THE SUSTAINABILITY WAGE GAP*

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Abstract

Using detailed administrative employer-employee matched data and a novel measure that quantifies the environmental sustainability of different economic activities, we provide evidence that workers earn about 10% lower wages in firms that operate in more sustainable sectors. We hypothesize that this *Sustainability Wage Gap* arises because workers, especially those with higher skills and from younger cohorts, value environmental sustainability and accept lower wages to work in more environmentally sustainable firms and sectors. Accordingly, we find that the *Sustainability Wage Gap* is larger for high-skilled workers, especially for those with high non-cognitive skills, and increasing over time. In further analysis, we document that more sustainable firms are also better able to recruit and retain high-skilled workers. We argue that our results are difficult to reconcile with many alternative interpretations suggested in prior research and that the *Sustainability Wage Gap* carries important implications for firms' human resource strategies and firm value.

Keywords: Wages; Wage differentials; Allocation of talent; Human capital; Sustainability; ESG; Firm value
JEL Codes: J24; J31; Q56; G32

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I Introduction

Attracting and retaining talent is important not only for a firm's competitiveness, but also for economic development (Murphy, Shleifer, and Vishny 1991). But what affects this allocation of talent? There is mounting evidence that individuals increasingly care about the environment. For instance, a survey conducted by the Pew Research Center in 2017 found that almost three quarters of Americans think that the country should do whatever it takes to protect the environment (Anderson 2017). Furthermore, anecdotal evidence suggests that such preferences for protecting the environment are even more pronounced among younger birth cohorts such as generations Y (Millennials) and Z.

In this paper we systematically analyze whether workers value the environmental sustainability of the sector in which they work. We uncover and provide novel evidence that workers have preferences for environmental sustainability[1] and are willing to accept lower wages to work for firms that operate in more environmentally sustainable sectors. Using detailed employer-employee matched data from Sweden, we provide direct evidence that employees in firms and sectors that are considered most environmentally sustainable do indeed earn about 10% lower wages. We coin this empirical regularity the *Sustainability Wage Gap*.

Using granular skill measures from military enlistment tests, we show that the documented Sustainability Wage Gap is particularly pronounced for workers with high *non-cognitive* skills, a component of skill that has been found to be of growing importance in the workplace (see Deming 2017). Further analysis also shows that retention rates of individuals with better non-cognitive skills are higher in firms that operate in more sustainable sectors.

The Sustainability Wage Gap channel has important implications for firms. Benabou and Tirole (2010) argue that one reason for why firms engage in sustainable business practices is that such behavior can contribute positively to firm value, and thus firms can "do well by doing good." For instance, more sustainable firms can sustain higher margins if sustainability aware customers are willing to pay higher prices (Servaes and Tamayo 2013) or can benefit from lower cost of capital (e.g., Chava 2014; Dunn, Fitzigbbons, and Pomorski 2017, Albuquerque, Koskinen, and Zhang 2019). Prior research in financial economics has also found that publicly listed U.S. firms with higher employee satisfaction, an important social dimension of

[1] As discussed more comprehensively in Appendix A, Sustainability, Corporate Social Responsibility (CSR), and the recently popularized umbrella concept ESG (Environmental, Social and Governance) are all related and difficult to delineate exactly. We believe that these concepts are ultimately concerned with similar matters, namely how firms address social and environmental issues—or more generally—firms' overall societal impact. In our paper, we assume that measures of sustainability, CSR, and ESG tend to be positively correlated and we choose to refer to them collectively as "Sustainability" or "ESG."

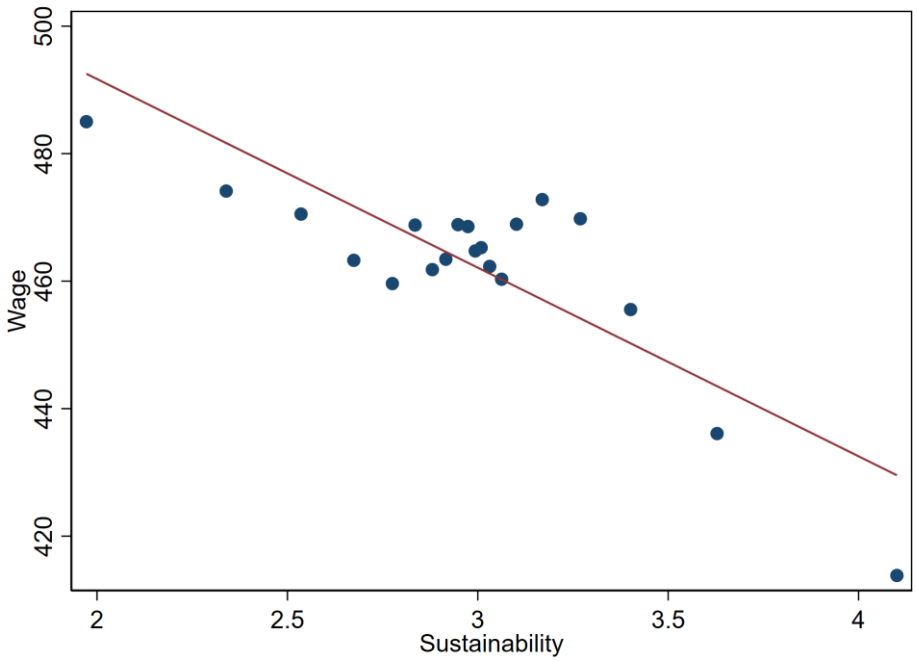
sustainability, outperform on a risk-adjusted basis (see Edmans 2011). However, much of the prior research falls short of identifying exact channels and mechanisms through which sustainability policies would affect firm value. In contrast, we believe to make a step forward in identifying a channel through which a firm's sustainability policies can affect its cash flows and thus create value, namely through the reduction of a firm's wage bill.

We start by motivating our analysis of the Sustainability Wage Gap using three waves of a representative labor survey on attitudes towards work, carried out by the International Social Survey Programme (ISSP). The survey produces several pieces of evidence consistent with our hypothesis: first, most individuals care about the sustainability characteristics of their jobs and these preferences are generally more pronounced for highly educated workers and for more recent cohorts. Using the same survey, we also find that preferences for sustainable jobs turn out to be related to labor outcomes: individuals who state to care more about the sustainability of their jobs also state that they are more willing to turn down a better paying job to stay with their current firm. Moreover, they assert to be willing to work harder to help their employer to succeed.

While the evidence based on the ISSP survey is consistent with the main premise of our paper—that is people are willing to work for less in more sustainable jobs—it is not clear if survey responses capture intentions only, or whether stated intentions also translate into true labor market outcomes. To overcome this concern, our main analysis makes use of administrative employer-employee matched data from Sweden. These data contain highly detailed information on wages, occupation, education, and measures of cognitive as well as non-cognitive skills from military enlistment tests. To test whether workers do indeed accept lower wages to work in jobs that are considered more sustainable, we combine our administrative labor data with a novel measure that quantifies the environmental sustainability of economic activities. We develop this sustainability measure explicitly for the analysis in our paper by asking a sample of survey participants to classify economic activities in terms of environmental sustainability.

Figure I illustrates our main result graphically. The binned scatterplot displays a strong negative association between wages and our environmental sustainability measure, suggesting that firms operating in more environmentally sustainable sectors pay lower wages. The relation is particularly pronounced in the tails of the sustainability distribution.

Figure I: Wages and Sustainability
This figure shows a binned scatterplot of the relation between wages and sustainability. *Wages* are measured at the worker-level in (deflated) Swedish Kronor (SEK) terms. *Sustainability* is a survey based measure that captures the environmental sustainability of the industry in which a firm operates. The sustainability measure ranges from 1=*Unsustainable* to 5=*Sustainable*.



Next, we estimate Mincerian-like wage regressions in which we examine the effect of sustainability on wages in a more comprehensive way. We find robust evidence that workers in firms that belong to the most sustainable sectors earn between 10-20% lower wages. Importantly, these regressions control for detailed demographic and job-related variables including usually *unobservable* measures of cognitive and non-cognitive ability as well as occupational information. We also examine heterogeneity in the documented Sustainability Wage Gap and find—in line with the evidence from the ISSP survey—that the wage gap is larger for workers that are more skilled and growing over time, a result that is difficult to reconcile with many alternative explanations.

An equivalent reading of our hypothesis is that, fixing a wage, more sustainable firms are better able to attract and retain workers that are more talented. In further analysis, we find that workers in more sustainable firms are indeed more highly educated and talented using several different measures for education and talent (e.g., when workers have university respectively doctoral degrees or when they exhibit higher cognitive and non-cognitive capabilities). We also find that university graduates as well as workers with high non-cognitive skills are less likely to leave a firm in a sustainable sector on a voluntary basis. Taken together, the tests focusing

on turnover and retention lend support to the view that firms in more sustainable sectors are better able to attract and retain talented workers.

