

Who do High-growth Firms Employ, and Who do they Hire?



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The purpose of this paper is to study who high-growth firms (HGFs) hire using a matched employer-employee dataset for all knowledge intensive industries in Sweden, where high growth is measured over the period 1999-2002. The results indicate that HGFs to a larger extent employ young people, immigrants, and individuals with longer unemployment periods. However, these patterns seem contingent on the stage of firm evolution. HGFs that have already realized rapid growth seem to start focusing on hiring individuals from other companies, even though immigrants are still overrepresented among new employees.

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1. Introduction

A burgeoning literature in the economics, management, and regional science literatures has amassed around the research on firm growth, and the small group of *high-growth firms* (henceforth HGFs) have received an increasing amount of attention in recent years. The reason is that empirical studies have shown that most net job-growth originates from a small number of HGFs (Birch and Medoff, 1994; Brüderl and Preisendörfer, 2000; Davidsson and Henrekson, 2002; Delmar *et al.*, 2003; Littunen and Tohmo; 2003; Halabisky *et al.*, 2006; Acs and Mueller, 2008; Acs *et al.*, 2008)¹. Macro-oriented research has focused on the role of HGFs for job creation (Henrekson and Johansson, 2010), productivity upgrades and industrial dynamics (Bos and Stam, 2011; Delmar *et al.*, 2011), as well as innovative outcomes (Stuart, 2000). Micro-oriented research has focused on the processes, predictors, and conditions that facilitate or hamper firm growth (McKelvie and Wiklund, 2011).

The remarkable ability of HGFs to create jobs has also received increasing policy interest. However, before the policy-maker becomes too enthusiastic about job creation by HGFs, more information is needed about the jobs that HGFs create. While the rate of job creation among these firms is substantial, we know little about what type of jobs they are creating and which types of people that come to occupy these jobs. These questions are important both from a macro and a micro perspective. From a macro perspective, these questions are imperative in order to know the effect of HGFs on total unemployment and the overall dynamics of labour markets. That is, do rapidly growing firms primarily “cannibalize“ on incumbent firms by recruiting highly skilled individuals from incumbents, or do they rather recruit newcomers and hence provide new opportunities for individuals marginalized on the labour market? From a micro perspective, HGFs represent one of the most dynamic forms of business organizations and researchers have taken a great interest in what human capital factors that may help them to realize and sustain rapid growth (McKelvie and Wiklund, 2011). Do HGFs benefit from recruiting individuals with a high human capital base that allow them to tap into their employees’ prior business and industry experiences to further the growth of the firm? (Wennberg, 2009). Or do HGFs benefit more from recruiting low-educated but perhaps more committed employees that they train by socializing and in-house training? (Eisenhardt and Schoonhoven, 1990; Lepak and Snell, 1999). Without a more

¹ Henrekson and Johansson (2010) provide a survey over the empirical literature on HGFs.

thorough understanding of what type of individuals that HGFs recruit, critical links in our understanding of both the micro-level dynamics and the macro-level significance of HGFs are missing.

In addition to interest in the number of jobs created by HGFs, the rapidly changing dynamic of HGFs indicate that they may offer important skills upgrades for employees that are hired. However, research to date has little understanding of what individuals are hired by HGFs. This question may be approach both through a supply-side perspective by focusing on the reasons for individuals to take up employment in HGFs, or through a demand-side perspective by focusing on the need for labour and skills in HGFs.

A major reason for this lack of attention in the literature to the hires in HGFs has been the lack of firm-specific data that can be matched with data on individual hires. While a number of studies have been successful in gathering firm-specific data with individual-specific data on the employees (e.g. Abowd and Kramarz, 1999), using such data to investigate the hires of *growing* firms necessitates a daunting task of collecting data that allows for identification of HGFs, identification of their employees, and information on the employees' previous labour market positions (Wennberg, 2005). Hence, very few studies to date – if any – have used matched employer-employee data to analyze the employment decision of HGFs.²

The purpose of this paper is to study who HGFs hire using a matched employer-employee data covering all individuals employed in the knowledge intensive industries in Sweden during the period 1999-2002. Theoretically, we outline a number of rationales from the labour economics and strategic management literatures suggesting why or why not the hires of HGFs should differ from those of other firms, which we use to guide our selection of variables in the empirical analysis.

There are five main dimensions to our empirical analysis. First, we distinguish between HGF employees and HGF new hires. Second, we measure growth in terms of either employment growth or sales growth. Third, we use different growth thresholds for the HGF category (5% and 1% highest growth firms). Fourth, we disaggregate our data by firm size to investigate whether HGFs of different sizes have different employment patterns. Fifth, we distinguish between young and old firms.

Our results indicate that young individuals, singles, immigrants, individuals with longer unemployment periods, and no experience of self-employment are more likely to be

² However, a recent paper by Dahl and Klepper (2007) used matched employer-employee data to analyze the hiring decision of new start-ups.

employed by a HGF. Many of these characteristics are common for individuals that are marginalized on the labour market; suggesting that HGFs provide these individuals with employment opportunities that otherwise might not have been present. On the other hand, the results indicate that HGFs start to recruit employees from other companies when they have realized their growth potential. This suggests that the employment patterns of HGFs seem contingent on the stage of firm evolution. However, even when HGFs have obtained rapid growth, they are still more likely to provide new jobs for immigrants. Irrespective of analyzing HGF employees or HGF new hires, employment opportunities in HGFs are provided by young and small firms.

The next section provides a theoretical background to the paper, where we develop some hypotheses to loosely guide our empirical investigations. The matched employee-employer data is described in Section 3. Section 4 presents the econometric model, while the results are reported and commented in Section 5. Finally, Section 6 summarizes and draws conclusions.

2. Theoretical Background

The distinction between supply and demand on the labour market is crucial for this issue since HGFs represent a very specific part of the labour market, with unique characteristics. For example, in regards to the demand for labour in HGFs, it may be that HGFs seek specific competencies that offer complementary skills to those currently existent in the firm. It may also be so that due to their rapid growth and consequently high organizational turbulence, HGFs are unable to offer the same type of formalized and stable jobs as incumbent firms, and hence would try to hire labour that is younger, more flexible, or have a more versatile skill background (Lazear, 2004).

