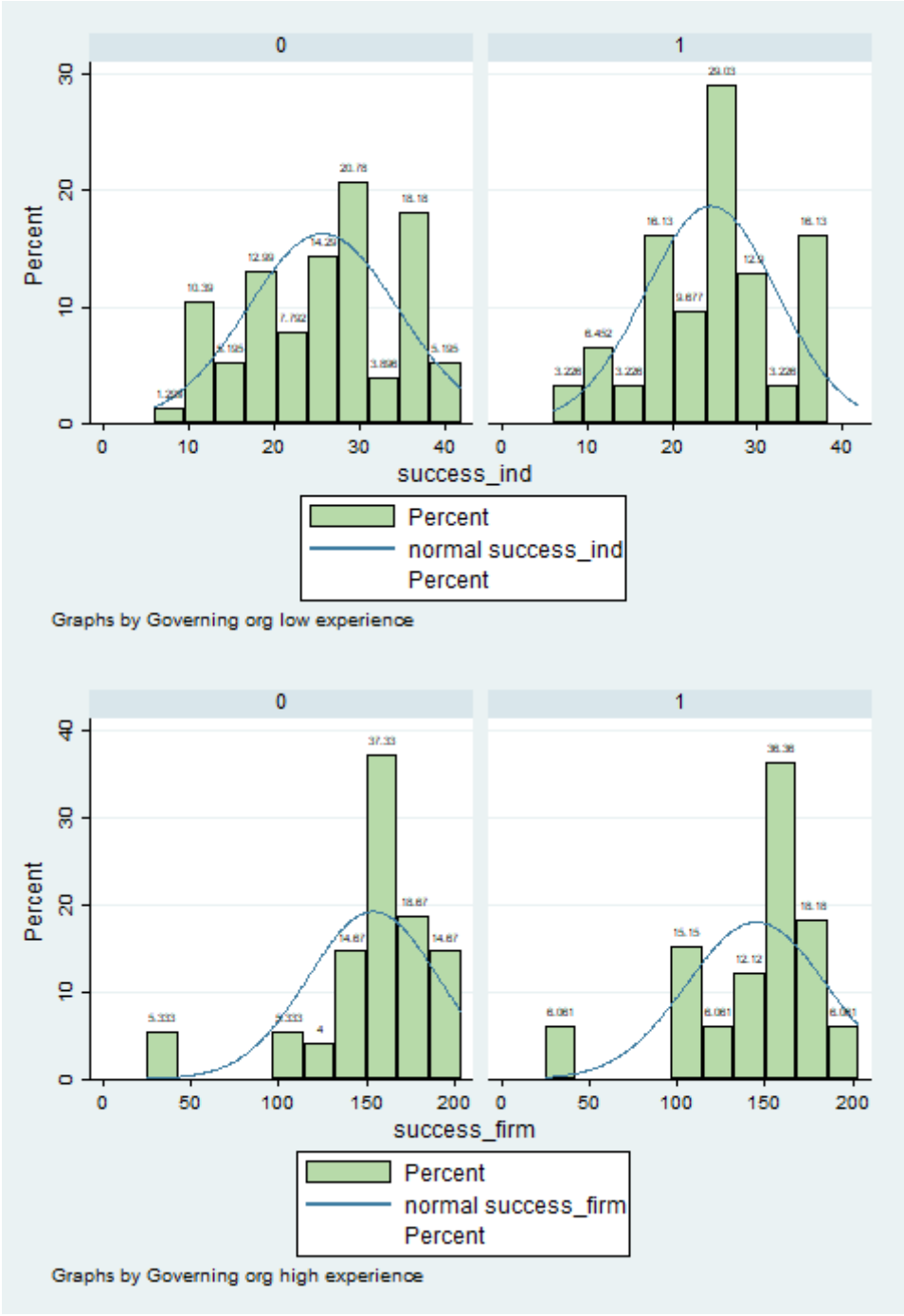
success_ind
normal success_ind
Graphs by Governing org high experience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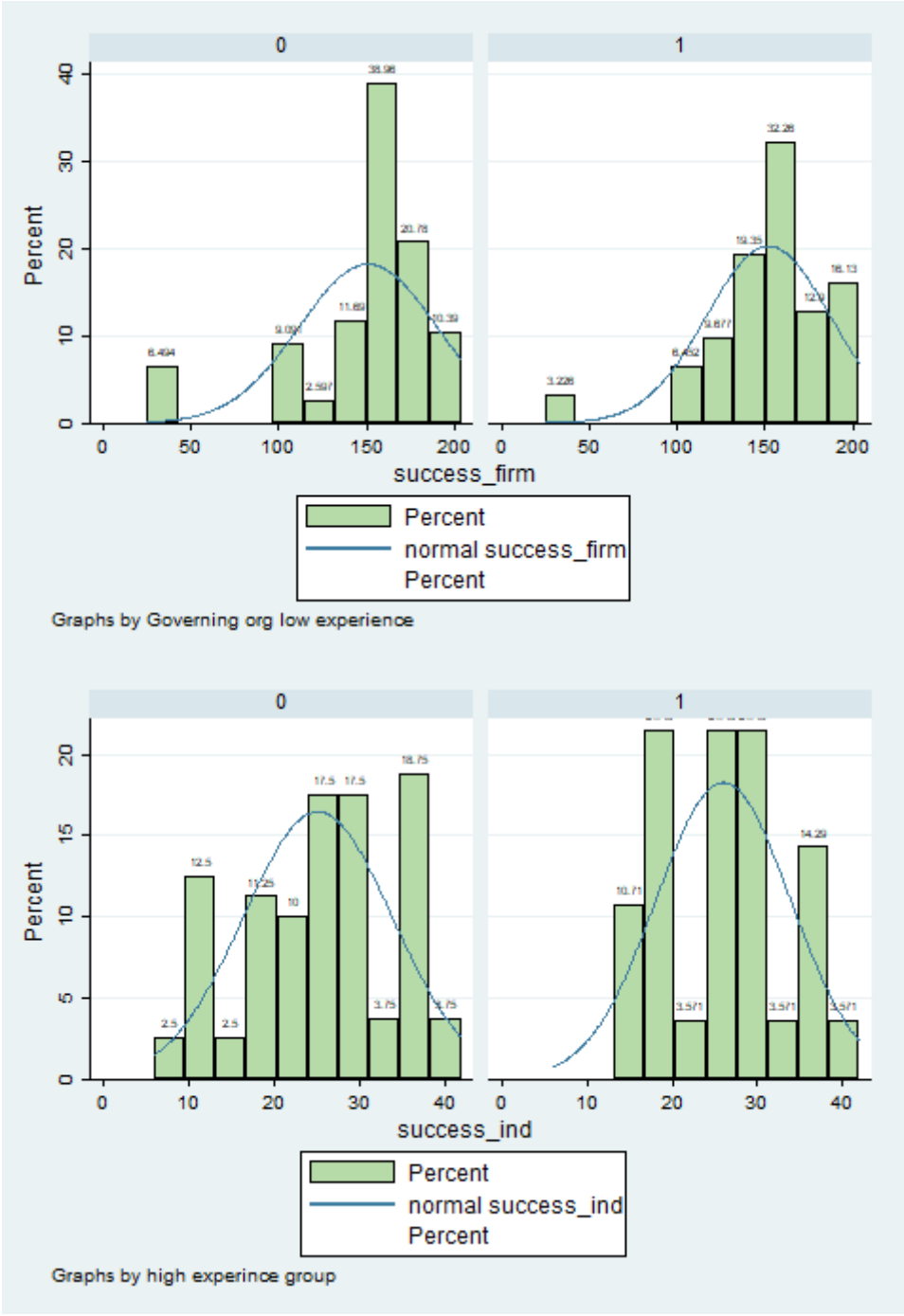
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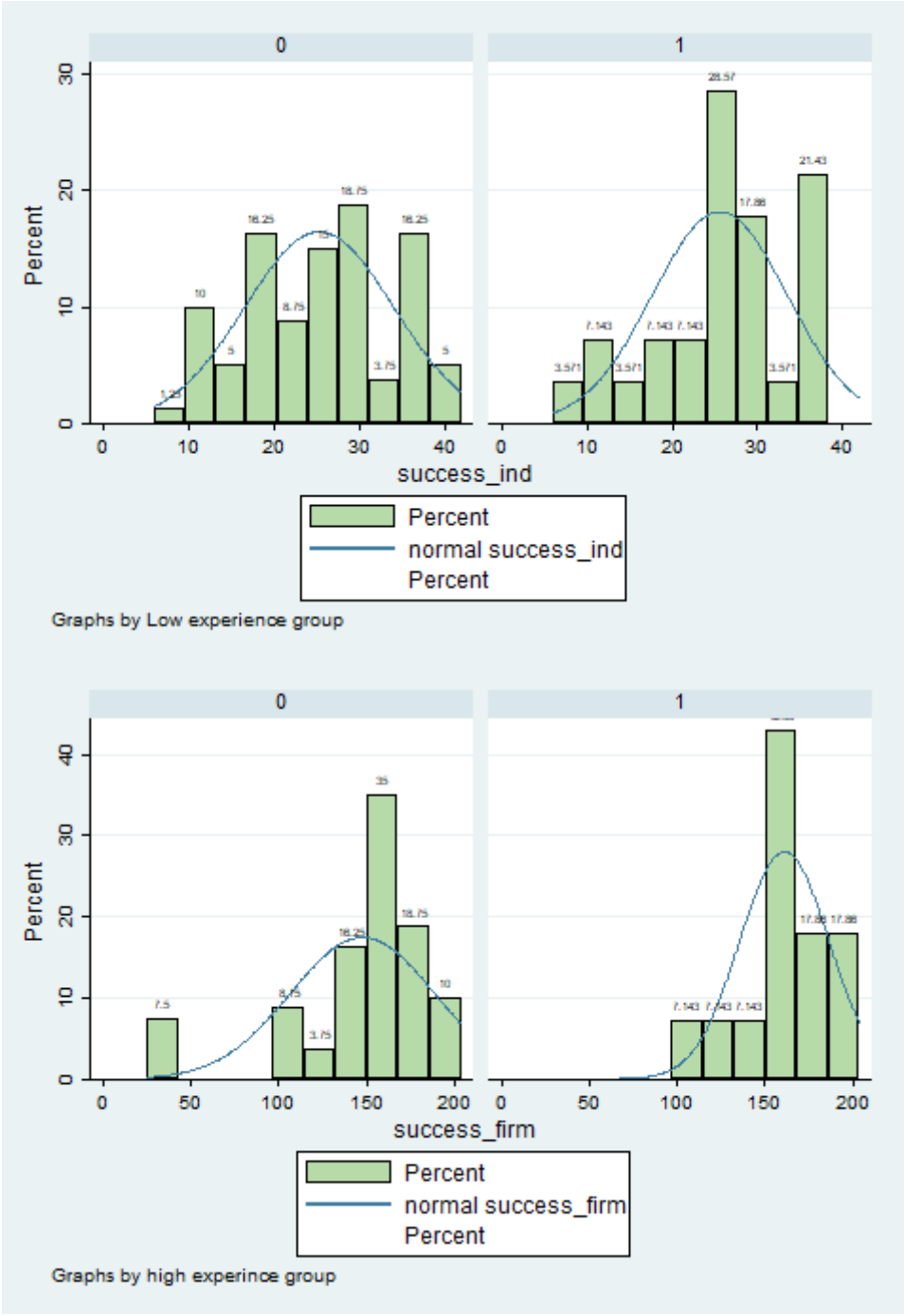
Graphs by high experince group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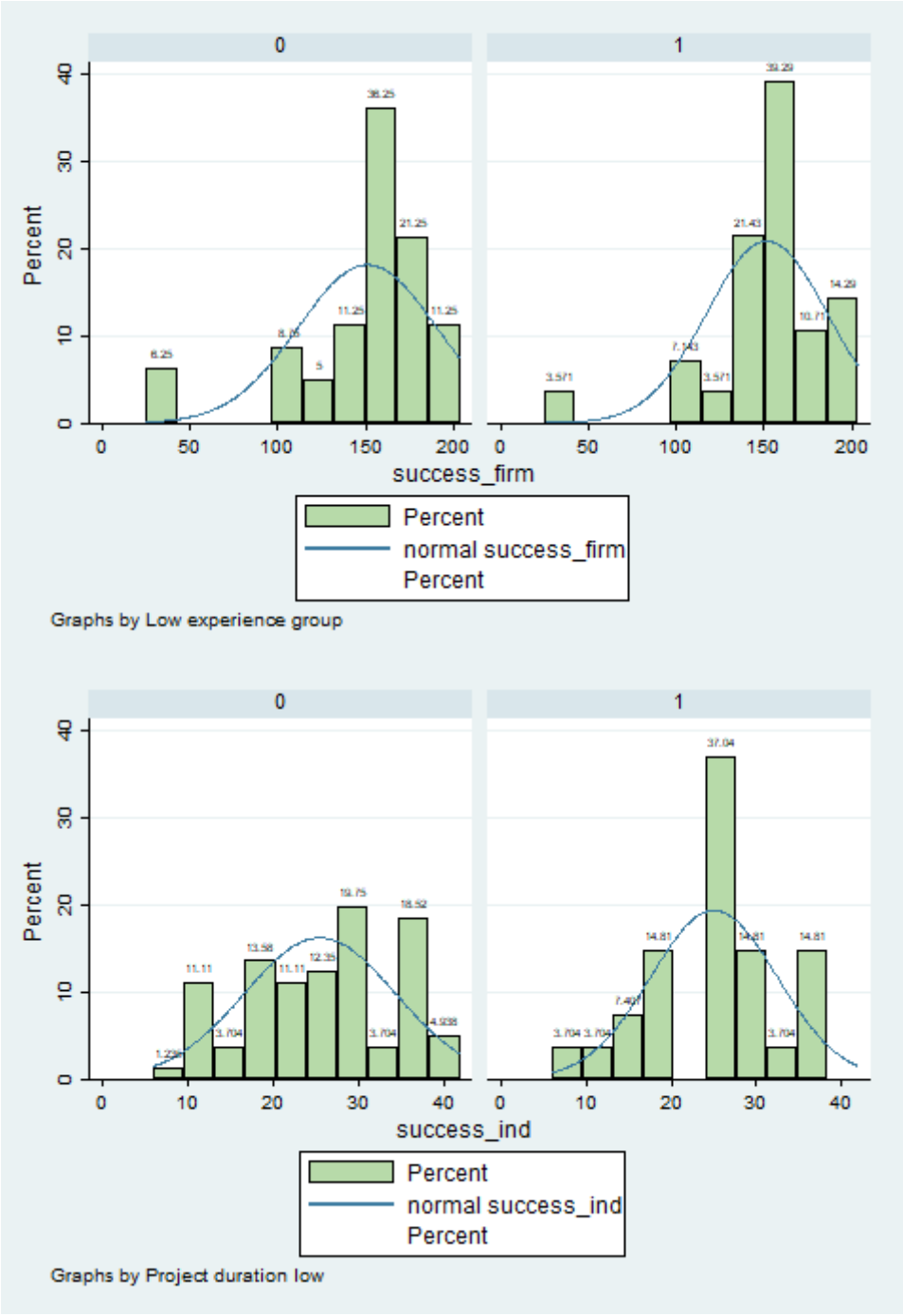
Graphs by high experince group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Percent
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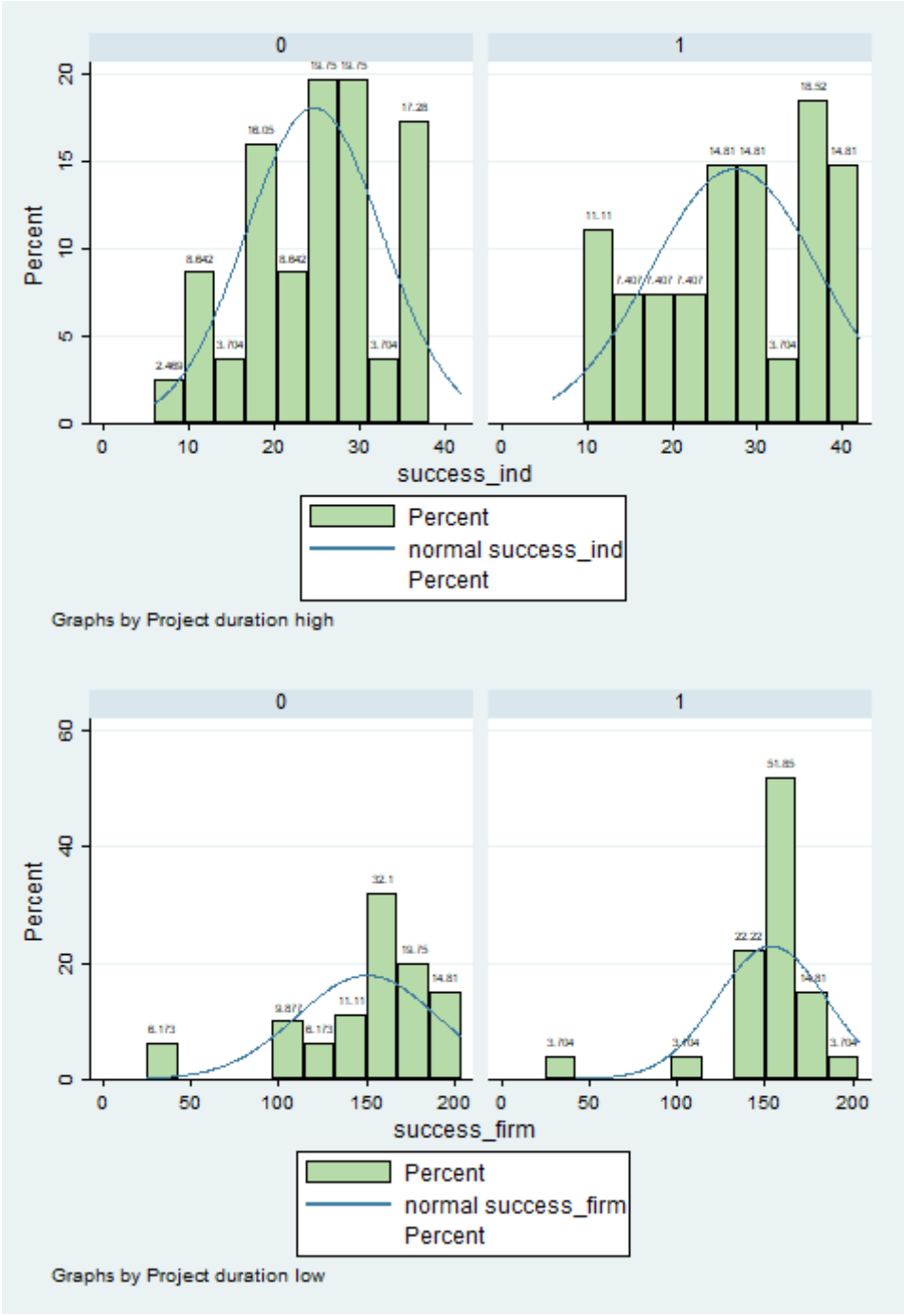
Percent
Graphs by Project duration low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Percent