Overall, our results are consistent with prior research that has suggested that firm-level investments into sustainability *can* increase a firm's bottom line and hence firm value. The firm-level benefits resulting from the Sustainability Wage Gap are potentially big as labor costs can represent a sizeable fraction of total costs and are also often large when compared to a firm's asset base. For instance, in our sample, Swedish firms in the middle of the sustainability distribution have a labor expenses to total costs ratio of 31.5% and a labor expenses to total assets ratio of 52.3%. Back-of-the-envelope calculations suggest that the *relative* increase in *Return on Assets* (ROA) is 17.5% when a firm moves from the middle to the top of the sustainability distribution, and, by doing so, saves about 10% of its labor costs.[2] While our evidence shows that more sustainable firms face lower labor costs and possibly higher ROA, we cannot observe the *net effects* of the Sustainability Wage Gap on a firm's profitability as we are unable to observe the direct costs associated with investments in more sustainable policies. This specific limitation is not unique to our setting but applies more generally to research concerned with firms' sustainability practices given that detailed firm-level measures quantifying the costs of improving sustainability do not exist.

While we rely on non-experimental data, we argue that the proposed Sustainability Wage Gap channel is more difficult to reconcile with reverse causation or other already proposed channels through which sustainability may contribute to higher firm value (e.g., higher margins through customer awareness). First, a simple reverse causation explanation and many other alternative explanations would predict *higher*, or at least not lower wages for workers of firms with better sustainability. Second, the ISSP survey reveals heterogeneous preferences for sustainable jobs among different subpopulations of the labor force (e.g., by education). In our analysis of the employer-employee matched data we also document consistent patterns in the heterogeneity of the Sustainability Wage Gap, important patterns that cannot easily be explained by other alternative mechanisms.

Other potential concerns with our findings could be related to unobserved worker, job, firm, or sector heterogeneity. For instance, individuals who self-select into working for firms belonging to more sustainable sectors might be less talented than workers in other sectors, which, in turn, could explain lower wages. Given our detailed employer-employee matched data, we are able to control for many worker characteristics such as education and experience

[2] We provide further details on the back-of-the-envelope calculations in Section IV.A.

as well as for—usually unobservable—talent measures such as cognitive and non-cognitive skills from military enlistment tests. Moreover, we have detailed information on occupations, and can thus compare two workers in the same occupation in the same year but in different sectors. We can also control for other aspects of the job or sector that might be related to wages (such as part-time vs. full-time work, firing risk, health risk, or the flexibility to move to other sectors) allowing us to isolate the effect of environmental sustainability on wages. Given that some of our hypotheses predict differential effects for specific types of workers in the same firm, e.g., more versus less talented workers, we can even exploit *within firm-variation* and control for unobserved firm heterogeneity.

Our primary measure of sustainability is at the sector-level. We construct this measure by letting survey participants classify economic sectors in terms of their environmental sustainability. We choose this survey-based measure at the sector-level as our main measure because firm-level sustainability or Environmental, Social, and Governance (ESG) ratings are generally only available for large and listed firms in the most recent past. In addition, there are potential methodological issues with such ratings (see, for example, Berg, Koelbel and Rigobon 2020; Fabisik, and Sautner 2021). In contrast to the potential problems with ESG ratings, our sector-level sustainability measure is based on an intuitive, straightforward, and transparent methodology, which is also available for private companies. Another important advantage of our measure is that the environmental sustainability of a firm's main economic activity is likely to be more comprehensible for potential workers than information captured by commercially available ESG ratings. Finally, it should also be noted that it is the sustainability of a sector as *perceived* by potential employees that should matter for the Sustainability Wage Gap, even if the objective or true sustainability of a sector is different.[3] Again, we believe that our survey-based sustainability measure is better at capturing the perceived sustainability than commercially available ESG ratings.

Despite the shortcomings of ESG ratings, we still complement our analysis with tests that use firm-level ESG rating data from MSCI and Refinitiv, two prominent ESG data sources that have been used in prior financial economics research (see, for example, Liang and Renneboog 2015; Pedersen, Fitzgibbons, and Pomorski 2020). Consistent with the evidence based on our sector-level sustainability measure, we find that firms with better ESG ratings (especially with

[3] Differences between the true and the perceived sustainability could arise for several reasons: For instance, large parts of the population might simply be unaware about the true sustainability of a sector. Alternatively, firms operating in unsustainable sectors might also be successful at distorting reality and the information environment, e.g., through lobbying and disinformation campaigns.

better environmental ratings) pay lower wages, highlighting the important idea that investments aimed at improving environmental policies can be beneficial to profitability because such investments allow attracting and retaining high skilled workers at lower wages. These firm-level tests are also important as they assess firms' sustainability policies relative to their industry peers ("best in class") and show that firms that have better sustainability policies are able to attract workers at lower cost compared to their peers.[4]

The rest of the paper is organized as follows: In the next section, we discuss our contribution to the literature. Section III makes use of the representative ISSP survey on work orientations to motivate our analysis. The section also develops our main hypotheses and explains how we construct our main empirical measure for environmental sustainability. Section IV tests the baseline Sustainability Wage Gap hypothesis using detailed administrative employer-employee matched data from Sweden. Section V investigates labor market consequences of sustainability for the most talented workers and for more recent cohorts. Section VI discusses alternative interpretations in detail. In Section VII, we relate commercial ESG ratings to wages. The last section concludes. We deliberately kept the data description part in the paper relatively short to improve the readability of the paper. However, we provide a detailed description and analyses of the different data sets that are used throughout the paper in the Appendices.

II Related Literature

In this paper, we contribute to several strands of the economics and finance literature. First, we add to research concerned with the financial performance implications of sustainability by documenting a new channel through which sustainability can affect the bottom line of firms. Second, we add to the debate on how to measure sustainability at the firm-level by proposing an intuitive and straightforward way of quantifying the sustainability of firms. Finally, our paper also connects to the labor-economics literature on inter-industry wage differentials and non-monetary incentives and the meaning of work.

Our paper contributes to the literature that studies the relation between sustainability policies and firm performance. The evidence in this literature is not un-ambiguous. For example, early meta-studies such as Margolis, Elfenbein, and Walsh (2007) show evidence of positive, negative, and no relation between financial performance and sustainability policies. However,

[4] The tests using firm-level ESG ratings are also complementary to the tests based on sector-based measures of sustainability because ESG ratings typically seek to assess the quality of the sustainability related policies and practices of firms and rather than the sustainability of the products and services a firm sells, with the latter being quantified by our survey measure.

more recent and more comprehensive meta-studies tend to point to a predominantly positive correlation between financial performance and sustainability characteristics (e.g., Friede, Busch, and Bassen 2015). From a corporate finance perspective, firms' sustainability efforts could translate into higher firm value either by lowering discount rates or by increasing cash flows. Several recent papers provide evidence that firms with better ESG performance exhibit lower cost of capital (e.g., Chava 2014; Dunn, Fitzgibbons, and Pomorski 2017; Albuquerque, Koskinen, and Zhang 2019). In contrast, prior research has been less able to credibly identify channels and mechanisms through which ESG policies would causally affect a firm's cash flows. Servaes and Tamayo (2017) is a notable exception in this respect. They provide evidence consistent with the view that that consumer facing firms with better ESG policies have higher firm value, possibly due to such firms being able to sustain higher margins if sustainability aware customers are willing to pay higher prices. While more sustainable companies might attract customers with sustainability preferences willing to pay higher reservation prices, it cannot be ruled out that products of more sustainable firms also exhibit higher quality and thus command higher prices. In our setting, we can control more directly for the quality dimension given that we have detailed demographic information including cognitive- and non-cognitive skills of the workers. In relation to this literature, our paper identifies another channel through which sustainability can potentially positively affect cash flows.

Another dimension along which we improve on the existing literature is that many of the papers that study the question of whether firms can do well by doing good (see Benabou and Tirole 2010) fail to provide causal evidence of the respective channels. In particular, a simple reverse causation explanation, i.e., well-performing firms having more financial slack to invest into sustainability, appears to be an alternative explanation that is usually difficult to rule out (Hong, Kubik, and Scheinkman 2012). As explained earlier, the availability of very granular data at the worker-level as well as additional predictions on specific subpopulations, derived from heterogeneity of workers' preferences for jobs in sustainable sectors, allows us to rule out many other explanations. Hence, we believe that our paper makes a step forward in identifying a specific channel through which sustainability can affect cash flows, namely lower labor costs.

Our paper also contributes to the discussion on the measurement of sustainability. There is an ongoing debate about the divergence and opaqueness of ESG ratings (Berg, Koelbel, and Rigobon 2020; Gibson, Krueger, and Schmidt 2021). Recent research also points to ESG rating providers "rewriting history" by changing historical ESG ratings (see Berg, Fabisik, and Sautner 2021). We offer a novel and intuitive sector-wide measure of the environmental sustainability of firms based on a simple survey that can be easily replicated and applied in

other, related domains. Using our measure, we also show that individuals form meaningful expectations about the sustainability of different sectors and that those expectations have real consequences.