In regards to the supply of individuals taking employment in HGFs, it may be that risk-seeking individuals seek employment in the challenging and turbulent work environment offered by HGFs. Such individuals may prefer the possibility of future high earnings or promotion opportunities in a HGF compared to the stable income or job security offered by large stable firms. Individual may also be tempted by unique aspects of being employed in rapidly growing firms such as learning opportunities, flat decision-making structures, or versatility in job tasks (Rajan and Zingales, 2001), or as in Roberts' (2004) words "Work is more fun in a growing company," (Roberts, 2004: 243). Further, it may also be so that

individuals with a weaker labour market position seek employment in HGFs due to a lack of other employment opportunities. Such individuals may be attracted to HGFs as a way to increase their human capital as a potential stepping-stone on the labour market.

2.1 Employees as complementary capabilities in HGFs

Penrose's (1959) theory of the growth of the firm views firms as collections of idiosyncratic resources, and it is the constellation of existing resources that provides the impetus and direction for further growth. This implies that firms may choose to add human resources by first evaluating their current configuration of human resources and seeking to add those workers who are appropriate matches to existing human resources (Lepak and Snell, 1999). In our context, it is worth investigating whether HGFs have specific requirements of their new employees (such as specialized vocational training) or whether HGFs have similar hiring strategies to the control group. Are HGFs composed of energetic 'jack-of-all-trades' characters, or do they carefully seek a diverse and complementary human resource base?

Penrose (1959) also emphasized that as managers become more accustomed to their work tasks, and more efficient in their execution. As a consequence, managerial attention is freed up as routinization becomes prevalent, and these managers can direct their excess managerial attention towards growth projects. As managers become more experienced, they also become more aware of growth opportunities. A major constraint on firm growth, however, is that new human resources must be added, and these new managers must be trained and internalized, which takes time and effort. If a firm attempts to grow too fast, then managers may be too distracted with their growth projects and with training new managers to maintain previous levels of production efficiency. 'Penrose effects' may arise, then, as excessively fast growth leads to a decrease in productivity. In our context, it can be expected that HGFs will struggle to keep productivity levels high as they can easily be overwhelmed with issues relating to their fast growth. As a result, they may seek employees that are better suited to the stresses and strains of managing fast-growth.

In their treatment of the resource-based view of the firm, Foss et al (2006) suggest that Penrose's view of firm growth is intimately tied to the subjective view of resources among managerial teams, where the heterogeneity of managerial mental models and shared experiences. Following this argument, HGFs would strive to recruit individuals with extensive human capital and industry experience but with diverging mental models. The ideas

by Foss and colleagues have some support in the research on drivers of HGFs, where the human capital of employees has been shown to facilitate rapid growth (Almus, 2002). Hence, from a resource-based perspective, HGFs need to expand and augment their stock of human capital by hiring employees that offer complementary capabilities needed to sustain and expand the scope of operations in the firm.

Further, it may also be so that the type of human capital resources needed for HGFs may differ depending on the firms' age and size. The model of firm growth proposed by Greiner (1972) emphasizes that growing organizations pass through a number of stages of organizational transformation, from an informal creative team, through stages of increasing monitoring and delegation, into a lumbering mammoth controlled by bureaucrats. Workers may have preferences regarding their employer's size, given that the nature of the work environment (including factors such as autonomy, skills utilization and diversity of tasks, all contributing towards overall job satisfaction) is strongly affected by the size of the organization. For example, life cycle models of firm evolution (Kazanjian and Drazin, 1989; Miller and Friesen, 1984) suggest that rapidly growing firms would reach a stage where formalized hiring practices would become important (Davila, 2005). In sum, this line of arguments suggests that HGFs of different sizes may attract different employees.

2.2 New employees in HGFs as cost-efficient strategy

However, it is not necessarily the case that HGFs always benefit from hiring highly skilled staff that already has a job. Such employees do not only come with higher general human capital, they also come at a higher cost and are more likely to seek other work unless their internal promotion possibilities accrue rapidly (Feldman and Ng, 2007). In dynamic labour markets, especially where customer-contact settings are important, high turnover rates may not only increase the costs of recruitment and selection, but also negatively affect sales growth because new employees face a learning curve and the cost of training new staff may be lower than the cost of hiring high-skilled staff (Batt, 2002).³

There is ample empirical evidence that wages are consistently higher at larger more stable firms, even after exhaustive efforts to control for observable worker characteristics and other job attributes (Oi and Idson, 1999). Garen (1985) and Kremer (1993) develop theoretical models that explain the systematic sorting of more productive workers to larger

³ For example, following the rapid growth of Internet mammoths Google and Facebook, the costs for hiring and retaining skilled staff in Silicon Valley has been reported as exploding in 2010-2011, making hiring increasingly difficult for other growing firms.

employers as an efficiency-enhancing outcome in economies with heterogeneous, imperfectly substitutable labour. Here, it is possible that the selection and sorting of employees in HGFs through hiring and enumeration is contingent on the stage of development of the firm. (Halabisky et al., 2006)..

From the employee perspective, individuals may seek employment in HGFs despite the possible uncertainty associated with such employments is that it may offer a way out of unemployment. This would primarily concern individuals with a weak labour market position or those seeking to learning specific skills. Minorities, youth and other individuals with a weaker labour market position may be tempted by taking employment in HGFs to enhance their labour market potential, despite the employment risk associated with HGFs due to frequent tenuousness of HGFs as employer. In their theory of recruitment and monitoring in young growing firms, Rajan and Zingales (2001) explain how owner-entrepreneurs of growing firms have to provide new employees with the knowledge of or *access* to critical resources for them to learn to produce effectively. While the focus of Rajan and Zingales is on monitoring and incentives suitable to have employees protect, rather than reallocation of these critical resources, a conclusion of their theory is that from the perspective of employees, young growing firms constitute a suitable setting for learning key skills about business making.