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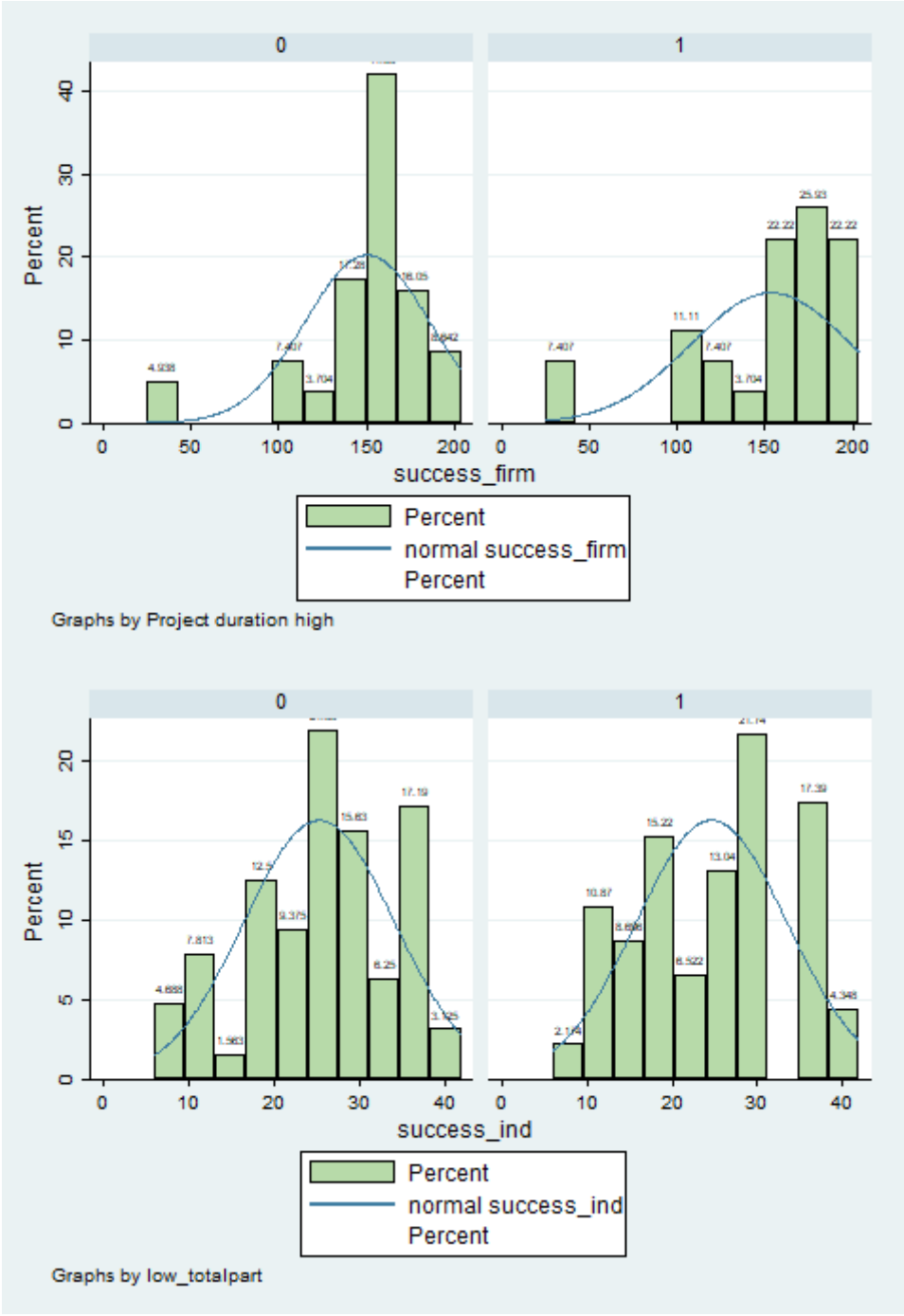
Graphs by Project duration low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Graphs by Project duration high
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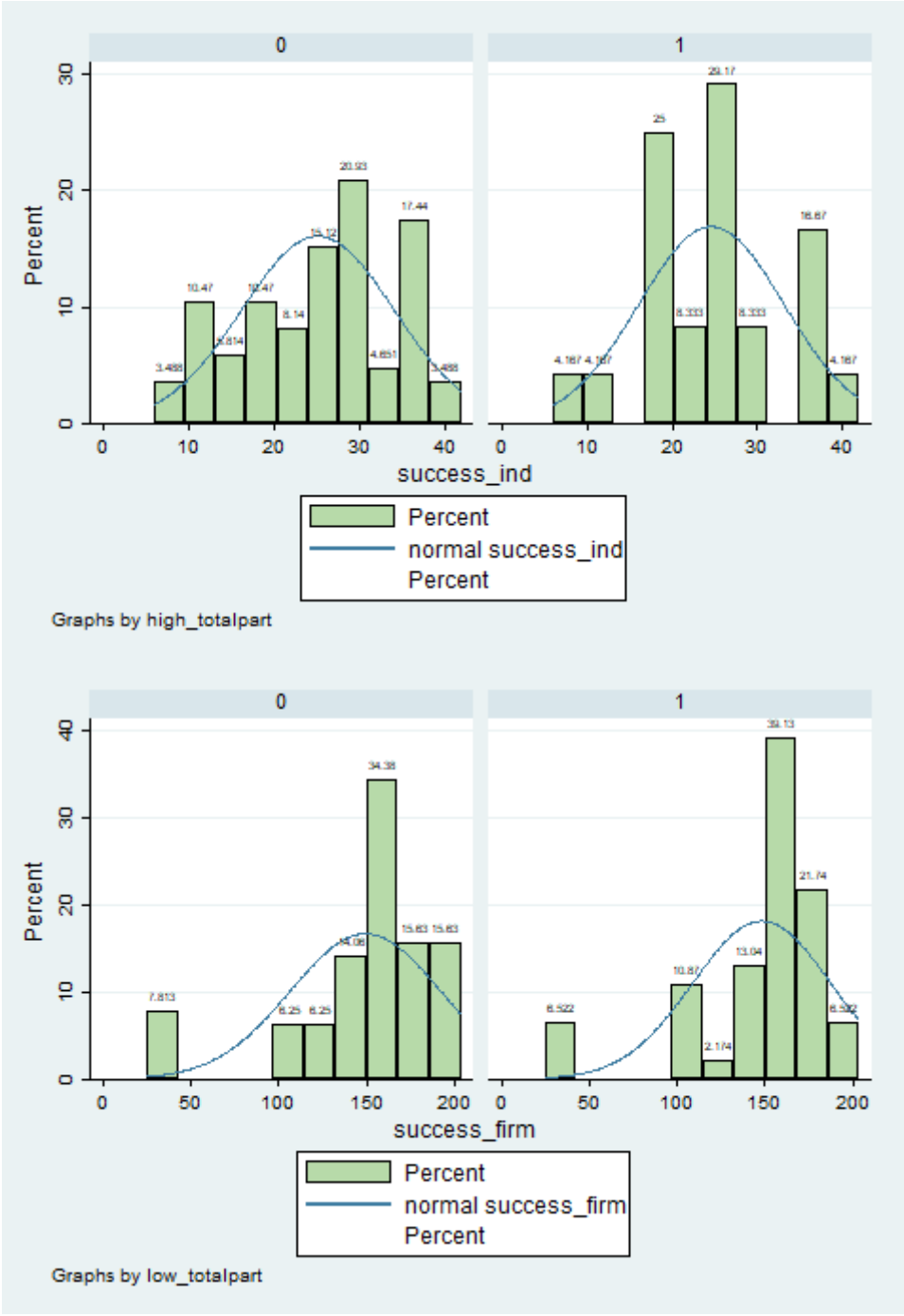
Percent
normal success_ind
Percent
Graphs by low_totalpart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Graphs by high_totalpart
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success_firm
Percent
normal success_firm
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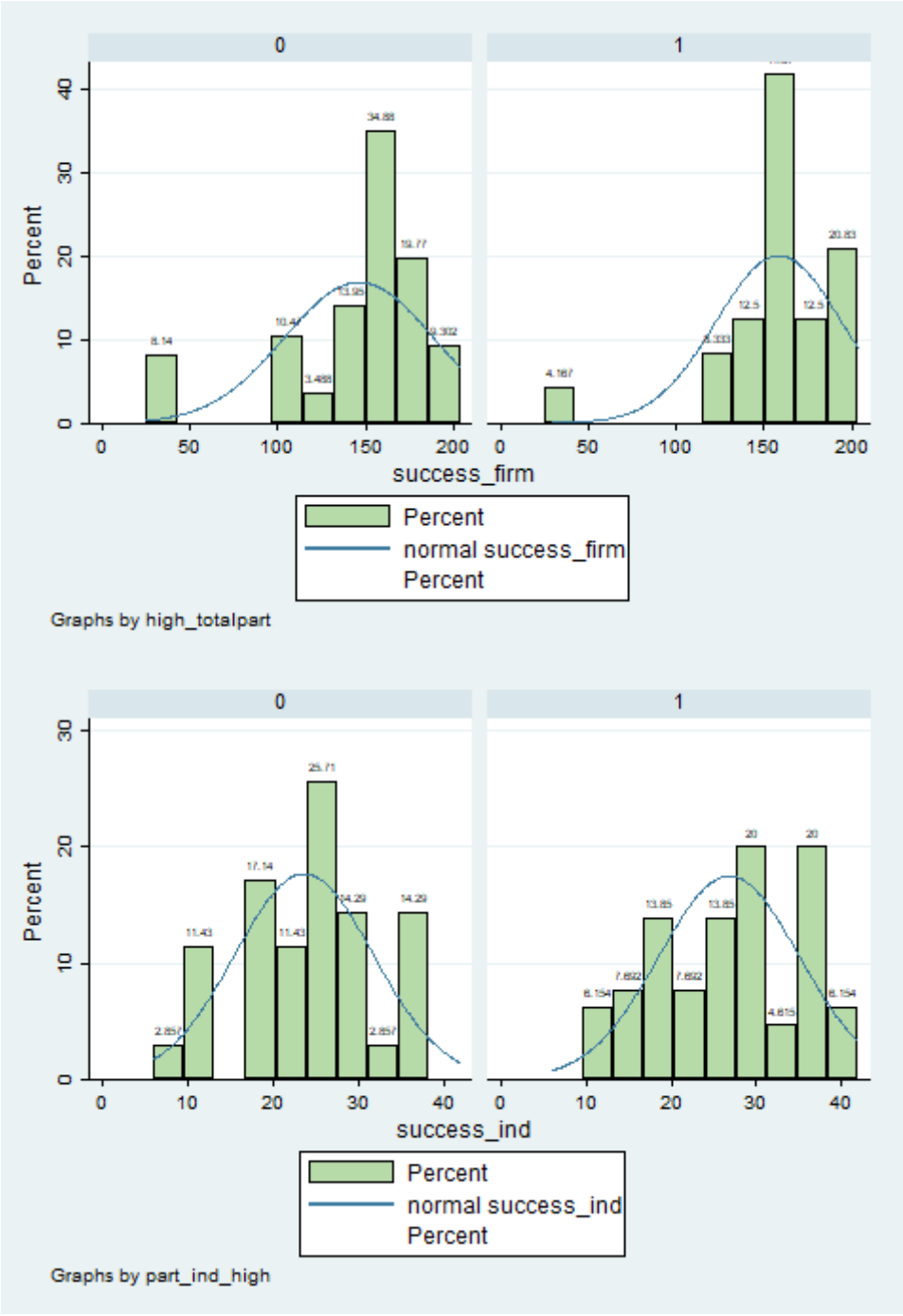
Graphs by low_totalpart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Percent
normal success_firm
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Graphs by high_totalpart