Other papers in the finance literature on sustainability have examined a variety of different issues. For instance, Lins, Servaes, and Tamayo (2017) study whether stock markets valued better sustainability policies during the Great Financial Crisis. Using the introduction of the Morningstar Sustainability rating, Hartzmark and Sussman (2019) examine if investors care about a mutual fund's sustainability characteristics. Edmans (2011) and Edmans, Li, and Zhang (2020) test whether and how employee satisfaction is related to stock returns. Liang and Renneboog (2017) explore determinants of corporate social responsibility policies and highlight the important role of the legal origins of the country in which a firm is headquartered. Other papers have used experimental methods to shed light on why investor hold socially responsible mutual funds (see Riedl and Smeets 2017) or whether shareholders value a firm's ethical actions (see Bonnefon, Landier and Sastry 2019).[5]

We also contribute to the rich labor economics literature. A large body of work starting at least with Slichter (1950) documents significant industry-differences in wages paid to workers (Schweitzer 1969; Dickens and Katz 1987; Summers and Krueger 1988; Katz and Summers 1989; Murphy and Topel 1990). Our analysis suggests that some of these inter-industry wage differentials can potentially be attributed to the environmental sustainability characteristics of different industrial sectors, in particular since we explicitly control for typically unobservable ability measures which have been thought to be behind observed wage differences across sectors (Gibbons and Katz, 1992; Gibbons el al. 2005). Other papers in the labor literature have focused more on firm-specific factors related to firm productivity differences (see Syverson 2011; Card et al 2018) or more generally unobserved firm heterogeneity (e.g., Abowd, Kramarz, and Margolis 1999; Card, Heining, and Kline 2013; Card, Cardoso, and Kline 2015; Song et al, 2019) in driving wage differentials. Our analysis suggests that some of these observable and unobservable firm effects could potentially be related to sustainability. In a recent paper, Card et al (2018) synthesize insights from the literature on rent-sharing and the literature emphasizing two-way fixed effects models (Abowd, Kramarz, and Margolis 1999) and proposes a theory of wage setting in which workers have idiosyncratic tastes for different workplaces. Our paper is strongly related to this modeling approach, since our paper suggests

[5] Given the dearth of finance theory on how to think about sustainable investing, a host of theory papers concerned with sustainability and ESG have emerged recently (Pastor, Stambaugh and Taylor 2020; Pedersen, Fitzgibbons, and Pomorski 2020; Oehmke and Opp 2020; Landier and Lovo 2020).

that one dimension of these idiosyncratic tastes is the environmental sustainability of the economic activity of firms. We also contribute to the labor literature on compensating differentials, which goes back at least to Adam Smith (see Rosen 1986). In a recent paper, Sorkin (2018) estimates that compensating differentials account for over half of the firm component in the variance of wages. Our analysis suggests that firm- or industry-level environmental sustainability is an important compensating differential that is not captured by more established compensating differentials such as firing risk, health risk, or the flexibility to move to other sectors.

Last but not least, we also add to a large literature on non-monetary incentives and the meaning of work in labor economics. Cassar and Meier (2018) summarize the literature and point out that, "in principle, job meaning could be either a substitute or a complement to monetary compensation, which in turn will influence whether people accept lower pay for a meaningful job, or whether job meaning and pay tend to rise together. The evidence on this point is mixed." Our findings show that workers accept lower wages for more environmentally sustainable jobs, suggesting that in our setting meaning—as proxied by the environmental sustainability of the job— acts as a substitute to wages. Dur and van Lent (2019) who use the same ISSP survey data as we do show that most workers care about having a socially useful job and suffer when they consider their job useless. We show that workers are willing to "pay" in order to work in a more environmentally useful job by accepting lower wages and thus foregoing compensation. Our paper is also closely related to Burbano (2016), Hedblom, Hickman, and List (2019), Bunderson and Thakor (2020), or Schneider, Brun, and Weber (2020) who use mainly surveys and experiments to show that workers are willing to give up parts of their wages to work in more sustainable, more meaningful, or less immoral jobs. For instance, Burbano (2016) uses an online experiment to show workers accept 44% lower wage bids for the same job after learning about the employer's social responsibility. Her paper provides causal empirical evidence of revealed preferences for social responsibility in the workplace and of workers' willingness to give up pecuniary benefits for nonpecuniary benefits. She also shows stronger social preferences among the highest performers, a point that our analysis also makes. While the internal validity of such experiments is high, it remains unclear whether these findings generalize and transfer to workers actually accepting lower wages. Our paper uses non-experimental data from the whole Swedish working population to show the external validity of such preferences for sustainable jobs. At the same time, the internal validity of our analysis remains arguably high as we can include a set of very detailed worker-, occupation-, and sector-level controls, including detailed measures of talent. Moreover, we make use of a large and

representative labor force survey to uncover important heterogeneities in the preferences for sustainable jobs. We believe that documenting these heterogeneities is already a contribution in itself but most important for us the insights on heterogeneous preferences for sustainable jobs also generate additional predictions regarding the Sustainability Wage Gap channel that we can test in our administrative wage data and which are more difficult to reconcile with alternative explanations. On the empirical side, we make use of unique and granular measures of different dimensions of skills to show that the Sustainability Wage Gap is higher for workers with high non-cognitive skills, a component of skill that has been found to be of growing importance in the workplace (see Deming 2017). We also find that retention rates of individuals with better non-cognitive skills are higher among firms that operate in more sustainable sectors.

III The Sustainability Wage Gap – Hypotheses and Data

In this section, we explain our Sustainability Wage Gap hypothesis in more detail and motivate it by using evidence from the large and representative ISSP labor survey. We also introduce our main measure of sustainability.

III.A The Sustainability Wage Gap Hypothesis

We hypothesize that firms' sustainability policies can benefit their bottom lines by lowering labor costs and allowing firms to attract and retain workers that are more talented. The main idea is that more sustainable firms can hire workers with explicit sustainability preferences at lower wages, or, equivalently, by offering a certain wage, they can hire workers that are more talented. Two central assumptions underlying our main hypothesis are that

(i) workers exhibit preferences for the sustainability of their jobs and

(ii) these preferences affect their labor market choices.

To motivate our analysis and illustrate that workers do indeed have preferences for sustainability of their jobs consistent with our main hypothesis, we make use of the International Social Survey Programme (ISSP). The ISSP is a cross-national collaboration that runs annual surveys on topics important to the social sciences and includes the Work Orientations Survey, which seeks to collect data on attitudes toward work and working conditions (see Dur and van Lent 2019).[6] For brevity, we explain these data and our tests in detail in Section 2 of the Internet Appendix and focus here only on the main takeaways.

[6] For more information on ISSP see https://bit.ly/393aWpR and https://www.gesis.org/issp/home/issp

First, we document that workers exhibit strong non-monetary preferences related to their labor choices. The survey data reveals that most workers care about non-monetary aspects of their jobs: a total of 63% state that they agree or strongly agree with the statement that it is important that a job is useful for society. In a similar spirit, 59% disagree or strongly disagree with the statement that a job is just a way of making money (see Internet Appendix Table IA.5). While those non-monetary preferences do not directly measure preferences for sustainability, they share important aspects such as the role of society and intergenerational equity, both important components of sustainability (see also our discussion of sustainability and related concepts in Appendix A). In the following, we simply refer to "sustainability preferences."

Second, we show that individuals who exhibit stronger sustainability preferences also display labor choices consistent with our main hypothesis, i.e., they are willing to work at lower wages. To do so, we make use of a specific question in the ISSP survey on the willingness of a worker to stay with her current employer and to turn down another better paying job. We compare the likelihood of staying in a job even if offered a higher paying job for individuals who value sustainability issues highly against those who value the sustainability aspects less highly. We find statistically significant differences between the two groups: workers with stronger sustainability preferences are indeed more likely to turn down better paying jobs. We also find that individuals who state to have stronger sustainability preferences are also more likely to work harder to help their organization. We report these results in Internet Appendix Table IA.6.[7] The tests based on the ISSP data are interesting in their own right as they suggest that workers with sustainability preferences may not only be willing to work at lower wages (something that we will be able to measure in our administrative wage data) but also that they exert more effort (something that we cannot observe in our main administrative data).

Third, we show that preferences for sustainability aspects of jobs are systematically related to meaningful worker characteristics. For instance, anecdotal evidence suggests that firms find it increasingly difficult to retain talent and that "Millennials" and the Generation Z (i.e., cohorts born after 1980) have strong preferences for meaning or purpose in their jobs. Documenting such potential heterogeneities would be interesting for two reasons. i) Those cohorts have entered the labor market / climbed up the corporate ladder and, hence, accommodating those preferences is increasingly important for firms to attract and retain the most talented worker, in

[7] Please note that, in one split, the differences are negative though not significant. However, when we replicate the tests with ISSP data for the U.S. (see Table IA.9 in the Internet Appendix) for which we have more power, we find consistent results across all specifications, suggesting that workers with stronger preferences for societal aspects of their jobs are also willing to work harder. Overall, the U.S. analysis is also important in adding external validity to our tests by showing that the patterns we document are not restricted to Sweden.

particular, in today's more knowledge-based economy. ii) Such heterogeneity in sustainability preferences leads to additional predictions which we can test in the administrative data and may allow us to rule out some other alternative explanations. To examine heterogeneity in preferences, we make use of both cross-sectional differences in demographical information among ISSP survey participants as well as the time-series dimension of the ISSP survey. We find that the preferences for having a job that is societally useful are more pronounced for more educated people and in more recent years.[8]

Consistent with the presented ISSP survey evidence we formulate our first hypothesis on the Sustainability Wage Gap:

Hypothesis 1: Workers in firms that operate in more sustainable industries or in firms that have better ESG policies relative to industry peers are paid less.

Workers in the ISSP survey also displayed considerable heterogeneity in sustainability preferences. For instance, more educated individuals tended to have stronger preferences for the overall societal good. In addition, there is evidence that societal preferences have become more important over time. In line with this survey evidence, our second set of hypotheses states that:

Hypothesis 2a: The Sustainability Wage Gap is larger for workers that are more talented.
Hypothesis 2b: The Sustainability Wage Gap is increasing over time.