In the labour economics literature, models relating to the matching of job vacancies with unemployed individuals suggest that it takes time to create new job-worker pairs (see Mortensen and Pissarides 1999 for a survey). The more time available for search, the better the expected match. In this context, firms choose an 'optimal stopping strategy' which puts limits on the amount of time they are willing to invest in searching for new hires. In HGFs, it is reasonable to expect that less time is available to search for new hires. Time spent in search bears the opportunity cost of neglecting a growing pile of work tasks. HGFs therefore have a higher degree of urgency, and can't afford to 'hold out' for long in the hope of finding a better match. This line of arguments suggests that in contrast to the resource-based theory's emphasis on growing firms employing individuals with high human capital, HGFs might be expected to compromise the quality of their new hires for speed of hiring.

In our study, firm growth is measured either in terms of employment or sales. While these two growth indicators are correlated, they represent different facets of firm growth (Coad 2010). We expect that HGFs experiencing fast growth of sales to be different from HGFs experiencing fast growth in terms of employees. Sales can be considered an output,

while employment is essentially an input. As such, HGFs that grow rapidly in sales might be expected to be more efficient and more profitable than employment HGFs, and therefore we suspect the employees of HGFs growing rapidly in sales to be more skilled than the employees of HGFs growing rapidly in employment.

It can be concluded that theory and prior research suggests a number of possible reasons why some individuals would seek employment in HGFs, and that HGFs would seek to employ individual with distinct characteristics. Although the theoretical explanation sketched in the above are rooted in the available theory, we acknowledge that there is a tension between them. Could we really expect that HGFs start with superior human resources, but then take on employees with lower human capital? This goes against notions of firms seeking to maintain a coherent match of the quality of their employees (Kremer 1993). With little empirical work to guide us in our assessment on these potential explanatory mechanisms, our empirical exercise attempts to fill this gap.

3. Data

3.1 Data sources

To study what kind of employees HGFs hire, we need first data that allows for identification of HGFs, as well as identification of their employees, and information on the employees' previous labour market positions. To facilitate these demands, we draw upon a unique matched employer-employee data set maintained by Statistics Sweden (SCB), the official bureau of census in Sweden. Firm-specific information is obtained from RAMS ('Registerbaserad arbetsmarknadsstatistik'), a database that provides yearly data on all firms in Sweden. The firm-specific data is matched with individual data from LISA ('Longitudinell integrationsdatabas för sjukförsäkrings- och arbetsmarknadsstudier'), a longitudinal data-base that provides yearly information on all inhabitants in Sweden 16 years or older. Note that our unit of analysis is the individual, not the firm.

Specifically, our data originate from a large longitudinal study of entrepreneurship in the knowledge intensive sector between 1989 and 2002 (Delmar and Wennberg, 2010). Firms were identified in this sectors if it met Eurostat and Organisation for Economic Co-operation and Development (OECD) classifications which are based on the ratio of research and

development expenditures to gross domestic product (Götzfried 2004, see Appendix 1). This excludes basic industries such as agriculture, retail commerce, and simple services.

Only firms that were active during the study period were included in the sample, i.e., those firms that grew in turnover for three consecutive years between 1999 and 2002. We also excluded all firms that were active in the health care and education industries (SIC-codes 80-85), since these industries are highly regulated and dominated by public actors in Sweden. The final sample then contains 47,390 firms and 505,595 individuals (2002).⁴

3.2 Defining HGFs

The analysis of HGFs includes deciding upon the indicator of growth, the measurement of growth and the time period studied (Delmar and Davidsson, 1998; Delmar et al., 2003). Growth indicator relates to the variable over which growth is observed, while the measurement of growth concerns a choice between absolute and relative numbers.

We use number of employees and sales as our growth indicators since they are the most commonly used indicators (Daunfeldt et al., 2010), but only moderately correlated (Shepherd and Wiklund, 2009). Growth is measured as the percentage change in number of employees and sales volume during the period 1999-2002. We use the whole period since (i) it accommodates the fact that while some HGFs exhibit ‘erratic’ growth in one year and little growth or stagnation in another year, other HGFs exhibit ‘persistent’ growth (Garnsey, Stam and Heffernan, 2006), and (ii) this is a common length of study period in prior studies of growth (Henrekson and Johansson, 2010). Note that relative growth is used as our growth measurement rather than absolute growth. While absolute measures of firm growth tend lead to a bias towards large firms, however relative growth measures might lead to a bias towards small firms (Acs et al., 2008; Schreyer, 2000).

There is no commonly accepted definition of HGFs. They are usually identified either as a certain share of the fastest-growing firms or as those growing at a particular rate, measured either as total growth or as annualized growth over the period. Other definitions of HGFs include firms that have at least doubled their sales over a four-year period and have an employment growth quantifier of two or more over the period (Acs et al., 2008). The Organization for Economic Cooperation and Development (OECD) recently proposed

⁴ 4,244,000 individuals were employed in total in Sweden in 2002, meaning that our sample represent 12 of the total workforce.

defining HGFs as those with 10 or more employees at the beginning and average employment growth exceeding 20 percent over a three-year period (Ahmad, 2006).⁵ In this paper, we define HGFs as the one and five percent fastest growing firms, respectively. We also considered applying the ten-percent definition, but this would mean including firms that grew by only one employee during the period 1999-2002.

3.3 Data and descriptive statistics

Our independent variables are the following: age, immigrant status, sex, educational attainment at university, civil status, number of children, and also information on an individual's unemployment history and also self-employment history, as well as their professional work classification (which can be taken as an indicator of professional specialization).

Firm size and firm age is also included in the empirical analysis to test whether it exist differences in the employment decision between young and small HGFs compared to old and large ones. Firm size is measured by the number of employees in 1999, whereas firm age is defined as the year of observation minus the registered start year. Note, however, that the data on the start year is truncated. The earliest registered start year is 1990 (even if the firm existed before 1990), implying that we cannot observe whether a firm is over 14 years of age. While we would ideally have more complete data on firm age, nonetheless our truncated firm age variable does provide some useful information on the underlying variable of interest.