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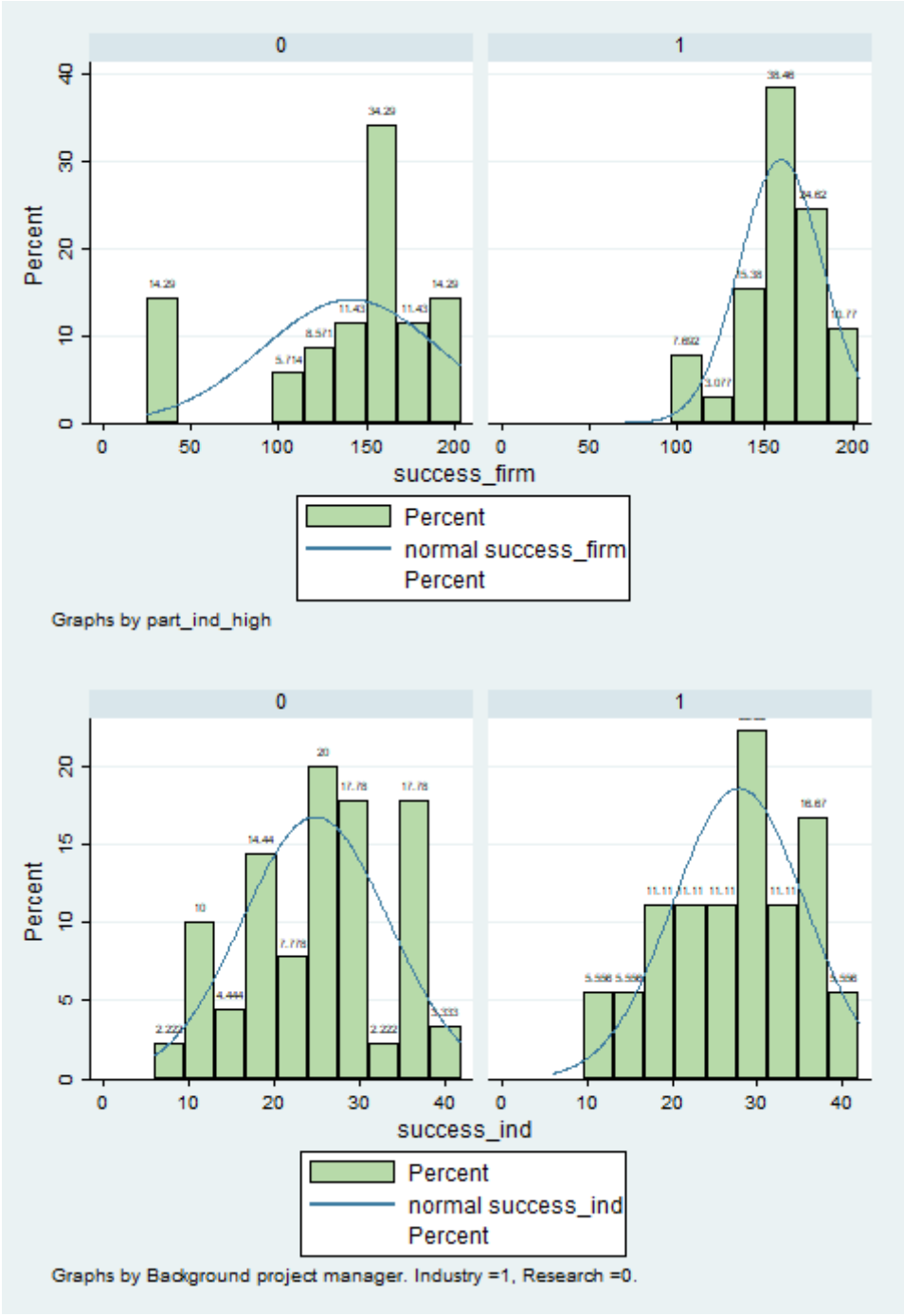
Percent
normal success_ind
Percent
Graphs by part_ind_high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success_firm
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normal success_firm
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Graphs by part_ind_high
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Percent
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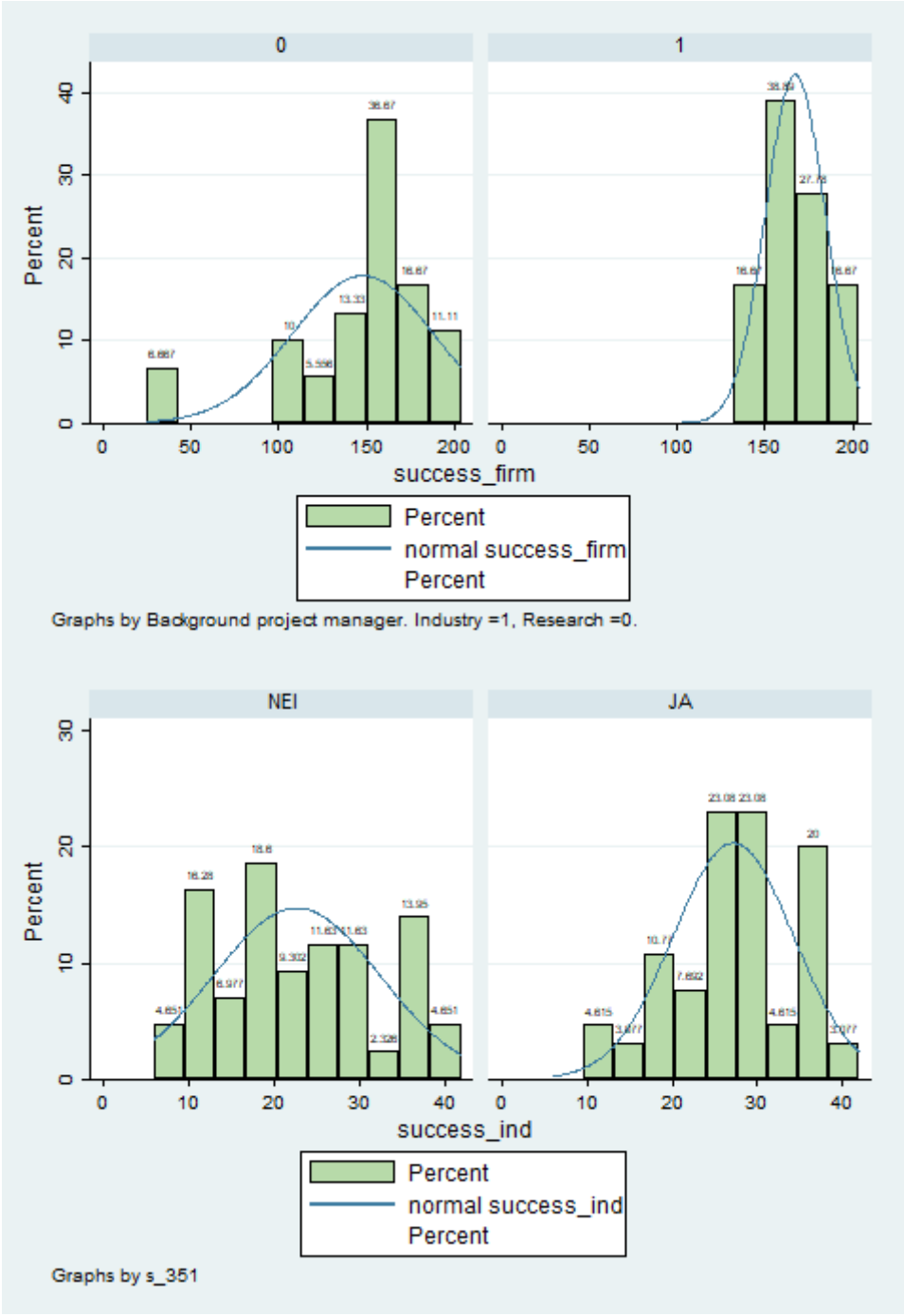
Percent
normal success_ind
Percent
Graphs by Background project manager. Industry =1, Research =0.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Percent
normal success_firm
Percent