While the evidence from the ISSP survey is suggestive, it is not clear whether survey responses capture intentions only, or whether they also translate into true labor market outcomes. Thus, we will test Hypotheses 1, 2a, and 2b using detailed employer-employee matched data from Statistics Sweden. Before carrying out these tests we will explain in the next section how we measure the sustainability of a job.

III.B Measuring the "Sustainability" of Firms

In our tests, we will rely on two measures for the sustainability of a job. While we are agnostic about the precise definition of sustainability (see also our discussion in Appendix A), we do

[8] The results using the ISSP data from Sweden are reported in Internet Appendix Table IA.6 (Panel B) and Figure IA.3. The corresponding analysis using U.S. participants in the ISSP survey is reported in Internet Appendix Table IA.9 and Figure IA.4.

think that an increasingly important component of sustainability concerns the impact of firms on the environment (see Hartzmark and Sussman 2019). We build on this idea and construct our primary measure of sustainability based on the extent to which a firm's primary economic activity can be considered environmentally sustainable. Secondly, we also rely on ESG ratings from commercial data providers. These ratings aim to assess the extent to which the policies of a firm address social and environmental concerns and are typically "best in class" meaning that the ESG policies are examined relative to industry peers. While there are several limitations and concerns related to the use of such firm-level ratings (e.g., opaqueness of methodologies, limited data availability in the cross-section and time-series, potential inconsistencies across data providers as well as backfilling of data), we believe that it is still informative to use such data in complementary analysis to study more directly the role of firms', possibly optimal, sustainability policy responses.

III.B.1 Measuring the Environmental Sustainability of Economic Activities: The Sustainability Survey

One intuitive way of measuring the sustainability of a company is to think about the environmental impact of the sector in which a firm operates. Indeed, Hartzmark and Sussman (2019) run a survey on MTurk to examine which elements of a company's business practices are most related to the concept of "sustainability." According to their survey, the majority of respondents believes that the sustainability of a firm's business practices relates primarily to a firm's environmental impact (79%) and its products (48 %).

We build on this idea and design a survey to assess the environmental sustainability of economic activities.[9] To do so, we recruit second year Bachelor students in Economics and Management enrolled in a Corporate Finance lecture in December 2019. We run an incentivized online survey in class and randomly award five gift-vouchers with an approximate value of $50 each to respondents who finish the survey. In the survey, students are asked to (i) answer several questions regarding the importance of environmental aspects in choosing an employer and (ii) classify economic sectors in terms of their environmental sustainability (1=unsustainable, 5=sustainable). We focus on 95 economic sectors that cover 98% of employment in our matched worker-firm data. Appendix D shows the survey questions in greater detail.

Each survey participant is asked to classify 35 randomly drawn economic sectors in terms of sustainability, which leads to about 42 survey responses for each sector. Fifty four percent

[9] Appendix B provides more detail on the survey.

of the respondents are women and the median birth year is 1998. The median time taken to complete the survey is about 7 minutes (See Appendix Table B.1). In Panel A (B) of Appendix Table B.2, we provide an overview of the ten most sustainable (unsustainable) industries according to the 124 survey participants of the 2019 survey run. The responses are highly plausible with undoubtedly unsustainable activities such as manufacture of refined petroleum products or mining of coal being classified as most unsustainable, while activities such as recycling of metal waste and scrap as well as education are being classified as most sustainable. Generally speaking, the most sustainable activities relate to health, education, and recycling, while activities related to fossil energy sources, production involving chemicals, and air transportation are classified as being unsustainable. We repeated the survey in December 2020. We find that the asessment of the sustainability of different industries is very stable across the 2019 and 2020 cohorts, with the correlation being 0.92. Appendix Figure B.1 in Appendix B shows a scatterplot of the sector-level sustainability measures in 2019 and 2020. In unreported analysis, we also replicate our baseline regressions and find very similar results when using the 2020 survey only, or an average of the 2019 and 2020 survey to construct the sustainability measures at the sector-level.

Classifying sectors in terms of environmental sustainability might be obvious for some economic activities, but difficult for others. Therefore, we allow survey participants to choose the response "Do not know" (DNK). We examine the issue of DNK responses more systematically by plotting the percentage of DNK answers conditional on the average sustainability the survey participants attach to an industry. We proceed as follows: we first calculate the fraction of DNK answers for each sector. Then, based on the sector's average sustainability, we group all sectors into five quintiles from unsustainable (first quintile) to sustainable (fifth quintile) and calculate the average percentage of DNK answers of all sectors that belong to that quintile. Intuitively, the bar chart displayed in Appendix Figure B.2 suggests a hump-shape, indicating that sectors that end up in the middle of the environmental sustainability distribution are more difficult to classify in terms of their environmental sustainability (i.e., a higher fraction of DNK responses). In contrast, there is less uncertainty about the most sustainable and unsustainable sectors in the tails, as evidenced by a lower fraction of DNK answers. Hence, our empirical analysis will use primarily specifications that focus on the most informative parts of the distribution of the survey-based environmental sustainability measure.

III.B.2 Commercial ESG Ratings assessing Corporate Policies, Practices, and Processes

While the environmental sustainability of a firm's primary economic sector is one way of thinking about a firm's sustainability, a second dimension is to evaluate a firm's sustainability policies. There are now many commercial data providers that rank and score firms in terms of their ESG policies, practices, and processes. While it might be difficult for firms to change their primary economic activity (e.g., selling coal, drilling oil, selling tobacco and alcohol), firms can choose to implement better environmental policies to mitigate the negative impacts of their activities. The quality of these policies is what we intend to capture using ESG ratings.

Despite the recognition that ESG ratings for the same firm can disagree across data providers (see Berg, Koelbel, and Rigobon 2020; Gibson, Krueger, and Schmidt 2021), such measures have been used in prior economics and finance research (see, for example, Hong and Kostovetsky 2012; Lins, Servaes, and Tamayo 2017; Liang and Renneboog 2017). To address the issue of disagreement[10] and ensure robustness of our results, we use ESG scores from two different data providers, namely MSCI and Refinitiv. We choose these data providers because they provide data for a meaningful number of Swedish firms.[11] Note that besides the limitations of ESG scores in terms of disagreement and methodologies, another limitation of these measures is that they are generally only available for publicly listed companies and in more recent periods. This is a big advantage for our sector-level measure, which we can use for 98 percent of our employment data.

IV The Sustainability Wage Gap: Do Sustainable Sectors Pay Lower Wages?

To test the main hypothesis that workers are willing to work for lower wages in more sustainable sectors and firms, we make use of administrative employer-employee matched data of the Swedish population, which we match with our survey-based measure described in the previous section.

In our survey, we also investigate whether participants would consider working for lower wages in more environmentally sustainable firms. About 60% of the participants state that they

[10] Using a sample of S&P500 firms between 2010 and 2017 and ESG scores from seven different ESG data providers, Gibson, Krueger, and Schmidt (2021) find that the average correlation for the total ESG score is about 0.45.

[11] In Section 4 of the Internet Appendix, we provide further details and background on the ESG ratings data we use in the paper.

would be willing to accept a wage cut to work for a more environmentally sustainable firm. The average wage concession is about 17% (15% as the median).[12] While this result is supportive of our main hypothesis and its magnitude in line with some experimental evidence on job advertisements (see Burbano 2016), it remains unclear whether intentions expressed in surveys also translate into real choices in the labor market, which is why we examine administrative employer-employee matched data from Sweden.

Our main data source for the administrative worker information is the Longitudinal Integration Database for Health Insurance and Labor Market Studies (LISA), provided by Statistics Sweden (SCB). LISA contains employment information (such as employment status, the identity of the employer, and occupation), tax records (including labor and capital income), and demographic information (such as age, education, and family composition) for all individuals 16 years of age and older, domiciled in Sweden, starting in 1990. In LISA, the sector in which an individual works is reported according to the Swedish Standard Industrial Classification (SNI) code at the level of the establishment at which they are employed. Note that a firm can have establishments in different sectors, for instance, if it is a multi-segment firm. For labor income, we use reported annual earnings before tax. Importantly, this information is not censored or top-coded, and includes bonus payments.

We also make use of talent measures consisting of estimates of cognitive and non-cognitive abilities from military aptitude tests. Cognitive ability (similar to IQ) was assessed through subtests covering logic, verbal, spatial, and technical comprehension. The four test results were aggregated into an overall integer valued score ranging from 1 (lowest) to 9 (highest), according to a Stanine (standard nine) scale that approximates a normal distribution with a mean of about 5 and standard deviation of about 2. A certified psychologist assessed the non-cognitive ability score through a 25-minute semi-structured interview. The individual was graded on his willingness to assume responsibility, independence, outgoing character, persistence, emotional stability, and power of initiative. The psychologist would weigh these components together and assign an overall non-cognitive score on a 1 to 9 Stanine scale. We complement these measures with detailed information on secondary education, including high-school grades and track, which enables us to impute a corresponding talent measure for women. See Böhm, Metzger, and Strömberg (2020) for more information on the imputed ability scores for women. Table I provides descriptive statistics of the wage data. All variables are defined and described in

[12] See Appendix Table B.3 in Appendix B.

Appendix Table C.1. The employer-employee matched data is described in further detail in Section 3 of the Internet Appendix.