Two different samples are used to analyze the employment decision of HGFs. First, we use data on employees for all firms active in the knowledge intensive industries in 2002 to analyze if employees in fast growing firms have certain characteristics in common. Many of the employees in these firms might have taken their job before the firms could be characterized as a HGF. Therefore, we also analyze how these firms employ new individuals as they realize their growth potential. This sample consists of individuals that either changed employer or went from unemployment to employment during the period 2001-2002.

3.3.1 Summary statistics for employees

⁵ The OECD-definition has, however, been criticized since it excludes most firms in the economy, and since there is empirical evidence that these firms are important in generating HGFs (Anyadike-Danes and Hart, 2011).

In what follows, we begin with a discussion of the summary statistics for HGF employees, before moving on to summary statistics for HGF new hires. The summary statistics in Table 1 refer to the individual and firm-level variables. Note that days in unemployment is the total sum of unemployment days during the period 1999-2002; immigrant status is measured with a dummy taking the value one if the individual is born outside Sweden; the gender dummy takes the value one if the individual is a female; educational attainment is measured with a dummy taking the value one if the individual has completed a university education; civil status is controlled for using a dummy that is equal to one for individuals that are married or living with a partner; work classification is indicated by a dummy that takes the value one if the individual's job has an occupational code; and self-employment history is measured using a dummy taking the value one if the individual has been self-employed during the period 1998-1999.

[Table 1 About Here]

In our sample of employees, the average individual is about 41 years old, 10% of our individuals are immigrants, 36% are females, 22% have a university education, and around 6% have experience in self-employment. Comparing these figures to the summary statistics for high-growth firms in Table 2, we see that HGF employees have higher proportions of immigrants (compare 0.169 for Empl-HGFs (1%) with the figure of 0.101 for the full sample). HGF employees have lower proportions of university-educated employees, and interestingly enough these employees tend to have lower levels of self-employment experience. We do not focus too much on these summary statistics, however, because we have not yet included control variables.

[Table 2 About Here]

3.3.2 Summary statistics for new hires

Summary statistics for the sample of new hires and for those being hired by a HGF are presented in Table 3 and 4, respectively.

[Table 3 About Here]

[Table 4 About Here]

In contrast to the corresponding statistics for employees, we see that new HGF hires, on average, have a higher level of university education (compare 0.33 with 0.22), there are more females (45% vs 36%), there are slightly more immigrants (12.5% vs 10.1%), these individuals have less experience in self-employment (2.65% vs 6.36%) and they are also slightly younger (36 years vs 41 years).

4. Econometric analysis

To investigate whether HGFs employ different individuals compared to non-HGFs, we estimate the probit model:

$$\Pr(HGF_{it} = 1) = F(\boldsymbol{\Theta}'_i \mathbf{X}_{it} + \boldsymbol{\Psi}'_j \mathbf{Y}_{jt} + a_I + a_R + \varepsilon_{it}), \quad (1)$$

where the dependent variable (HGF_i) is a dichotomous variable, taking the value one if individual i can be classified as a HGF during the period 1999-2002 and zero otherwise; \mathbf{X}_{it} is a vector of individual-specific characteristics assumed to influence the probability of being employed by a HGF in period t ; and $\boldsymbol{\Theta}'_i$ is the corresponding parameter vector. \mathbf{Y}_{jt} is a vector of firm-specific characteristics relating to firm j , and $\boldsymbol{\Psi}'_j$ is the corresponding parameter vector.

To control for heterogeneity across industries and regions, industry-specific (a_I) and region-specific (a_R) fixed effects are also included in the model. The inclusion of a full set of firm-specific fixed effects in our probit model proved to be too computationally intensive, so we did not include them. However, to take advantage of the panel structure of our data, we cluster our standard errors at the firm-level.

Four different definitions of HGFs are used in this paper to analyze if the results are sensitive to the choice of growth indicator and the definition of a HGF. HGF_i takes the value one for the: (i) 1% fastest growing firms in terms of percentage change in employees; (ii) the 5% fastest growing firms in terms of percentage change in employees; (iii) the 1% fastest growing firms in terms of percentage change in number of turnover; and (iv) the 5% fastest growing firms in terms of percentage change in number of turnover.

The vector of individual-specific characteristics, \mathbf{X}_{it} , includes age, days in employment during the period 1999-2002, a dummy indicating whether the individual is born outside Sweden, sex, educational attainment, civil status, and the number of children in the household. We expect age to have non-linear effects (from inexperienced youths, to the ‘golden age’ (middle age) to those who are too old). To allow for the possibility of non-linear age effects, we include an age-squared term alongside the linear age variable. The vector of firm-specific characteristics, \mathbf{Y}_{jt} , includes firm age and firm size. The latter variable is measured using the initial size of the firm, measured as the number of employees in 1999.

Equation (1) is also estimated for a sub-sample including only individuals who changed their employment status in 2001 and 2002, either going from unemployment to employment or changing employer. In this case, we use an unemployment dummy instead of days in unemployment to investigate if HGFs hire unemployed individuals or already employed individuals to a greater extent than non-HGFs when expanding their businesses. We then also include a year dummy, taking the value one if the individual changed their employment status in 2002, to control for time variant changes in the hiring decision of HGFs.

5. Results

Equation (1) is first estimated for the full sample, using data on all individuals employed by firms active in the Swedish knowledge intensive industries in 2002. These are referred to as HGF employees (as opposed to HGF new hires). The aim is to analyze whether individuals employed by HGFs have certain characteristics that are different from those employed by other firms. In the next step, equation (1) is re-estimated for a subsample of individuals that changed their employment status in 2001 and 2002; either by ending an unemployment

period or changing employer. These individuals are referred to as HGF new hires. Industry and region-specific fixed effects are omitted from the tables to save space.⁶

5.1 The characteristics of employees among HGFs

The results from estimating equation (1) for the full sample are presented in Table 5. Table 5 shows the probit regression results when the growth of HGFs is measured in terms of employment or sales, or whether HGFs are defined as the top 1% or the top 5% fastest growing firms. Despite the differences between these regressions, they do not give conflicting results. The Pseudo-R2 statistics indicate that a better model fit is obtained when HGFs are defined as the top 1% fastest-growing firms.