Graphs by Background project manager. Industry =1, Research =0.
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JA
Percent
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30
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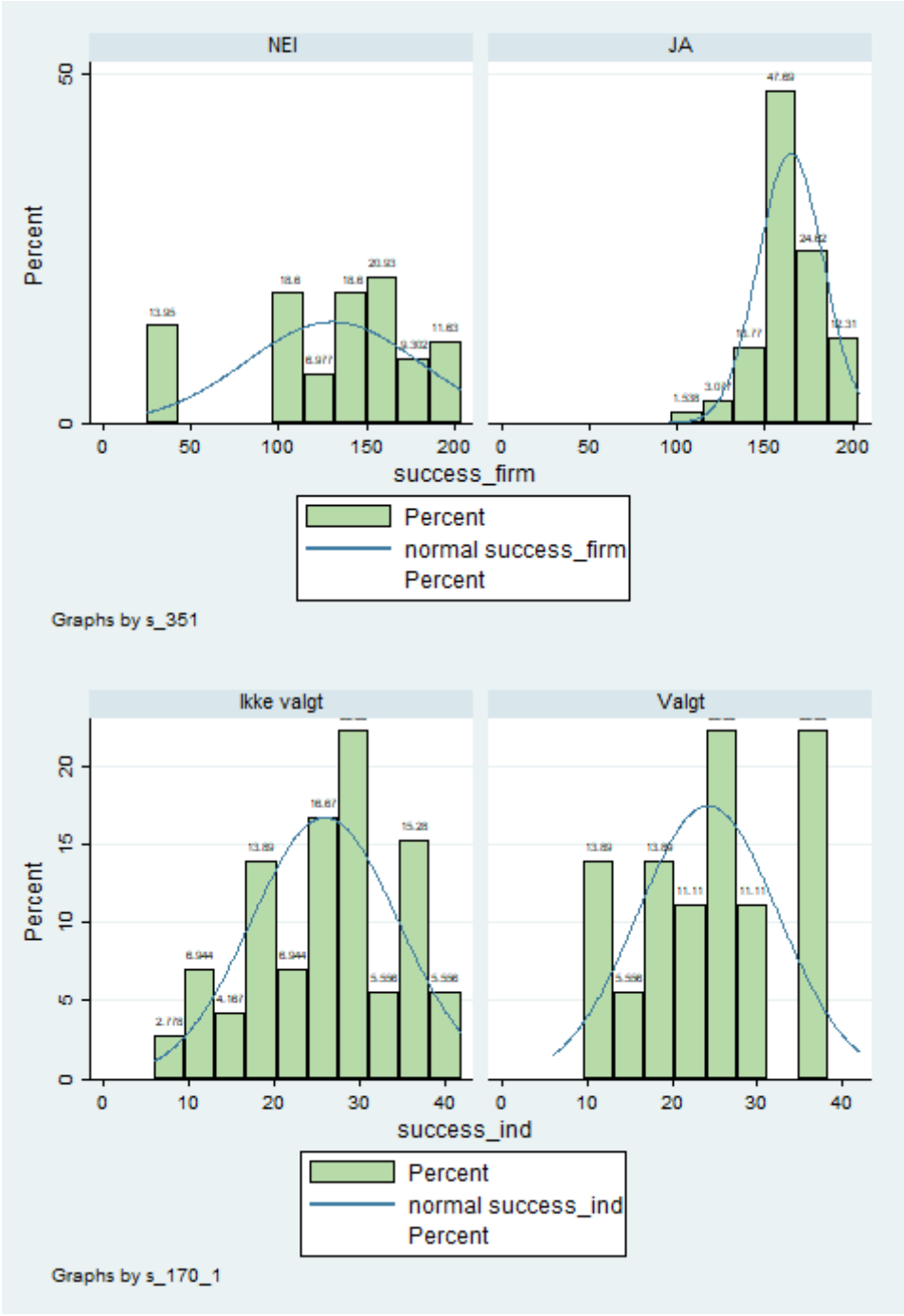
40
success_ind
Percent
normal success_ind
Percent
Graphs by s_351


NEI
JA
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Percent
normal success_firm
Percent
Graphs by s_351
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Valgt
Percent
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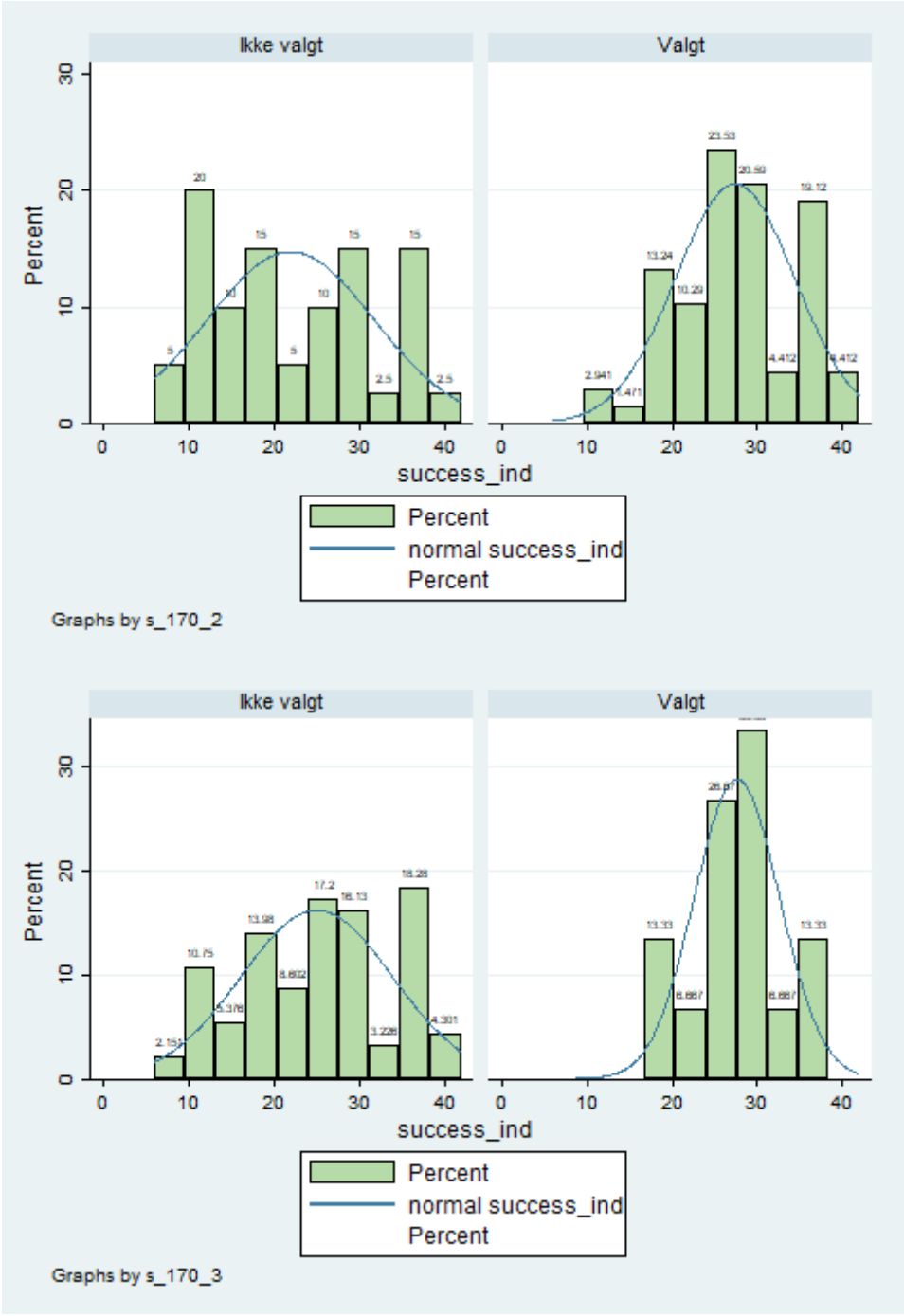
Percent
normal success_ind
Percent
Graphs by s_170_1


Ikke valgt
Valgt
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success_ind