IV.A Baseline Results

We start our analysis of the administrative data by running standard Mincerian wage regressions augmented by an indicator variable capturing the environmental sustainability of the sector of employment of the individual. In our baseline regression, we use the dummy variable *Sustain. (high)*, which is equal to one if the sector belongs to the top sustainability quintile of all sectors.[13] Consistent with Hypothesis 1, Column (1) in Panel A of Table II shows that male workers earn about 19% less if they work in sectors considered to have high environmental sustainability. The corresponding analysis for women in Panel B shows consistent evidence, though the coefficient estimate is slightly smaller (about 17%).[14] Interestingly, the magnitude of the effect is quite similar to the wage concession of 17 % that we find in our survey of Bachelor students (see Appendix Table B.3).

Although we control for education and experience, there is the concern that other omitted factors explain why workers or occupations in more sustainable sectors are less productive. For instance, education is a very broad measure of ability and there might be considerable variation among university graduates. To address this concern, we control for cognitive and non-cognitive skills from military enlistments tests (or predicted cognitive skills for women) in Column (2). Those measures have been found to be very informative for labor related outcomes (see Lindqvist and Vestman 2011 or Böhm, Metzger, and Strömberg 2020). Interestingly, once we control for these skill measures, the coefficient estimates on the sustainability dummy increase to 20% (19% for women).[15]

In columns (3) to (5) we make use of different granularities of occupation-year fixed effects, controlling for occupation-specific, time-varying heterogeneity.[16] In the specification with the highest level of granularity, i.e., the specification in Column (5), we find that the wage difference between workers in the same occupation, of the same education, same experience,

[13] We describe alternative specifications allowing for different functional forms later in the paper and find robust results.

[14] We cluster standard errors at the firm-level. In Internet Appendix Table IA.1, we take several alternative structures for the error terms into consideration. Our results remain robust to various ways of clustering.

[15] While we cannot directly measure worker productivity, our analysis of the ISSP survey suggests that individuals who state to have stronger preferences for societal and weaker preferences for monetary aspects of their job are more likely to work harder to help their organization. Please refer to Section III.A for more details.

[16] We employ Swedish Standard Classification of Occupations (SSYK) codes at different level of granularity. The finest level (*Ssyk4*, 4-digit) corresponds to 354 unique occupations, the 3-digit level *Ssyk3* to 113 unique ones, and *Occ8* corresponds to eight unique occupational groups.

same cognitive and non-cognitive skills in sectors with high and low environmental sustainability is about 10% (9% for women). Given that occupational and sectoral choices are sometimes indistinguishable[17], we think of this 10%, which is still very sizeable, as a lower bound for the Sustainability Wage Gap. In the analysis that follows, we will be conservative and focus on males for which we have more detailed and precise skills measures and include occupation-year fixed effects at the highest level of granularity (i.e., *Ssyk4*, 4-digit). In Section VI.A of the paper, we will also address the possible concern that workers might be "stuck" in high-sustainability sectors or occupations by focusing on sectors and occupations that allow workers to move more easily.

In the specification reported in Column (6) of Table II, we also include worker fixed effects to exploit within-worker variation. While there is still a difference of about 5.5% (2.1% for women), there are some concerns with these specifications as they implicitly assume that workers randomly move between firms and sectors. This assumption is unlikely to be true in general and is particularly difficult to defend in our setting. The (timing of) job changes across different sectors might be correlated with some unobservable time-varying characteristics of workers such as expected changes in household compositions or changes of preferences (e.g., due to a "midlife crisis"). Indeed, as we document in Table III, workers are more likely to move into *unsustainable* sectors when getting married or becoming parents and are more likely to move into a more sustainable sector around a divorce. In the analysis conducted in Table III, we focus on the subset of workers who are changing jobs and relate the type of job change (moving into the most sustainable sector / moving into the most unsustainable sector) with changes of worker-level variables around the move (+/- 2 years). This analysis is also informative for an interpretation of panel regressions that exploit within worker variation as those models typically assume that workers' changes across firms are basically random. In later tests, we will partly address the concerns that moves between firms and sectors are not random by also looking at "more" exogenous job changes after firm bankruptcies or mass layoffs to confirm a wage differential in the range of 10-12% as in our previous specifications (see Section VI.A for more details).

Next, we analyze the validity of our environmental sustainability measure as well as its robustness by analyzing different functional forms. In Table IV, Column (1), we use the continuous version of the measure, which we denote by *Sustain. (cont.)*. The point estimate is –0.067 and significant at the 1%-level. The estimated effect is very large in absolute terms,

[17] For instance, the occupation "Health professionals (except nursing)" (*ssyk3* code 222) does not exist outside the health sector.

suggesting that a worker moving from the lowest rated sector to the highest rated sector earns about 27% less. However, our prior analysis implies that it is likely that there are important non-linearities in the effect and, for instance, moving by one notch in the middle of the sustainability distribution is not the same as moving by one notch in the top of the distribution.

In columns (2) and (3), we therefore split the continuous variable into quintiles and terciles. This analysis reveals two interesting facts: i) the wage difference is growing (in absolute terms) monotonously; ii) the results are mostly driven by the highest rated sectors (and to a certain extent by the sectors that are least sustainable). For instance, in Column (2) we see a sizeable difference between the least sustainable sectors (the omitted category) and the sectors in the middle of the distribution (-0.033 to -0.049). We then observe another, even bigger, jump between the most sustainable sectors and the other ones. The point estimate for the dummy identifying the most sustainable sectors is -0.137, suggesting a jump of about 10 percentage points between the most sustainable sectors and the sectors in the second most sustainable category. In terms of insights, the analysis exploring functional forms is similar to the graphical evidence provided in Figure I: using a binned scatter plot on the association between wages and our sustainability measure, the figure showed stronger effects in the tails as opposed to the middle of the sustainability distribution. These non-linear patterns are also consistent with results from auxiliary analysis where we show that people find it relatively straightforward to classify the most sustainable and unsustainable sectors in the tails of the distribution, whereas classifying sectors in the middle of the sustainability distribution appears more difficult.[18]

In Column (4) of Table IV, we define a worker-weighted dummy for high sustainability sectors. More specifically, *Sustain. (high – empl.)* is a dummy variable that is equal to one if the sustainability score of a worker's job belongs to the top 20% of all workers' jobs. Consistent with previous analysis, we find that those workers earn about 11% less than comparable workers in less sustainable sectors. In columns (5) to (8) we re-estimate the same specifications for women and find similar results.

One of the contributions of our paper is to argue that the Sustainability Wage Gap can have important implications for a firm's financial performance as labor costs can represent a sizeable fraction of total costs and are also often large when compared to a firm's asset base. For instance, in our sample, Swedish firms in the middle of the sustainability distribution have a ratio of labor to total expenses of 31.5% and a labor expenses to total assets ratio of 52.3%. Labor expenses are defined as salaries to workers and executives plus social security expenses. The magnitudes

[18] The fraction of "Do not know" survey responses is higher for industries in the middle of the distribution and lower in the left and right tail (see Figure B.2 in Appendix B and the discussion in Section III.B.1 of the paper).

of the ratios are comparable to firms in Compustat North America that report labor expenses between 2000 and 2019, for which we find a median ratio of labor to total operating expenses of about 36%. North American firms from high sustainability sectors according to our industry-level sustainability measure also have comparable ratios of labor expenses to total asset: for instance, firms from sectors such as Health Services (SIC2=80), Educational Services (SIC2=82), and Social Services (SIC2=83) exhibit labor expenses to asset ratios between 32% and 91%.[19]

To illustrate the potentially sizeable firm-level financial implications of the Sustainability Wage Gap, we now conduct several back-of-the-envelope calculations based on the insights from the functional form analysis in Table IV. The estimates in Column (2) of Table IV suggest that the difference in the Sustainability Wage Gap between firms in the 3rd and the 5th quintile of the sustainability distribution (i.e., medium versus high sustainability firms) is 9.8 percentage points (=0.137-0.039). Hence, the estimates imply that if a firm in the middle of the sustainability distribution moves to the top, the firm could possibly lower its wage bill by about 9.8%. The median ROA for firms in the middle of the sustainability distribution is 0.087. We calculate for each firm in the middle of the sustainability distribution the *relative* increase in ROA that would result from a reduction of labor costs by 9.8%. The median of these *relative* increases is 17.5% illustrating the sizeable firm-level financial effects of the Sustainability Wage Gap.[20] A second alternative to illustrate economic magnitudes is to calculate the expected decrease of ROA for a firm that is moving from the top quintile of the sustainability distribution to the middle quintile. The expected relative (absolute) decrease of ROA in this case would be about 22.1% (0.095). Note that firms in the top quintile of the sustainability distribution have higher ROA (partly originating from a lower asset base) as well as a higher fraction of labor costs to total costs (about 57.6%). Overall, these back of the envelope calculations illustrate that more sustainable firms benefit from lower labor costs. However, and as noted before, we cannot observe the net effects of the Sustainability Wage Gap on a firm's profits as we are unable to observe the direct costs associated with investments in more sustainable policies. This specific limitation is not unique to our setting but applies more generally to research concerned with

[19] To calculate the labor cost ratios for firms in the Compustat North America database between 2000 and 2019, we use firms for which Compustat items *sich* (Historical SIC code), *xopr* (Total Operating Expenses), *at* (Assets), and *xlr* (Total Staff Expense) are available between 2000 and 2019. Recent work in finance (see Hartman-Glaser, Lustig and Zhang 2019; Donangelo 2021) has used Compustat item *xlr* to proxy for labor expenses.