[Table 5 about here]

Irrespective of the choice of growth indicator and definition of HGFs, the results reveal that HGFs-employees on average are younger, have longer unemployment periods, and are more likely to be born outside Sweden compared to non-HGFs. Regarding the immigration variable, however, we observe that the effect of being born outside Sweden is not as strong when turnover instead of employment is used as the growth indicator. Young individuals, long-term unemployed, and immigrants are often seen as outsiders at the labour market. Taken together, the evidence suggests that rapidly growing firms can provide these groups with employment opportunities that otherwise might not have been present.

Higher education is in most cases not significantly determined, indicating that HGF employees have not achieved different education levels than those employed by non-HGFs. This speaks against the suggestions of resource-based theory that growing firms need to hire individuals with ‘complementary skills’ to bolster the base of human capital in the growing firm. We do, moreover, found that HGFs employ singles to a greater extent than non-HGFs, as evidenced by the negative coefficient estimates for the civil status variable. The parameter estimates regarding the work classification code are stronger for employment HGFs as opposed to sales HGFs, but in most cases HGF-employees seem to have a work classification

⁶ The explanatory power of the models increase a lot when these fixed effects are included in the model, indicating that the probability of being employed or hired by HGF is influenced by industry and region-specific heterogeneity. The results are available from the authors upon request.

code to a greater extent than individuals working in non-HGFs. In other words, employees of HGFs do not seem to be hired into idiosyncratic job positions but rather they are hired to a specific position (Miner, 1987).

Our marginal effect coefficients can be interpreted as follows: a coefficient of 0.037 on the *Dimmigrant* variable in the case of Employment HGFs (top 5%), for example, indicates that a change in status from non-immigrant to immigrant is associated with a 3.7% increase in probability of being a HGF employee. The corresponding effect for 1% employment-HGFs is weaker though – in this case we observe that a change in status from non-immigrant to immigrant is associated with a 0.56% increase in probability of being a HGF employee.

Our firm-level variables indicate that HGFs are consistently more likely to be younger, and also more likely to be smaller than non-HGFs, which is in line with previous research.⁷

5.2 New hires

Table 6 shows estimates when we only include individuals that changed their employment status in 2001 and 2002. The results indicate that HGFs are more likely to hire immigrants, irrespective of growth indicator and choice of cut-off level for being defined as a HGF. The effect is stronger when high-growth is measured in terms of employment rather than sales. Our civil status variable shows that HGF hires are more likely to be single, although this effect is only significant for employment-HGFs, not sales-HGFs. HGF new hires tend to have less self-employment experience, for each of the four HGF definitions, although once again the effect is stronger when high growth is measured in terms of employment. HGF new hires are not significantly different in terms of age, however, which contrasts from our previous finding that HGF employees tend to be younger.

The coefficient for our unemployment variable is negative, which suggests that individuals who were recently unemployed are less likely to be hired by HGFs. It thus appears that HGFs are initially composed of individuals with a history in unemployment, but that HGFs tend to avoid taking on unemployed individuals when it comes to hiring new individuals during their growth phase.

⁷ An aggregated analysis as in Table 5 might wipe-out effects that are present in a more disaggregated analysis. Therefore, we also estimated Eq. (1) for different firm sizes and age classifications. This robustness analysis did not yield any major insights, however, and so we do not report it here.

Our results seem to indicate that HGFs tend to be composed of employees from groups that often are considered as potential outsiders at the labour market (that is, younger individuals with some experience in unemployment), but when it comes to new hires, they are no longer more likely to recruit from these disadvantaged groups. One interpretation is that firms with strong growth ambitions need to employ individuals from these groups in order to begin their fast growth. However, when they have achieved high-growth, their job recruitment strategy seems to change. Now they seem able to attract older individuals and individuals that already have a job. Note, however, that immigrants both are more likely to be employed by a HGF and to be hired by a HGF in 2001 and 2002.⁸

[Table 6 about here]

6. Discussion

We began this paper with the observation that high-growth firms (HGFs) have been shown to contribute to a lot of new jobs in the economy, but research to date has been virtually silent regarding what types of people that are hired by HGFs. As policy makers are increasingly looking for new growing firms as drivers of job creation and economic development, this is a conspicuous void in the literature. Research to date also lacks a theoretical perspective that may explain hiring practices in HGFs. While the resource-based theory of firm growth originating with Penrose (1959) suggests that that growing firms need to hire individuals extensive human capital to enhance and upgrade the resource base in the growing firm, other work in microeconomics and labour economic suggest that due to the uncertainty associated with rapid growth (Henrekson and Johansson, 2011) and the necessity of close ties with of entrepreneurs to new employees (Rajan and Zingales, 2001), individuals with a weaker labour market position may be tempted by taking employment in HGFs to enhance their labour market potential. In this paper we have begun to fill this empirical and theoretical void based on a study using a comprehensive matched employee-employer data-

⁸ To analyze if the hiring decision differ between old and young HGFs, and among HGFs of different sizes, Equation (1) is also estimated separately for size classes and age intervals. Once more, we did not find any striking new insights from this disaggregation exercise, and so the results are not reported here.

set that includes all active firms in the Swedish knowledge intensive industries during 1999-2002.

Our empirical investigation revealed several intriguing results. First, when analyzing what characterizes the work-force among HGFs, we found that young individuals, immigrants, and those with long unemployment periods were more likely to be employed by HGFs than non-HGFs. These groups are often considered as typically outsiders at the labour market, suggesting that HGFs provide them with employment opportunities that not are present in the same extent among other firms. This speaks against the suggestions of resource-based theory that growing firms need to hire individuals with ‘complementary skills’ to bolster the base of human capital in the growing firm (Penrose, 1959). Our results are comparable to those of Barringer et al (2005), who observe that fast growth firms are not particularly selective in their hiring decisions, but put more emphasis on on-the-job training.