Percent
normal success_ind
Percent
Graphs by s_170_2
Ikke valgt
Valgt
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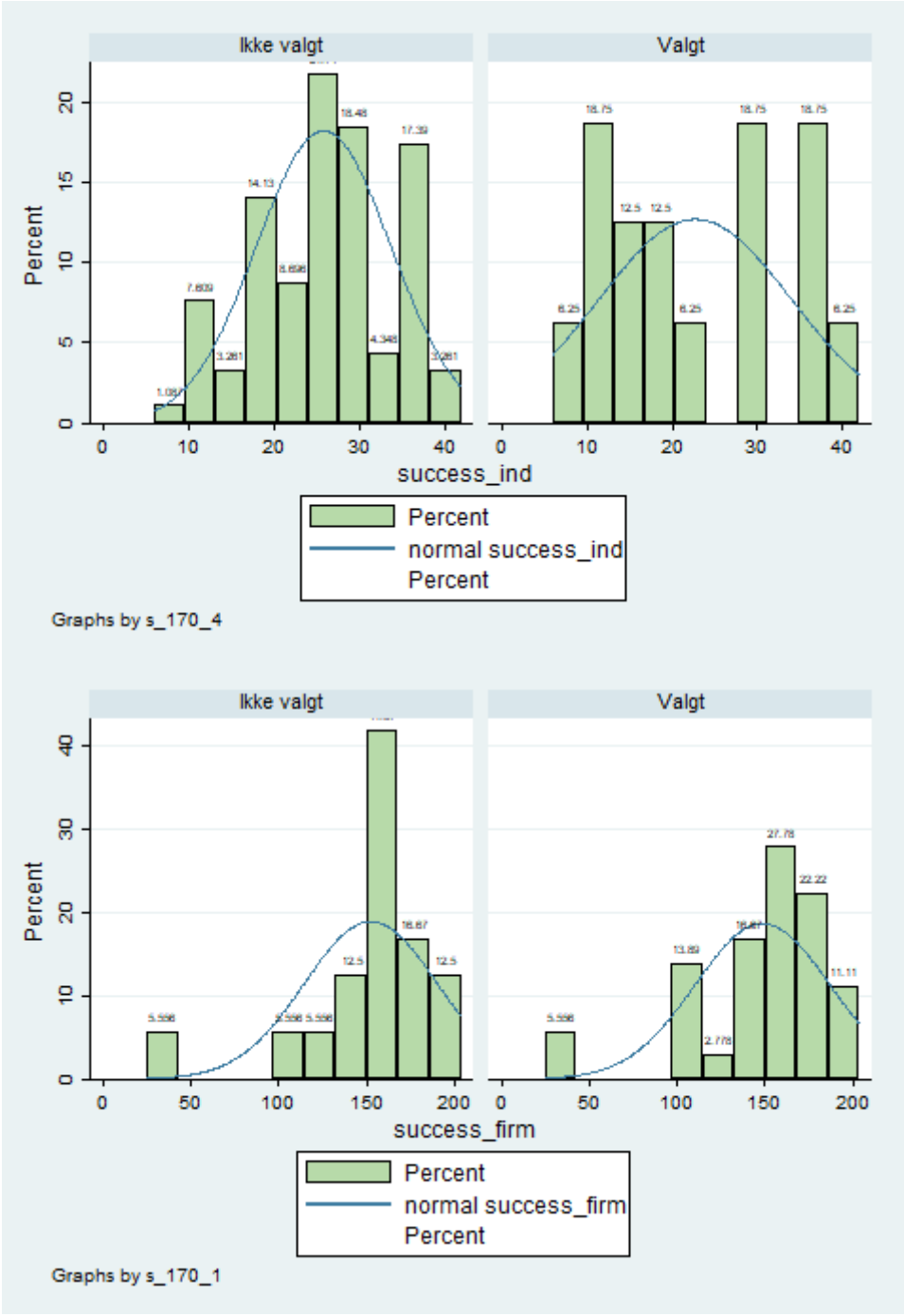
Percent
Graphs by s_170_3


Ikke valgt
Valgt
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success_ind
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normal success_ind
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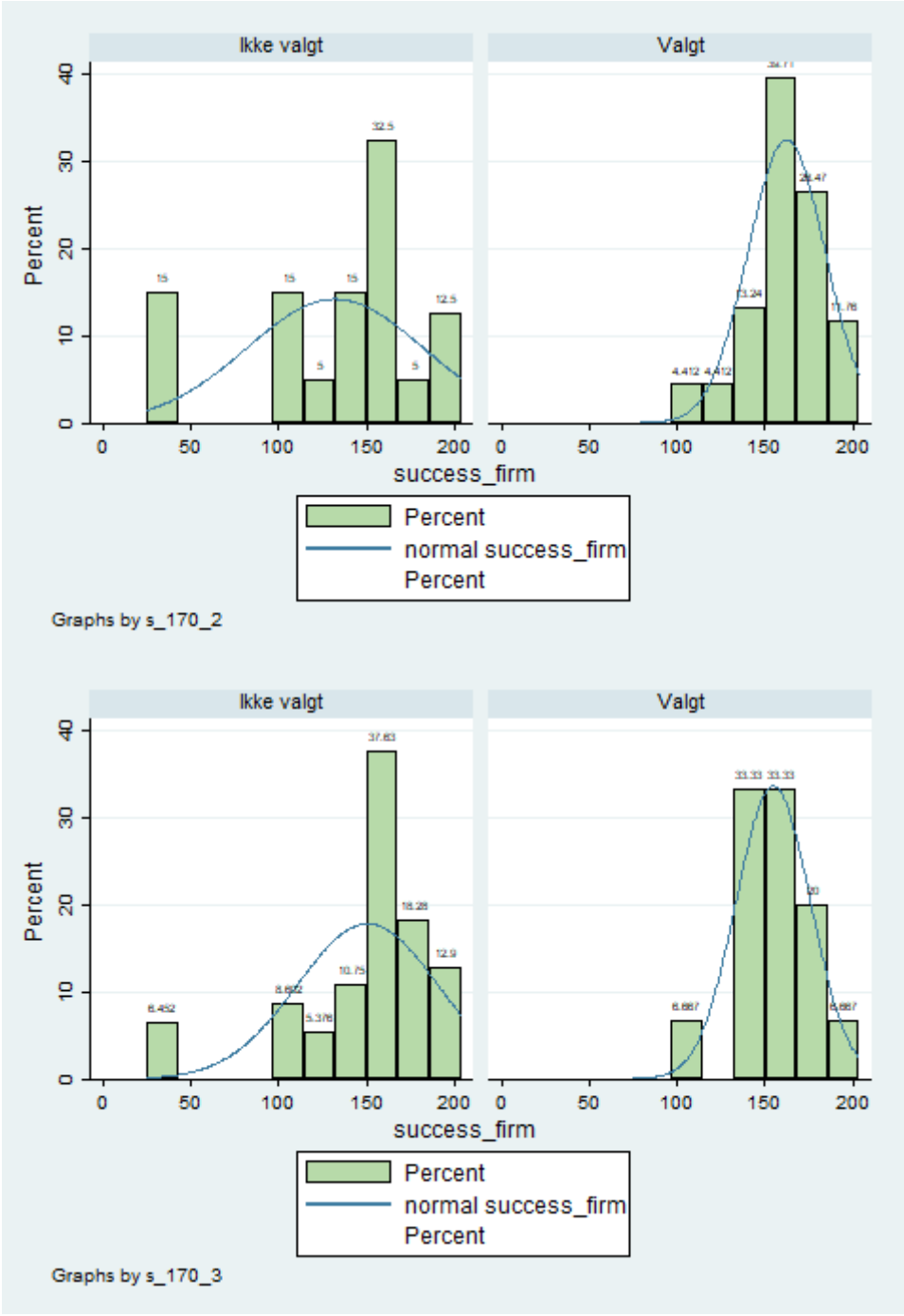
Graphs by s_170_4
Ikke valgt
Valgt
Percent
success_firm
Percent
normal success_firm
Percent
Graphs by s_170_1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12.5
4.412
4.412
13.24
26.47
11.76
Percent
normal success_firm
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Graphs by s_170_2