[20] Alternatively, we can calculate the median of the absolute increase of ROA for those firms, which is 0.051. Comparing this to the median ROA corresponds to a relative increase of almost 60%. Given the substantial heterogeneity in ROAs and costs structures, we believe that reporting the lower number of 17.5% is more accurate and still very sizeable.

firms' sustainability practices given that detailed firm-level measures quantifying the costs of improving sustainability do not exist.

Finally, we also examine the sustainability wage along the wage distribution by using quantile regressions. Figure II plots marginal effects of different quantiles of worker wages to the sustainability of the sector. Panel A shows the analysis for log wages and Panel B for wages. We document a sizeable wage gap across all quantiles of the wage distribution. In Panel A, we see that the size of the wage gap (in logs) is larger in absolute terms for low wages (e.g., -18.8% at the 10^{th} quantile) and lower for high wages (e.g., -6.6% at the 90^{th} quantile). In Panel B, we see that the Sustainability Wage Gap is increasing in (deflated) Swedish Kronor (SEK) terms. Overall, these results show that working in a more sustainable sector is not just a luxury good available to the best earning individuals and, percentagewise, the wage gap is actually higher for workers in the lower quantiles of the wage distribution.

IV.B The Sustainability Wage Gap for Highly Educated Workers and its Evolution over Time

As discussed in Section III.A, there exists substantial heterogeneity in the worker population with respect to preferences towards sustainability. The ISSP survey data suggest that more talented people care more about societal aspects of their jobs and that these sustainability preferences are increasing over time. This evidence leads to additional predictions, which we can test in our administrative data. These tests are informative and important for at least two reasons.

First, they are helpful in terms of more credibly identifying an effect of sustainability on wages. Any alternative explanation would also need to explain such heterogeneity. For instance, if firing risk or hazardous work conditions were driving the results, it remains unclear why higher educated workers would be more affected by those. If anything, one would expect that higher educated workers could more easily find a new job or have white-collar jobs that expose them less to hazardous work conditions. Moreover, it remains unclear and would need to be explained why alternative channels such as firing risk or hazardous work conditions are becoming more important over time.

Second, if preferences towards sustainability were indeed more relevant for younger cohorts, our findings are expected to become even more important for firms in the future. Younger cohorts (e.g., Generation Y (Millennials) and Generation Z) have entered the labor market and are climbing up the corporate ladder and, hence, accommodating their preferences might become increasingly important for firms to attract and retain the most talented workers. In other

words, given the generational changes in the composition of the work population our analysis carries policy implications of increasing relevance in the future.

Exploiting heterogeneity in the sustainability preferences of the work population, we now test additional predictions in Table V. In the ISSP survey, we measured educational attainment using a dummy variable indicating if the respondent has a university degree. We interpret educational attainment as a proxy for talent and correspondingly use a university dummy in our analysis of the administrative wage data. However, as pointed out by Böhm, Metzger, and Strömberg (2020), using educational attainment as a proxy for talent is problematic in time-series comparisons. Due to a large expansion of education, the cohort of university graduates has increased sharply over the last decades, resulting in a substantial decline of average talent in the group of university graduates. For instance, as shown in Böhm, Metzger, and Strömberg (2020), during 1990–2014, post-secondary attainment rose from 21 % to 37% accompanied by a decline in average cognitive ability of more than a fifth of a standard deviation in the working population. For that reason, we will also use cognitive and non-cognitive skills as measures of talent. The advantage of these detailed measures is that they are comparable over time since the distributions in the population are the same across cohorts. Compared to using the achievement of a university degree as a crude measure of talent, another advantage of the skill-based talent measures is that they are sufficiently detailed to allow analysis of the upper percentiles of the talent distribution. Moreover, it has been documented that especially non-cognitive skills have been of growing importance in the workplace (see Deming 2017).

We focus on the male subsample because the talent measures are of higher quality for men and examine differential effects for groups with different levels of education or skills. In Column (1) of Table V, we test whether there are differences in the Sustainability Wage Gap for workers with and without a university degree. Given that there are workers with different levels of education (or skills) within the same firm, we can now also include firm fixed effects in our specifications, absorbing time-invariant firm-heterogeneity. We find that the interaction term between the sustainability dummy and the university dummy is -3.6%. In columns (2) and (3), we analyze whether there are differential effects for the most talented workers using our measures of cognitive and non-cognitive skills. We define dummy variables *Cog89* (*NonCog89*) that are equal to one if cognitive skills (non-cognitive skills) are either 8 or 9, corresponding approximately to the top 5% of workers according to the skills distributions. Please note that we estimate positive and sizeable coefficients for the main effects of skills (and on top of education). The interaction terms between the dummy variables identifying high-skilled individuals and sustainability are negative (-1.5% and -1.6%, respectively), consistent with

Hypothesis 2a, which states that the Sustainability Wage Gap is more pronounced for more talented workers.

In columns (4) to (6) we investigate whether, as stipulated in Hypothesis 2b, the documented wage gaps are indeed increasing over time, especially for highly educated and talented workers. To test this hypothesis, we include, besides the main effects, double and triple interaction terms between education/talent, our sustainability dummy, and time, which we measure using a linear trend. The results are consistent across the different measures of education and talent. First, we show that the Sustainability Wage Gap is increasing over time. The estimates are between -0.1 and -0.2%. This means that the wage gap is widening by 1-2 percentage points every decade. Second, we document significant estimates on the triple interaction terms (about -0.1 to -0.2%) for university graduates and workers with high non-cognitive skills; we do not find that workers with high cognitive skills earn less in sustainable sectors over time. This finding is interesting and suggests that sustainability preferences are more pronounced for workers with high non-cognitive skills compared to workers with high cognitive skills, dimensions that we cannot disentangle in the ISSP survey. The increase of the effects of sustainability over time for university graduates and workers with high non-cognitive skills are also economically significant as they suggest that the wage gap is increasing by additional 1-2 percentage points every decade. Third, while returns to education are decreasing over time, the returns to skills are increasing over time, especially returns to non-cognitive skills. This also stresses the importance to include the cognitive and non-cognitive skills measure, as educational attainment measures are becoming less informative due to a severe expansion of schooling over time (see Böhm, Metzger, and Strömberg 2020). The finding that the Sustainability Wage Gap is higher for workers with high non-cognitive skills is of particular interest given that this component of skill has been found to be of growing importance (see Deming 2017).

Taken together the results of Table V are supportive of the hypotheses that more talented workers have stronger preferences toward sustainability and are willing to accept lower wages and that these effects are growing over time. These findings increase our confidence in a causal interpretation of the Sustainability Wage Gap as alternative explanations would need to explain those heterogeneities as well.

V Attracting and Retaining Talent

An alternative reading of our main hypothesis is that, fixing wages, more sustainable firms are better able to attract workers that are more talented. We test this hypothesis directly in Panel A

of Table VI. The outcome variables consist of several education and skills based dummy variables. *UNI* and *PhD* are dummy variables equal to one if a worker has obtained a university respectively a doctoral degree. *Cog9*, *Cog89*, *Noncog89*, and *Noncog9* are indicator variables that are equal to one if the cognitive skill measure of a worker takes on values of 8 or 9, which corresponds to the top five percent of the skill distribution. Consistent with our hypothesis, we find that workers in more sustainable firms are indeed more highly educated or talented. For instance, workers with university or doctoral degrees are more likely to work in more sustainable firms (see columns (1) and (2)). When looking at our talent measures, we find results consistent with prior analysis in that the effects are particularly pronounced for non-cognitive skills (see columns (5) and (6)), a dimension of increasing importance (see Deming 2017).

Preferences for sustainability may not only affect reservation wages of workers but also their loyalty to stay with a firm. This hypothesized second channel is also consistent with evidence from the ISSP survey in Section III.A. There we provided evidence that workers who care more about the societal usefulness of their job are also more likely to "turn down another job that offered quite a bit more pay in order to stay with this organization." We make use of the panel structure of the wage data to test whether workers in sustainable sectors are less likely to change firms. We define a *Stay in firm* outcome variable, which is a dummy variable that is equal to one if a worker is still employed with the same firm in the next year.

Table VI, Panel B shows the results using the same setup as in our previous tests using *Stay in firm* as the dependent variable. The interaction terms between our measures of education/talent and the sustainability of the sector are positive and significant. For university graduates and workers with high non-cognitive skills, the likelihood of staying with a firm in the next year increases by about 0.9 – 2.2 percentage points; effects are smaller for workers with high cognitive skills, but these are still positive and significant at conventional levels. In general, an interpretation of these coefficients is not straightforward, however, as the likelihood of a turnover will also depend on other, potentially endogenous, factors such as wages. For that reason, we report regressions with and without wages as additional controls.

While the previous regressions analyze turnover more generally, we are particularly interested in whether more sustainable firms are better able to retain talented workers. For that reason, we aim to distinguish between firings and voluntary turnovers. We consider a worker as fired if i) she moves to a new firm and ii) claims unemployment benefits in the current or in the next year; or if she moves into unemployment in the next year. We define a turnover as voluntary if a worker changes firms and is neither fired nor above 60 years old. In Panel C of

Table VI, we then focus on voluntary turnovers. We find, similar to our previous analysis, that university graduates as well as workers with high non-cognitive skills are less likely to leave a firm on a voluntary basis in a sustainable sector, with the estimated effects being between -0.4% and -0.6%, corresponding to a decrease of about 6% in relative terms. The interaction term between high cognitive skills and the dummy for high sustainability sectors is positive but smaller and non-significant.