From an economic viewpoint, HGFs, especially those in knowledge-intensive sectors, might be credit constrained since they are dependent on developing new products, solutions, and business models that often are innovation intensive activities that are more difficult to fund with debt capital compared to equity (Hall and Lerner, 2010; Martinsson, 2010). Since owner-entrepreneurs of young firms have to provide new employees with the knowledge of or access to critical resources for them to learn to produce effectively, HGFs may seek to hire low-cost employees and enhance their degree of uniqueness of their human capital by customizing or adjusting their skills (Rajan and Zingales, 2001). To the extent that these skills are developed in a particular organization, it becomes more difficult for competitors to bid away those talents (Becker and Gerhardt, 1996).

Such an explanation may also be accommodated by moderation of the Penrosian resource-based view of firm growth. From this perspective, HGFs potential to renew and upgrade their talent pool need to necessitate the hiring of individuals with extensive general human capital, as one would predict if education and age are used as the common proxies for human capital. If one considers the often dynamic and rapidly changing organizational structure of HGFs (Eisenhardt and Schoonhoven, 1990), one strategy to leverage the benefits obtainable from human capital relative to the costs incurred that is supportive to the data is to hire less experienced labour and invest in on-the-job experience and training. The resulting knowledge and experience of those employees become more idiosyncratic to the specific

firm, decreasing the risk of employee turnover and in so doing, alter the cost/benefit ratio of their human capital (Lepak and Snell, 1999).

We also analyzed the hiring decision of HGFs in 2001 and 2002 to investigate whether HGFs hire different types of employees when they have achieved rapid growth. HGFs were shown to be less likely than non-HGFs to hire unemployed individuals when they had achieved rapid growth. Instead they were more prone to hire individuals that already had a job. One possible interpretation is that potential HGFs (i.e., firms with growth ambitions) from start (when they maybe is not a HGF) needs to employ unemployed individuals to grow. But when they have achieved high-growth, they are able to attract individuals that already have a job. From a theoretical perspective, this pattern suggests an evolutionary view in that hiring decisions in HGFs will differ depending on their stage in their evolution. As such, our study also adds to the research in evolutionary economics stressing the need to examine both the sources of variation in firm practices and the sources of variation in firm output (Nelson and Winter 1982).

Even for these slightly more established HGFs, we found them to be more likely to hire immigrants compared to non-HGFs. This clearly indicates that HGFs are important for creating job opportunities for individuals that are born outside Sweden. These are imperative results from a public policy perspective in the sense that employment rates immigrants in Sweden is on average 30 percent lower than among native Swedes (Statistics Sweden, 2010), and similar figures have been reported throughout the European Union.

Our results thus imply that HGFs are not only of importance since they create many jobs in the economy, they are also important because they give immigrants, younger individuals, and long-term unemployed job opportunities. This suggests that it is of importance to create institutions that foster HGFs if policymakers want to reduce the exclusion of these marginalized groups from the labour market. Our finding that HGFs take on marginal individuals (labour market rejects) is consistent with two interpretations. One the one hand, we might suspect that HGFs choose marginal employees because there is an urgent need to quickly find new employees, and that they cannot afford to spend much time searching for employees. Alternatively, it could be that HGFs are virtuous heroes that take the outcasts and motivate them into becoming 'revolutionaries' and 'superstars'. Although we think the first interpretation is more realistic, both interpretations have similar implications for policy.

Our paper also comes with limitations, all of which offers interesting ideas for future studies. First example, our data is limited to knowledge intensive industries and therefore do not include all industries in the economy. Previous studies have shown that HGFs seem to be present in all industries, and anecdotal evidence suggests that many of the most famous HGFs in recent time such as Wal-mart or IKEA may be found in the retail industry. However, our focus on the knowledge intensive industries – defined as industries characterized by high rates of R&D and skilled labour usage – mean that our findings regarding the prevalence of outsiders being hired by HGFs are conservatively estimated. Nevertheless, it would therefore be desirable to expand our sample to include these industries as well.

Second, the detailed longitudinal data use in this paper to propel the research on HGFs to also look at the hiring practices of HGFs may be expanded also to other areas, for example by looking at the financial and legal structures of rapidly growing firms (Myers, 2001). Third, despite the detailed longitudinal data, our research has yet to resolve the difficult issue of if and how policy interventions can effectively help HGFs achieve higher performance than they would have otherwise experienced. In order to answer such questions, counterfactual research design such as natural or quasi experimental approaches are likely needed. The theoretical literature on HGFs suggests several institutional mechanism that may enhance the emergence and growth of HGFs (Davidsson and Henrekson, 2002; Henrekson and Johansson, 2009). Hence, there are ample opportunities for further research looking into the internal structures and evolution of HGFs, and the external institutional conditions shaping those structures and firm evolution. This paper represents a first step in such a direction.

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Table 1: Summary statistics for individuals *being employed* in a HGF.

Variable	Obs	Mean	Std. Dev.	Min	Max
Age	504,764	40.94	11.98	16	84
Days in unemployment	504,764	31.52	93.85	0	1277
Immigrant (D)	504,764	0.10	0.30	0	1
Gender (D)	504,764	0.36	0.48	0	1
University education (D)	502,595	0.22	0.41	0	1
Civil status (D)	504,764	0.54	0.50	0	1
Number of children	504,764	0.70	0.99	0	12
Work classification (D)	504,764	0.93	0.26	0	1
Self-employment (D)	496,718	0.063	0.24	0	1
Employes_1999	504,764	1838	4443	1	36594
Employes_2002	504,764	2700	5691	1	31888
Turnover_1999	504,764	0.510	1.45	1	7.72E+10
Turnover_2002	504,764	0.629	1.76	1	9.55E+10
Firm age	499,480	11.22	3.29	4	14

Note: D=dummy variable. Mean and st. dev. for turnover is measured in billion SEK.