Ikke valgt
Valgt
Percent
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20
30
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100
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success_firm
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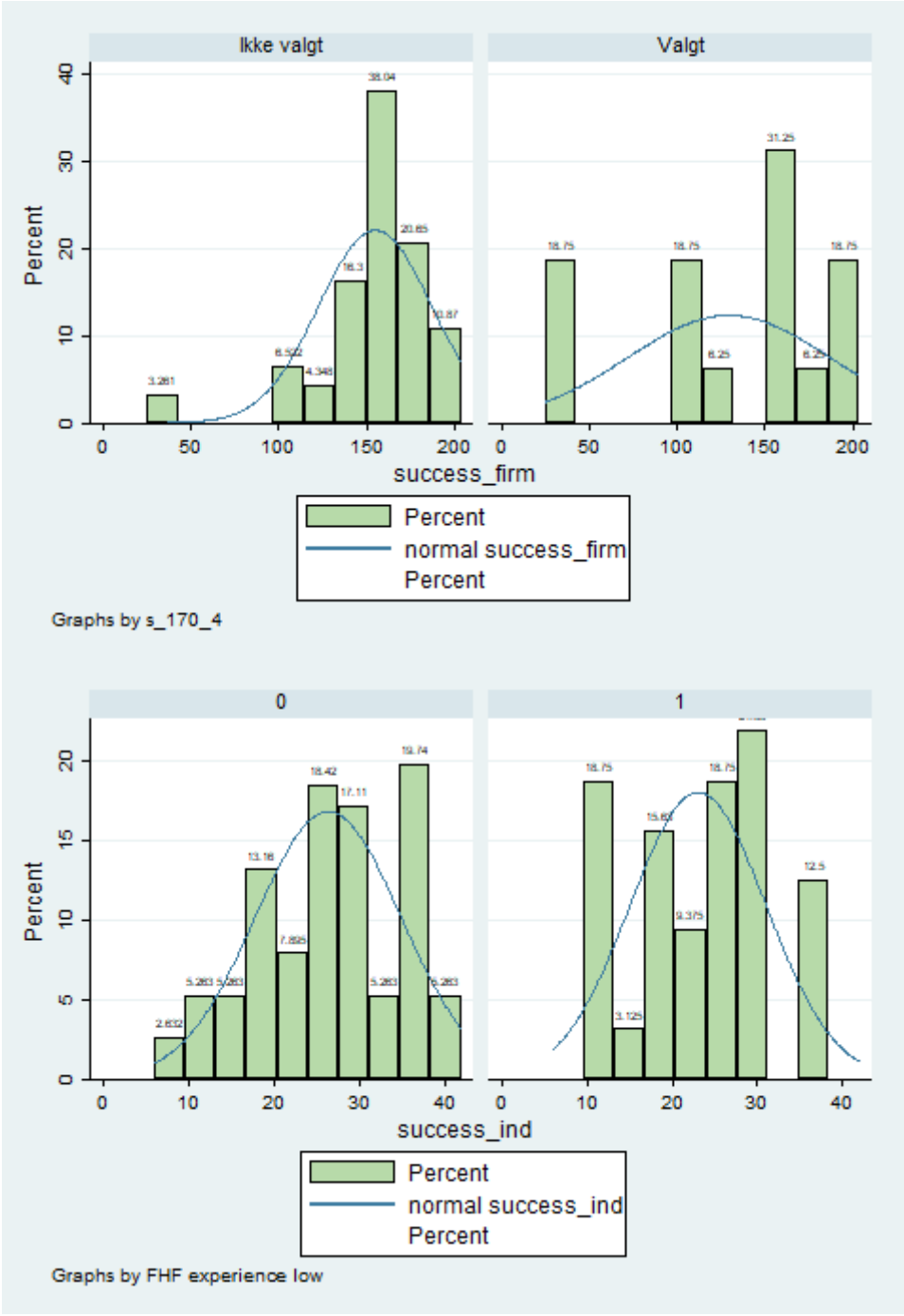
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Graphs by s_170_4
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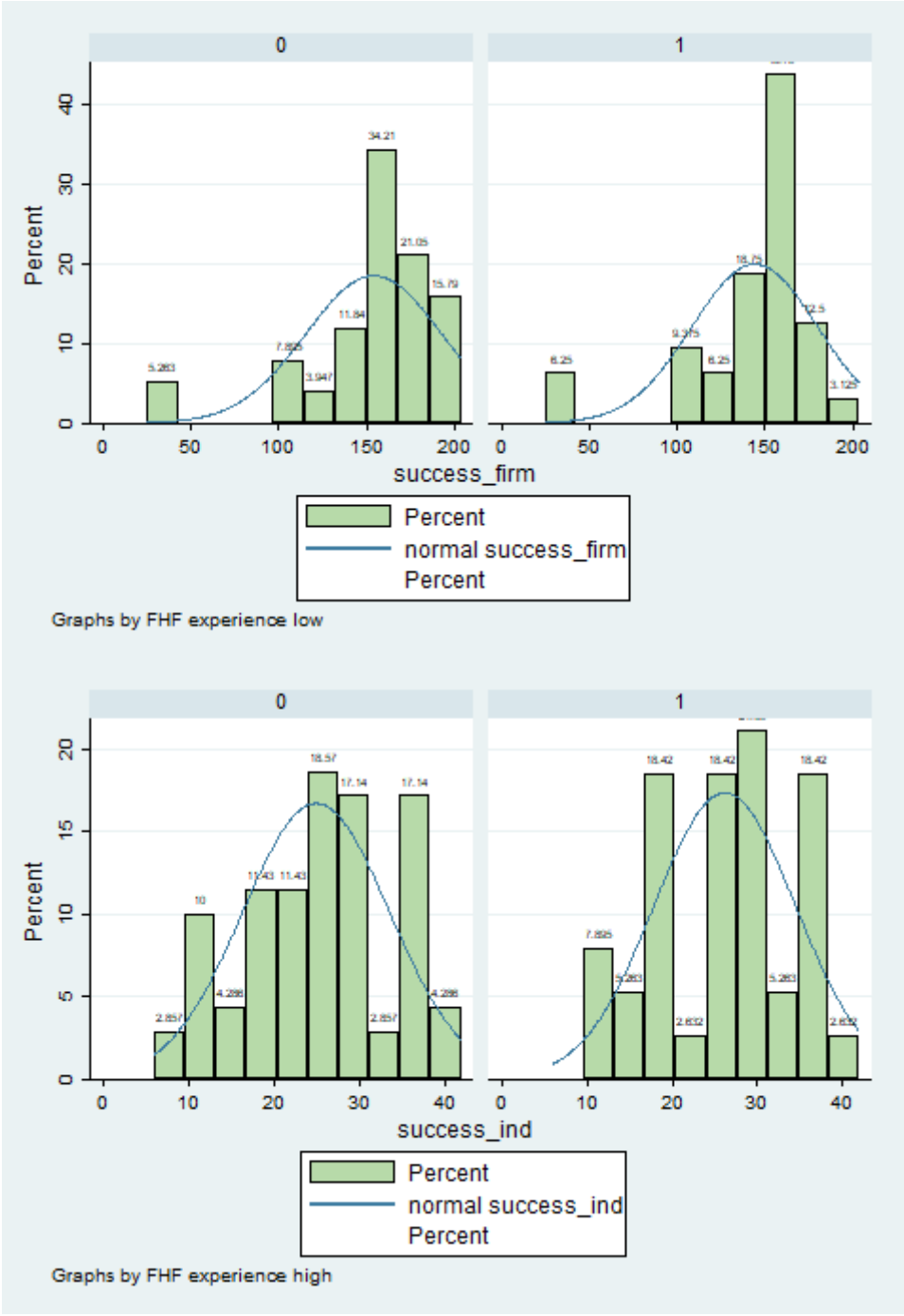
Graphs by FHF experience low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Graphs by FHF experience low
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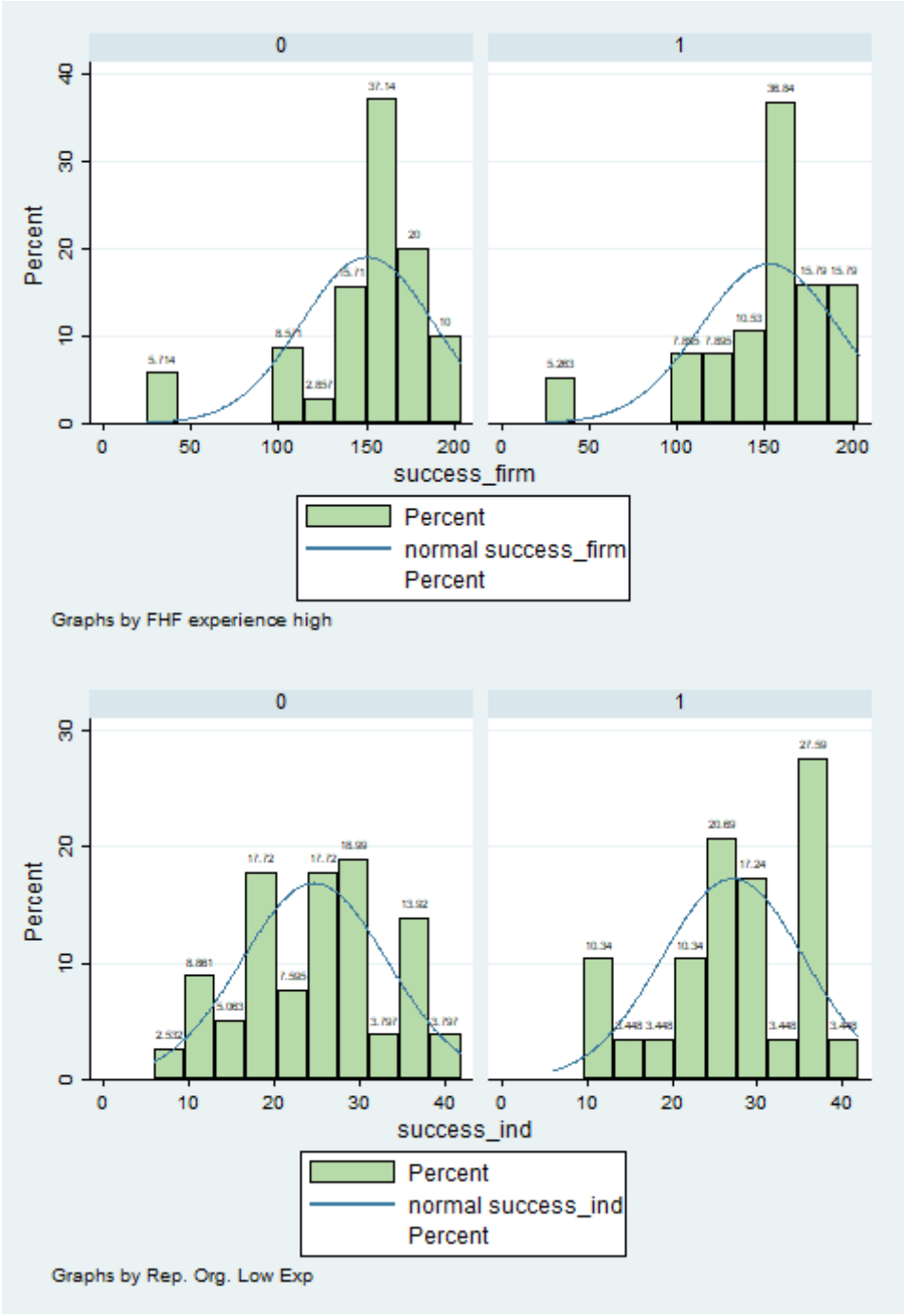
Graphs by FHF experience high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Graphs by FHF experience high