Overall, our analyses suggest that university graduates and workers with high non-cognitive skills are more likely to work for more sustainable firms. In addition, they are also more likely to stay with their employer and are less likely to leave on a voluntary basis whenever they work in firms that are operating in more sustainable sectors, despite such firms paying lower wages.

VI Alternative Explanations

While we do not have exogenous variation of sectors'/firms' sustainability, we argue that our findings are more difficult to reconcile with many alternative explanations. In the following, we discuss potential alternative explanations and explain how we address them in our analysis. For instance, some concerns related to worker and especially job and sector heterogeneity might remain, which we address in Section VI.A. In Section VI.B, we discuss alternative explanations regarding the relation between firm performance and sustainability policies and their implications for wages.

VI.A Worker, Job, and Industry Heterogeneity

Workers who select into more sustainable sectors or firms might be less productive than workers in other sectors, which, in turn, could explain lower wages. Our baseline specifications have already addressed parts of such concerns. While we do not directly observe productivity, we made use of our detailed-level administrative data to control for worker characteristics that are expected to be correlated with productivity: on top of standard Mincerian controls, we controlled for detailed cognitive and non-cognitive talent measures from military enlistment tests, variables that have been found to be highly informative in explaining labor market outcomes (see Lindqvist and Vestman 2011 and Dal Bo et al. 2017, for instance). Moreover, the ISSP survey evidence presented in Section III and in Internet Appendix Tables IA.6 and IA.9, also shows that workers with stronger preferences for the sustainability of their jobs are working harder, suggesting that their productivity might be even higher (at least not lower) than

the productivity of workers who care less about such aspects. In some of our next tests, we will analyze job switchers after more exogenous separations related to bankruptcies or massive layoffs. In all these tests the Sustainability Wage Gap remains significant.

Another source of concern could be that heterogeneity at the job- or industry-level might explain our findings. For instance, the composition of jobs might be quite different across industries or there might be other aspects of the job or industry that make working in sustainable sectors more attractive (compensating differentials). We have already addressed such concerns in several ways: First, given that we have information on occupation, we compared two workers working in the same occupation, in the same year but in different sectors. Second, exploiting heterogeneity in workers' preferences, we compared workers within the same firm, controlling for unobserved heterogeneity at the firm-level. As a third and new test, we will now control for other aspects of the job or sector that might be related to wages. For instance, we have information on part-time vs fulltime work, on firing rates, wage risk, flexibility to move across sectors at the worker or sector-level, which we can include as additional controls in our regressions.

We start our additional robustness tests by looking at several subsamples in Table VII. In Column (1), we consider only observations from the most recent years of the sample period (2016-2017), given that our sustainability measure is not time-varying and the survey was conducted in 2019. There is the concern that the sustainability of some sectors may have changed over the full period and that our measure is less relevant for early years of the sample. Focusing on the most recent years does not change the results and the estimates are virtually unchanged (-0.101 vs -0.109). In Column (2), we focus only on full-time workers as there might be the concern that the composition of fulltime vs. part-time workers is systematically different in high vs. low sustainability sectors. However, the estimate is again basically unchanged (-0.103).

The next two tests deal with the concern that workers might be "stuck" in certain industries or occupations. If accumulated human capital is more specific in more sustainable sectors and less valuable in others, outside options might be smaller, negatively affecting the wage progression of workers in those industries or occupations. To address this issue, we look at subsamples of workers that are expected to be more "movable." First, we calculate the concentration of different occupations across sectors, i.e., we calculate how specific occupations are distributed across different sectors using the Herfindahl-Hirschman Index (HHI). We then focus our analysis on occupations with a low sector-specific concentration using cut-offs from the anti-trust literature (HHI < 0.25). This means we are focusing on

occupations that exist in many different sectors, suggesting that movements across sectors are feasible. The specification in Column (3) of Table VII shows the results for this subsample. The estimate on *Sustain. (high)* is -0.114, once again almost unchanged. Next, we directly analyze the movements of workers across different sectors. For that test, we specify a sector-to-sector matrix of job switchers, including those who change firms but stay within the same sector. We then calculate the HHI for each "departing" sector and restrict our analysis to sectors from which workers can move more easily to other sectors (i.e., HHI < 0.25). The specification in Column (4) shows an estimate of -0.90 which is slightly smaller but still very sizeable in absolute terms.

In the last two tests of Table VII, we consider scenarios in which the separation between workers and firms is arguably "more exogenous", addressing the concern that some time-varying omitted factors may bias our estimates (e.g., finding "meaning of life during midlife crises"). In Table III we indeed provided evidence that is consistent with this concern by showing that changes to the family structure are related to moving into the most sustainable or unsustainable sectors. Now, we partly address the concern of endogenous job changes by focusing on workers who had to change jobs because of their firms going bankrupt in the previous year (see Column (5), Table VII) or because their firms experienced a massive layoff of more than 75% of their workforce (see Column (6), Table VII). The results remain basically unchanged in both specifications (-0.119 and -0.103, respectively).

While the presented evidence is consistent with the hypothesis that workers are willing to accept lower wages to work in a sector that is more sustainable, there might still be other aspects of working in those sectors that could possibly explain lower wages but are unrelated to environmental sustainability. For example, there might be compensating wage differentials such as firing risk, hazardous work conditions, work flexibility, or better training opportunities. To control for those (and other) sectoral differences we compute industry averages of variables related to i) firing risk, ii) health risk, and iii) family outcomes (such as being married or having children)[21] and include these averages and their squared values as additional controls. We first include those variables separately by groups in columns (1) to (4) of Table VIII and then pool them all together in Column (5). The coefficient estimates on the high sustainability dummy are not changing much across specifications and lie between -10% and -13%. It is worth noting

[21] For the U.S., Liu et al. (2020) show that firms use maternity benefits to attract certain types of workers. In Sweden, both parents together receive 480 days' parental allowance per child by law and explicit additional maternity benefits offered by firms are expected to be of lower importance. However, different firms may have different cultures that may affect family choices – while we do not have data on those, we can observe heterogeneity in family composition across different industries.

that some of those controls, such as being married or getting children, might be endogenous to the wages, which may bias the estimates. The tests on compensating differentials also help to connect our findings to the literature documenting that companies included in the list of the "Best companies to work for" (BC) outperform other companies (see Edmans 2011 and Edmans, Li, and Zhang 2020). The predictions of being a BC on wages are ambiguous. First, a company might be voted a BC by their workers because they pay *higher* wages. In that case, lower wages in more sustainable sectors are thus inconsistent with the hypothesis that our measure of sustainability is a proxy for BC. Alternatively, it might also be the case that firms end up on the list of "Best companies to work for" because their employees like working in more environmentally sustainable firms. That would be fully consistent with our hypothesis of the Sustainability Wage Gap.

However, BCs may also treat their workers better in non-pay dimensions, allowing those companies to pay lower wages. For instance, they may provide employees with mentorship, skills development, opportunities to step up, or a great corporate culture. We have implicitly tested for some of these alternative explanations to the extent that those dimensions are correlated with our measures of compensating differentials.

An alternative hypothesis that we can explicitly test is that firms in sustainable sectors provide better learning and training opportunities. This could allow those workers to enter a path of higher wage growth (despite lower starting levels) and catch up or even overtake in terms of wages with workers who start in less sustainable sectors. We test this hypothesis non-parametrically in our data. To be specific, we investigate three cohorts of 30-years old men in 1990, 2000, and 2010. We analyze whether they work in sustainable or non-sustainable sectors at age 30 and follow those cohorts over time (until 2017, the last year of our data). We calculate the average wages for those six different groups (three different cohorts times sustainable/non-sustainable sectors) over time. Please note that we do not require that workers stay in their firms or sectors, that they work fulltime (or even work at all) during their career. Indeed, the ability to switch industries, the likelihood of staying employed or of working full time might be all margins (compensating differentials) through which an initial job in a sustainable sector might have positive long-term consequences on wages. Figure III, however, shows that this is *not* the case. First, we see that sustainable jobs pay, on average, less than non-sustainable jobs as documented before. Second, and more interestingly, we do not find that workers who start in sustainable jobs are at higher wage growth rates (and catch up eventually). For all three cohorts, the trajectories of workers who start in sustainable vs. unsustainable sectors are basically

parallel suggesting that the Sustainability Wage Gap remains constant throughout the career of a worker.

While we have presented a battery of tests showing that potential observable compensating differentials such as firing risk, health risk, work flexibility, family outcomes, or future career progression, cannot explain the Sustainability Wage Gap, we cannot formally rule out that there are other dimensions of a firm or job that *are* not correlated with the measures of compensating differentials already included that can (partly) explain the wage gap.[22]

VI.B Other ESG-related Explanations: Customer Awareness, Discount Rates, and Reverse Causation

One of the contributions of our paper is to provide direct evidence on a new channel through which sustainability/ESG can affect firms' cash flows, namely through the reduction of labor costs. As discussed in the literature review, there is increasing evidence of a positive correlation between the quality of a firm's ESG policies and financial performance. Scholars have offered different (non-exclusive) explanations for a beneficial effect of ESG policies on financial performance: increased cash flows, lower discount rate, or a generally larger "corporate pie" to be shared between all stakeholders. Moreover, reverse causation, i.e., well performing firms being more able to invest into improving ESG policies, appears also consistent with most evidence presented in the previous literature. In the following, we discuss these alternative explanations and their implications for wages and wage heterogeneity in more detail.[23]

(1) Investing into ESG might increase free cash flows of a firm, for instance, by allowing to sustain higher margins if customers with sustainability preferences are willing to pay higher prices (see Tamayo and Servaes 2013) or if suppliers are willing to deliver inputs at lower prices to sustainable firms. Explanations of this type would predict that ESG investments should increase the value added, and standard rent-sharing models would then predict higher (or at least not lower) wages for workers in high sustainability firms. Moreover, those explanations do not have any clear predictions on the heterogeneities of the wage gap that we document, i.e., the differential effects for high-skilled workers.