Table 2: Summary stats for individuals *being employed* in a HGF, for various definitions of HGFs

Variable	Empl (1%)		Empl (5%)		Sales (1%)		Sales (5%)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Age	41.240	11.953	39.666	11.698	43.728	11.407	40.422	11.733
Days in unemp	57.629	129.304	40.743	107.677	44.452	117.220	44.290	112.736
Immigrant	0.169	0.375	0.139	0.346	0.175	0.380	0.141	0.348
Gender	0.391	0.488	0.352	0.478	0.385	0.487	0.365	0.481
University	0.139	0.345	0.199	0.399	0.117	0.322	0.188	0.391
Civil status	0.437	0.496	0.492	0.500	0.454	0.498	0.470	0.499
N of children	0.601	0.971	0.684	0.993	0.574	0.956	0.646	0.982
Work classif.	0.942	0.234	0.946	0.225	0.952	0.213	0.943	0.232
Self-employm.	0.019	0.136	0.022	0.147	0.016	0.127	0.031	0.173
Employes1999	83.775	206.571	1815.231	3392.537	367.871	931.227	487.151	1073.007
Employes2002	9020	9913	6727	8697	11819	9941	5878	8758
Turnover1999 (billion SEK)	0.483	1.990	13.400	28.200	0.028	0.080	0.582	2.030
Turnover2002 (billion SEK)	2.700	3.280	18.200	34.600	3.150	2.110	3.520	7.030
Firm age	8.939	3.328	10.563	3.632	10.421	2.916	9.143	3.502
No Obs	31,472		96,808		23,472		50,852	

Note: Number of observations is reported, but might be slightly less for some variables, due to a small number of missing observations in some cases.

Table 3: summary statistics for individuals *being hired* to a HGF in 2000-2001

Variable	Obs	Mean	Std. Dev.	Min	Max
Age	258,813	35.78	12.19	15	93
Unemployed (D)	256,403	0.20	0.40	0	1
Immigrant (D)	258,813	0.13	0.33	0	1
Gender (D)	258,813	0.45	0.50	0	1
University (D)	258,492	0.33	0.47	0	1
Civil status (D)	258,813	0.40	0.49	0	1
N. of children	258,813	0.64	0.97	0	12
Work classification (D)	258,813	0.44	0.50	0	1
Year (D)	258,813	0.37	0.48	0	1
Self-employment (D)	252,295	0.027	0.16	0	1
Employes_1999	258,813	1697	4569	1	36594
Employes_2002	258,813	2987	6122	1	34392
Turnover_1999	258,813	0.323	0.988	1	7.72E+10
Firm age	256,494	10.20	3.35	3	14

Note: D=dummy variable. Mean and st. dev. for turnover is measured in billion SEK.

Table 4: Summary stats for individuals *being hired* to a HGF in 2000-2001, for various definitions of HGFs

Variable	Empl (1%)		Empl (5%)		Sales (1%)		Sales (5%)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Age	40.169	12.479	37.764	12.491	42.925	12.002	38.644	12.311
Unemployed	0.106	0.308	0.140	0.346	0.076	0.265	0.127	0.333
Immigrant	0.185	0.389	0.150	0.357	0.204	0.403	0.168	0.374
Gender	0.436	0.496	0.419	0.493	0.452	0.498	0.433	0.495
University	0.181	0.385	0.272	0.445	0.139	0.346	0.250	0.433
Civil status	0.400	0.490	0.409	0.492	0.406	0.491	0.399	0.490
N. children	0.579	0.963	0.614	0.967	0.537	0.938	0.599	0.963
Work classific	0.685	0.464	0.521	0.500	0.796	0.403	0.599	0.490
Year	0.673	0.469	0.482	0.500	0.788	0.409	0.571	0.495
Self-employm	0.017	0.128	0.019	0.138	0.012	0.109	0.019	0.135
Employes1999	65.485	161.601	685.821	1870.957	89.747	359.840	227.096	680.322
Employes2002	8817	9987	5269	8092	12933	9912	6861	9364
Turnover1999 (Billion SEK)	0.285	1.530	3.810	15.000	0.022	0.058	0.426	1.870
Firm age	8.381	3.422	9.351	3.592	9.445	3.048	8.335	3.495
No Obs	31656		73136		21020		41729	

Note: Number of observations is reported, but might be slightly less for some variables, due to a small number of missing observations in some cases.

Table 5: Probit results for *being employed* in a HGF

DepVar: HGF	Empl (1%)		Empl (5%)		Sales (1%)		Sales (5%)	
Dummy	Marg. Eff.	z-stat	Marg. Eff.	z-stat	Marg. Eff.	z-stat	Marg. Eff.	z-stat
Age	-0.00023	-4.97	-0.00195	-4.57	-0.0001	-1.65	-0.00076	-6.25
Age_sq	3.64E-06	1.26	2.07E-06	0.10	4.20E-07	0.11	1.29E-06	0.17
Log(Daysunemp)	0.001301	4.13	0.006099	3.93	0.000203	1.09	0.002194	2.45
Immigrant	0.005604	3.74	0.03722	5.14	0.003146	2.34	0.008128	2.43
Gender	0.000298	0.27	0.003669	0.44	0.000046	0.04	-0.00395	-1.31
University	-0.00062	-0.40	0.010275	1.03	-0.00088	-0.52	0.001382	0.36
Civil status	-0.00233	-5.56	-0.01056	-4.97	-0.00189	-3.70	-0.00576	-5.03
Log (Nchildren)	0.000457	0.85	-0.00035	-0.13	-0.00019	-0.43	0.000342	0.27
Work classificat.	0.005158	4.53	0.047821	3.91	0.002778	1.18	0.01795	4.34
Self-employment	-0.00927	-12.81	-0.10476	-12.16	-0.00962	-9.84	-0.0304	-8.18
Firm age	-0.00251	-4.59	-0.01279	-2.91	-0.00115	-2.18	-0.01092	-6.44
Log(employees99)	-0.00512	-5.22	-0.01796	-2.56	-0.0052	-5.67	-0.00914	-2.84
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo-R2	0.515		0.214		0.566		0.344	
No obs	483,999		489,300		438,028		488,978	

Marginal effects and z-statistics reported. Standard errors clustered at the firm level. Sector dummies at the 2-digit level SIC-level. Region dummies at the county level.