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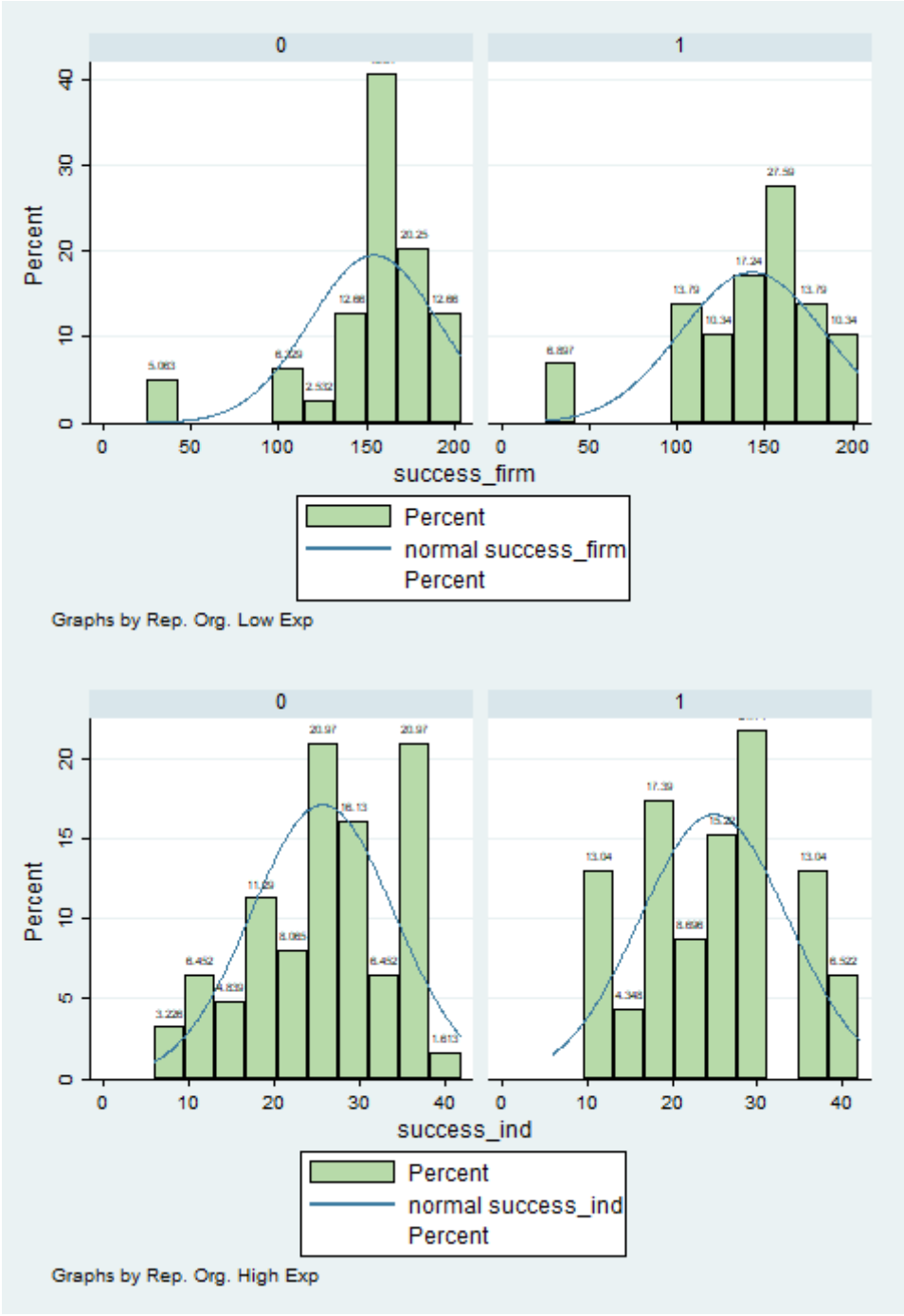
Graphs by Rep. Org. Low Exp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Graphs by Rep. Org. Low Exp
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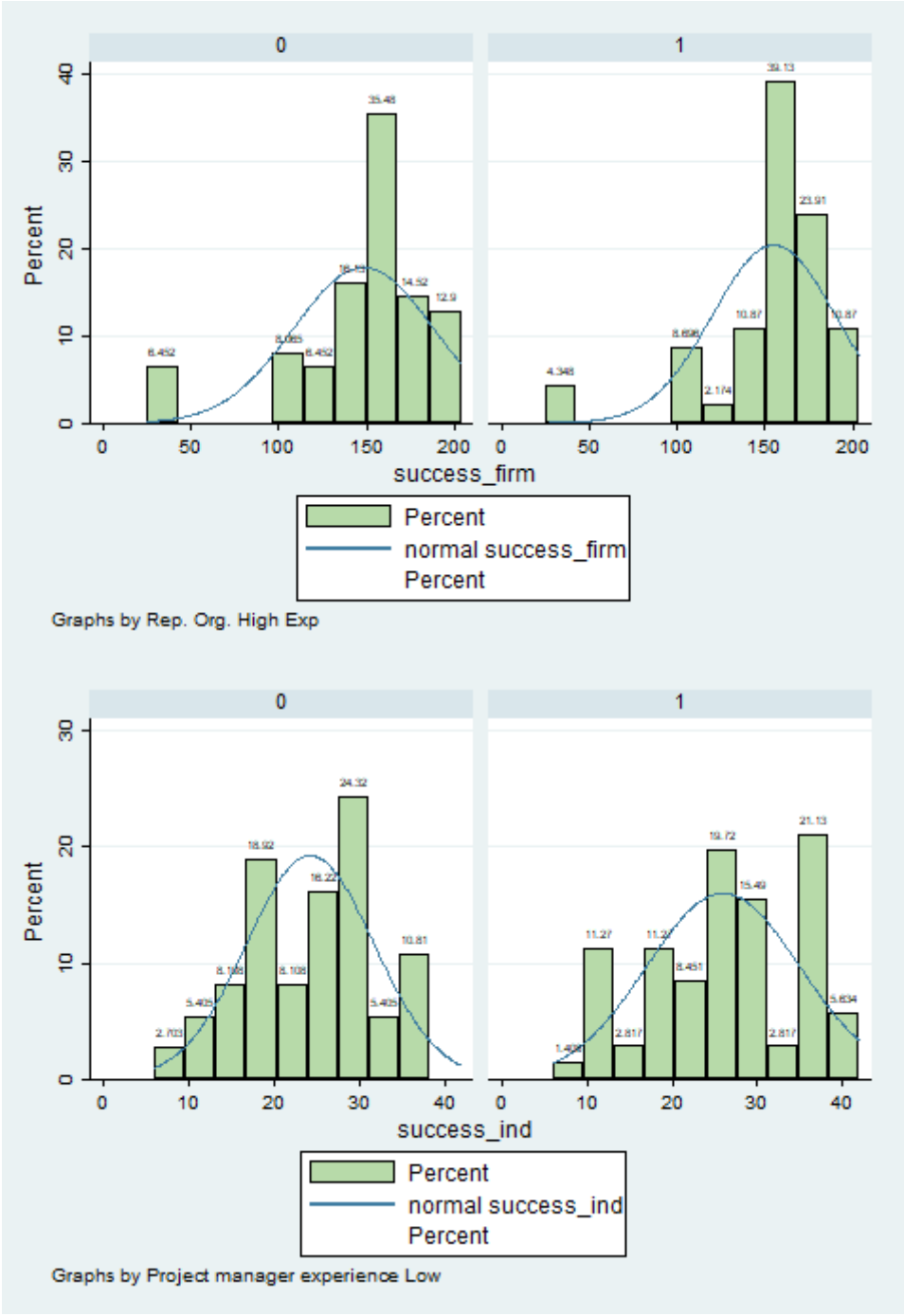
Percent
Graphs by Rep. Org. High Exp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Graphs by Rep. Org. High Exp
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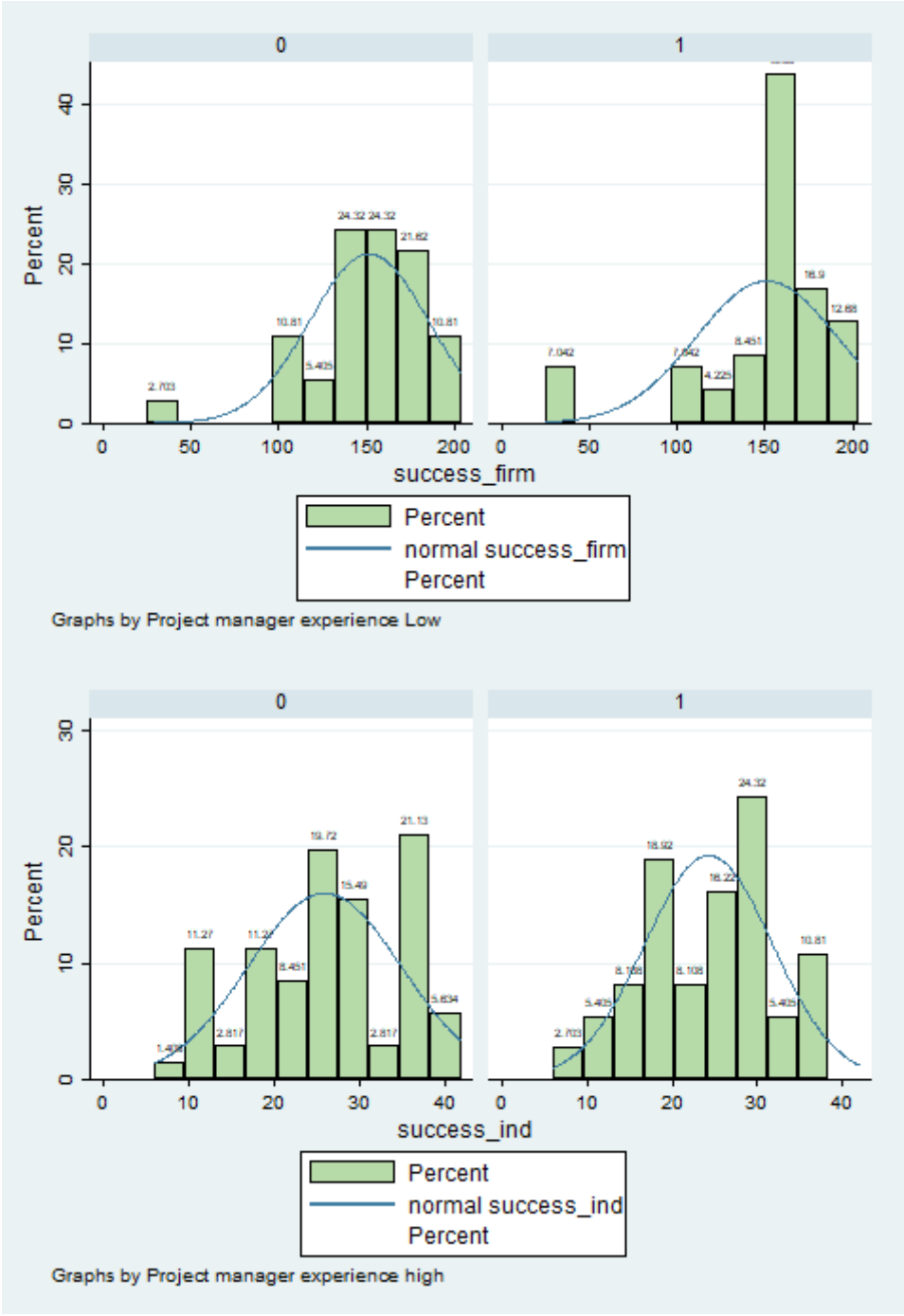
Percent
Graphs by Project manager experience Low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normal success_firm
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Graphs by Project manager experience Low
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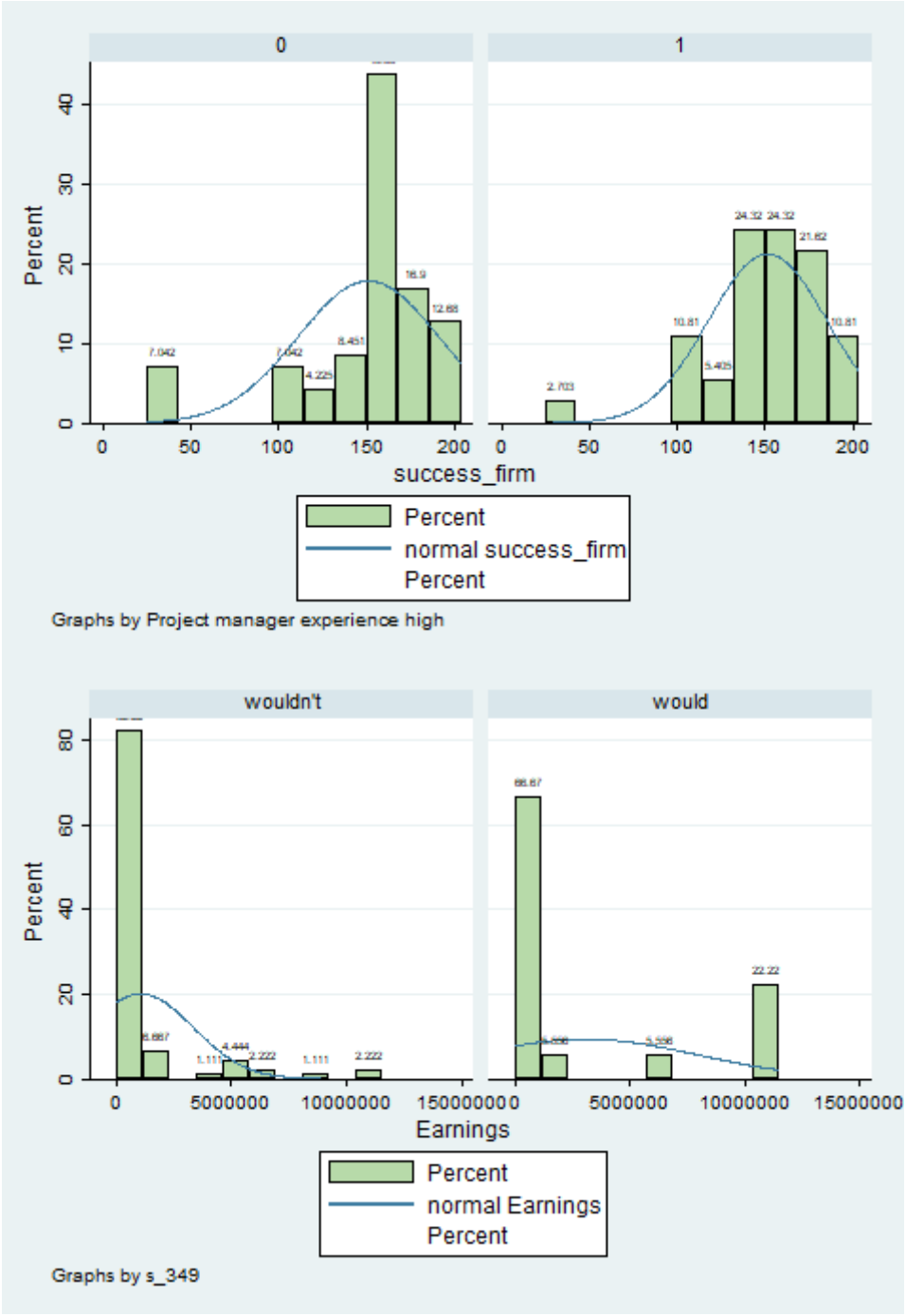
Graphs by Project manager experience high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Graphs by Project manager experience high
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Earnings
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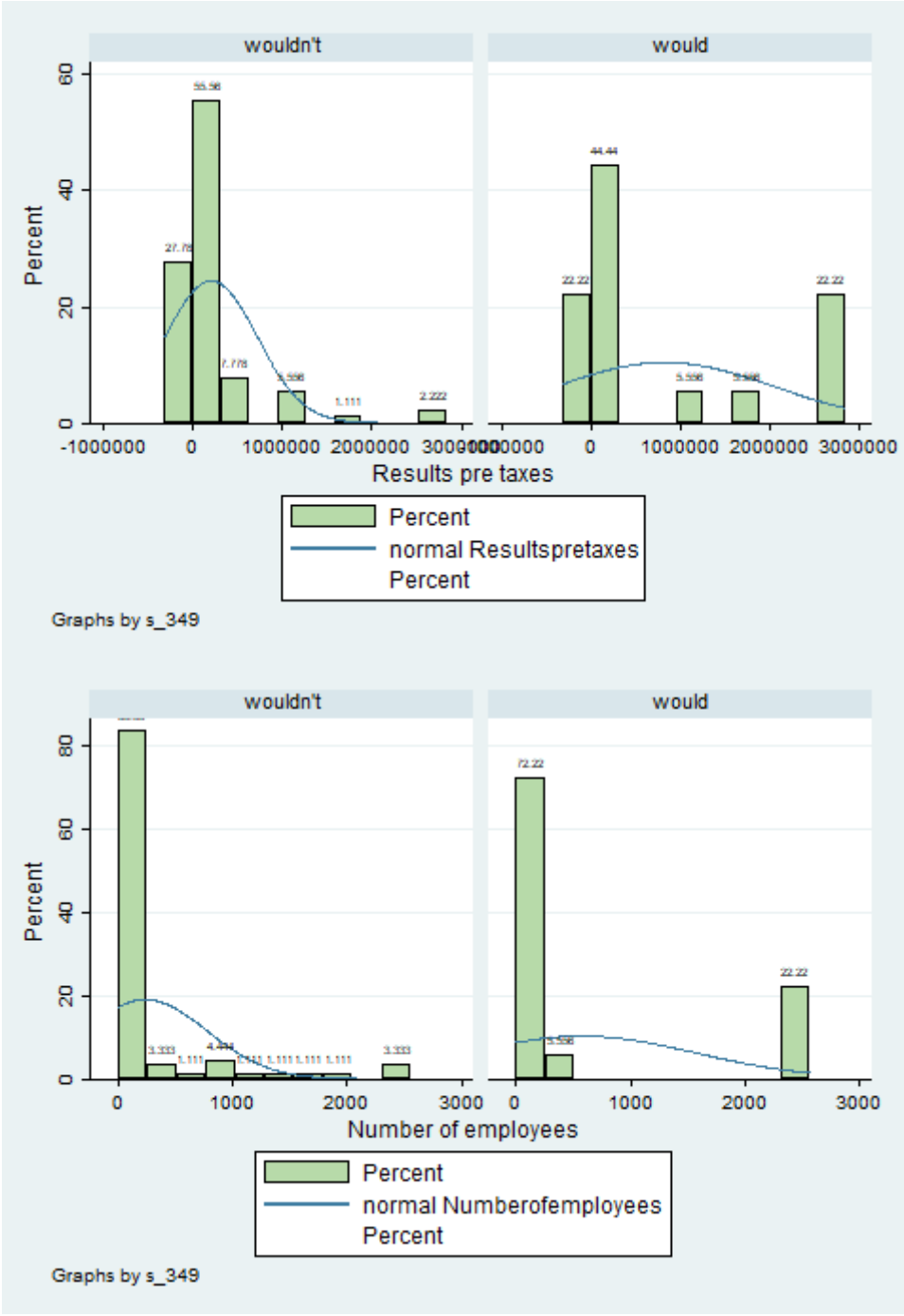
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Graphs by s_349
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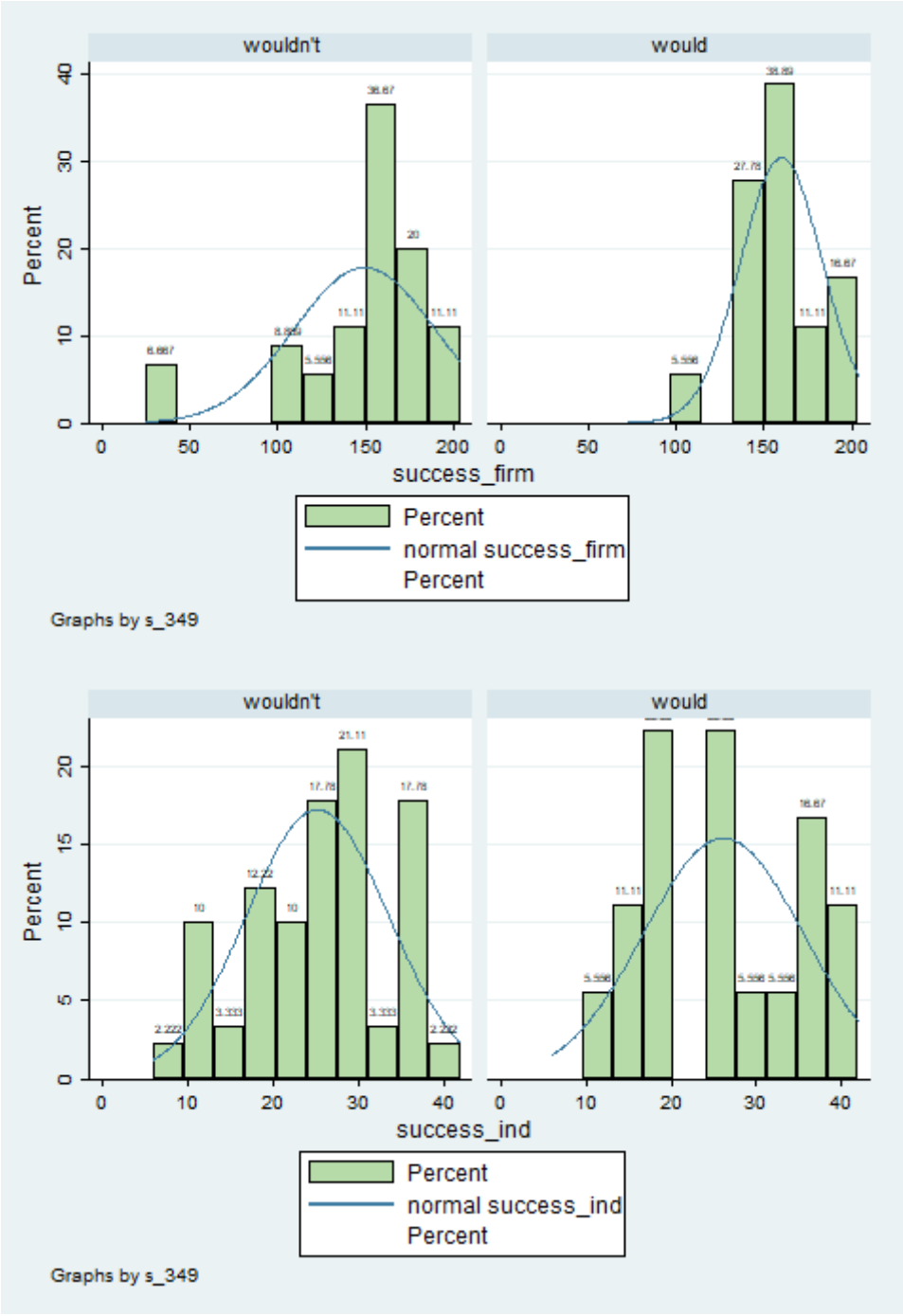
Graphs by s_349



Original questionaire for initial study.

Contact Ragnar Tveterås for a copy of the questionnaire. He is available at ragnar.tveteras@uis.no