Table 6: Probit Regression on individuals *being hired* to a HGF in 2001-2002

DepVar:	Empl (1%)		Empl (5%)		Sales (1%)		Sales (5%)	
HGF dummy	Marg. Eff.	z-stat	Marg. Eff.	z-stat	Marg. Eff.	z-stat	Marg. Eff.	z-stat
<i>Individual-level coefficients</i>								
Age	0.000174	1.16	0.001202	1.54	0.000205	1.35	0.000307	1.07
Age_sq	-1.4E-05	-2.21	-2E-05	-0.75	-5.38E-06	-0.93	-3.4E-05	-2.60
Immigrant	0.020164	4.38	0.050432	3.58	0.006875	3.42	0.017593	2.27
Gender	-0.00532	-1.40	-0.00611	-0.38	-0.00089	-0.43	-0.01469	-1.98
University	-0.00772	-1.62	-0.01942	-1.07	-0.00241	-0.78	-0.00362	-0.39
Civil status	-0.00291	-2.11	-0.00917	-2.09	-0.00124	-1.05	-0.00278	-1.03
Log (nchildren)	-0.00145	-1.04	-0.00909	-1.84	-0.0017	-1.74	-0.00352	-1.32
Work classificat.	-0.002	-0.80	-0.00323	-0.41	0.003946	2.82	-0.00345	-0.68
Unemployed	-0.00994	-2.63	-0.05593	-5.62	-0.00524	-2.27	-0.0217	-3.44
Year	0.027916	4.69	0.050078	3.07	0.009371	1.90	0.038051	3.29
Self-employment	-0.01873	-8.04	-0.08811	-9.09	-0.01055	-5.72	-0.03482	-6.53
<i>Firm-level coefficients</i>								
Firmage	-0.00885	-5.80	-0.02488	-4.74	-0.00318	-2.86	-0.02185	-6.75
Log (emp_1999)	-0.01682	-5.93	-0.03817	-3.41	-0.00974	-5.06	-0.02332	-4.60
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo-R2	0.525		0.251		0.626		0.393	
No. Obs	246,446		248,581		235,877		248,104	

Notes: Marginal effects and associated z-statistics. Standard errors clustered at the firm level. Sector dummies at the 2-digit level SIC-level. Region dummies at the county level.

Appendix 1: Number and percentage of employees and firms by 2-digit industries in 2002.

2-digit industry	Industry name	Employees 2002		Firms 2002	
		#	%	#	%
N/A	Unreported industry	848	0,17	330	0,82
1	Agriculture and hunting	894	0,18	226	0,56
2	Forestry and logging	72	0,01	37	0,09
5	Fishing	30	0,01	23	0,06
11	Extraction of petroleum and gas	2	0	1	0,00
13	Mining of metal ores	192	0,04	2	0,00
14	Other mining and quarrying	56	0,01	3	0,01
15	Manufacture of food products and beverages	1,186	0,23	39	0,10
16	Manufacture of tobacco products	291	0,06	2	0,00
17	Manufacture of textiles	175	0,03	21	0,05
18	Manufacture of wearing apparel	5	0	3	0,01
20	Wood products	471	0,09	68	0,17
21	Pulp and paper	1,833	0,36	16	0,04
22	Publishing, printing, recorded media	2,763	0,55	204	0,51
23	Manufacture of petroleum products	14	0	1	0,00
24	Manufacture of chemicals and pharmaceuticals	5,307	1,05	73	0,18
25	Manufacture of rubber and plastics	2,354	0,47	53	0,13
26	Manufacture of other non-metallic mineral products	547	0,11	29	0,07
27	Manufacture and casting of metals	700	0,14	12	0,03
28	Manufacture of fabricated metal products	4,086	0,81	231	0,57
29	Manufacture of machinery and equipment	16,423	3,25	397	0,98
30	Manufacture of office machinery and computers	3,156	0,63	116	0,29
31	Manufacture of electrical machinery and apparatus	22,283	4,41	548	1,36
32	Manufacture of radio, television and communication	12,145	2,41	262	0,65
33	Manufacture of medical, precision and optical instruments	16,591	3,29	905	2,24
34	Manufacture of motor vehicles	42,071	8,33	93	0,23
35	Manufacture of other transport equipment	11,527	2,28	72	0,18
36	Manufacture of furniture	13,397	2,65	68	0,17
37	Recycling	91	0,02	5	0,01
40	Gas, water and electricity	1,277	0,25	20	0,05
41	Distribution of water	7	0	1	0,00
45	Construction and other engineering activities	11,831	2,34	589	1,46
50	Sale, maintenance and repair of motor vehicles	1,602	0,32	121	0,30
51	Wholesale and commission trade	15,466	3,06	755	1,87
52	Retail trade	9,539	1,89	376	0,93
55	Hotels and restaurants	4,573	0,91	191	0,47

Appendix 1: Continued

2-digit industry	Industry name	Employees 2002		Firms 2002	
		#	%	#	%
60	Land transports	2,155	0,43	118	0,29
61	Water transports	183	0,04	10	0,02
62	Air transports	95	0,02	3	0,01
63	Travel agencies	2,404	0,48	105	0,26
64	Post and telecommunications	22,059	4,37	79	0,20
65	Financial Services	3,001	0,59	221	0,55
66	Insurance	171	0,03	21	0,05
67	Auxiliary Financial Services	6,102	1,21	660	1,64
70	Real estate	35,409	7,01	4347	10,77
71	Renting of machinery and equipment	415	0,08	89	0,22
72	Computers and related activities	51,283	10,16	3706	9,18
73	Research and development	5,066	1	308	0,76
74	Business services	147,051	29,13	21845	54,12
75	Public administration	9	0	1	0,00
90	Sanitation services	168	0,03	8	0,02
91	Voluntary Organizations	1,247	0,25	45	0,11
92	Recreational, culture and sports	22,921	4,54	2791	6,91
93	Other services	1,220	0,24	113	0,28
Total		504,764	100	40363	100,00