[22] Interestingly, however, we do not find a positive correlation between "Best companies to work for" and being a highly sustainable company. When we compare "Best companies to work for" (BC) to the universe of the Swedish public companies, we document negative correlations between BC and sustainability.
[23] Table IA.3 in Section 1 of the Internet Appendix tabulates the alternative explanations and provides references to related papers.

(2) Investing into ESG might decrease the cost of capital of a firm for two reasons. First, investors might be willing to forego some returns when providing capital to more sustainable firms (Pastor, Stambaugh, and Taylor 2020). For instance, there are governmental programs that support the transition into cleaner production processes by providing cheap loans or loan subsidies. These types of explanation would also predict that workers in high ESG firms would earn higher (or at least not lower) wages and, again, differential implications for high vs. low skilled workers and more recent cohorts are less clear. Second, investing into ESG might decrease the costs of capital by lowering the exposure to systematic risk of the company, e.g., by lowering the dependence on certain types of energy. Lower systematic risk may translate into lower wage risk or lower firing risk, which might then relate to lower wages as risk-averse workers require a risk premium for riskier jobs. The channel, in that case, would go through risk preferences and not directly through preferences for more sustainable jobs. We do not generally object to this interpretation and it also operates through the same margin: more sustainable firms are able to pay lower wages. However, the evidence from the heterogeneity tests are not supportive of a risk explanation. We documented that the wage gap is relatively larger for more talented workers and that it is increasing over time, consistent with heterogeneity in preferences towards sustainable jobs. It is less obvious why we would expect to see similar patterns in risk preferences. If anything, we would expect that more skilled workers are *less* exposed to wage or firing risks as highly skilled individuals have more outside options and lower unemployment risk. Moreover, as we discuss below in more detail, we can directly control for firing risk, for instance, in different sectors.

(3) One plausible explanation for the observed correlations between ESG investments and (financial) performance is simple reverse causation. Firms which are (or expected to be) more profitable are more likely to invest into ESG. In this case, we would expect to see higher (or at least not lower) wages in high ESG firms due to rent sharing.

However, there might be more evolved channels through which ESG policies and wages are associated, without ESG having an effect on wages. For instance, a firm might be more profitable because it is able to pay lower wages for other reasons – and, because of being more profitable, it is also able to invest in its environmental sustainability. While we cannot formally rule out this alternative explanation, we can control for various observable characteristics that might be correlated with a firm's ability to pay lower wages for reasons not related to sustainability (see Section VI.A). Moreover, this alternative explanation also needs to explain the heterogeneity of the documented sustainability gap with respect to talent or cohorts, for

instance (in particular because in the tests exploiting differences in worker preferences for sustainable jobs, we are able to absorb unobserved heterogeneity at the firm-level).

(4) Last, it has been advocated that investments into ESG can help "growing the corporate pie" and sustainability does not need to come at the expense of any stakeholder (see Edmans 2020). In this case, we would also expect to see higher wages in high ESG firms or sectors, but not lower wages.

Overall, we conclude that the alternative interpretations discussed in sections VI.A and VI.B are more difficult to reconcile with the full set of presented results. On the contrary, the results are fully consistent with the set of hypotheses derived from worker preferences toward sustainability and their heterogeneities.

VII Doing Well by Doing Good? Firm-level Evidence

In the previous sections of the paper, we used a survey-based measure of sustainability at the sector-level. Using this measure had several advantages. First, the sustainability of sectors (compared to individual firms) can be easily assessed and judged by potential employees. Second, the methodology we used for the assessment of the sustainability of economic sectors is transparent. The interpretation of commercially available ESG ratings, on the contrary, is not always straightforward: such ratings are complex, their methodologies are often opaque ("black box"), and the ratings rely to a large extent on self-reported data by firms. Third, there is increasing evidence of relatively low correlations between the ESG ratings from different rating providers (see Berg, Koelbel, and Rigobon 2020 and Gibson, Krueger, and Schmidt 2021). Fourth, recent research has also documented changes to the historical ratings by some ESG rating providers (Berg, Fabisik, and Sautner 2021).[24] Finally, historic data on firm-level ESG ratings are available for publicly listed firms only, with the data often being available only for a relatively small number of years, which also severely restricts the sample in both the time-series and the cross-section. In contrast, our survey-based measure allows us to cover firms representing 98% of Swedish employment.

While there are many reasons for *not* using firm-level ESG ratings in our main analysis, we believe that it is still interesting and potentially informative to analyze whether and how wages are related to ESG ratings. Hence, we run some basic tests using ESG ratings from MSCI and Refinitiv (former Thomson Reuters Asset4), two data providers that have been used in finance

[24] We also observe updates in the historic ratings of Refinitiv ESG over time. However, our results remain qualitatively unchanged using different vintages of ESG ratings.

research before (Pedersen, Fitzgibbons and Pomorski 2020; Liang and Renneboog 2017; Ferrell, Liang, and Renneboog 2016). These tests are interesting as they assess firms' sustainability policies relative to their peers ("Best in class"). Note also that ESG ratings seek to primarily assess the sustainability of the ESG policies and practices of firms and not of the sustainability of the products and services a firm sells. Hence, firms can be part of an unsustainable sector (e.g., oil) but still obtain good ESG ratings. While it is more difficult for firms to change their main economic activity or to improve the sustainability of a whole sector to attract and retain talent, firms might be able to improve their ESG practices and policies compared to their peers by, for instance, investing into cleaner production technologies, improving their carbon footprint, and/or sourcing green energy. Those investments might then be rewarded by workers with aligned preferences and firms could "do well by doing good." However, whether an investment in improving ESG policies is cash flow positive or not will also depend on the costs of such an investment. While we believe that our data allow us to relatively precisely measure ESG's contribution to the cash flows through lower wage costs, we do not have an estimate on the cost side, which is a limitation that all other research on ESG is also suffering from.

In our main firm-level tests we focus on the environmental pillar of ESG ratings as the environmental dimension is most closely related to the sector-level measure used in the previous sections and also likely to be easier to interpret by potential workers. Indeed, we believe that it is more straightforward to objectively quantify the quality of a firm's environmental policies and practices since aspects such as water and energy use or greenhouse gas emissions can be measured. In contrast, scoring firms regarding social and governance aspects requires more value judgements and is thus inherently more subjective. In addition, we do not have clear predictions regarding the impact of the social (S) or the governance rating (G) on wages. For instance, the social rating could potentially also incorporate the level of wages. In that case, one would expect a positive relationship between the S rating and wages as ESG data providers are likely to assign higher scores to firms that pay higher wages. On the other hand, some of the aspects of the social rating might also be related to compensating differentials such as work flexibility.

As pointed out before, ESG ratings are relative to industry and geographical peer groups. For example, Refinitiv's ESG scores are "best in class" and are supposed to enable investors to choose companies that have better environmental and social policies than industry peers. Given that governance standards vary more strongly at the country-level, Refinitiv ranks firms relative

to geographic peers when it comes to governance. [25] Refinitiv and MSCI use different industry classifications. We observe that the granularity of their industry peer-groups lies somewhere between a 2- or 3-digit industry classification in our data. In our regressions, we therefore report results using 2-digit and 3-digit industry-year fixed effects, which amounts to comparing firms to an increasingly narrow set of industry peers. Given the small sample of firms for which we have ESG rating data—essentially, we are restricted to publicly listed firms in the most recent years—the choice of the granularity of the industry fixed effects will also affect the number of firms that contribute to the estimation of the effect of the ESG rating on wages. Using 2-digit peer firms, about 95% (85%) of the firms in the Refinitiv (MSCI) sample have at least one industry peer in 2017. This number shrinks to 81% (48%) if we define peer firms at the 3-digit level (see Internet Appendix Tables IA.11 and IA.12). For that reason, we decide to use a 2-digit industry classification in the later tests in which we also investigate the relation between wages and the S and the G pillar of the ESG ratings.

In Panel A of Table IX we show summary statistics for the ESG ratings for Refinitiv and MSCI. We report statistics on the composite ESG scores and the individual components. Refinitiv scores have a support between 0 and 1 whereas that of MSCI lies between 0 and 10. In both cases, higher values indicate better ESG policies.[26] Panel B shows the results from the wage regressions when using the environmental (E) component of the MSCI ESG ratings (columns (1) to (2)) and of Refinitiv (columns (3) to (4)).[27] A firm with a one standard deviation higher score in the MSCI environmental pillar pays 2.65 – 4.92% lower wages; the corresponding findings for the environmental pillar of Refinitiv suggest 1.66 – 1.90% lower wages, hence of comparable magnitude.

We also analyze the effects of the social (S) and governance (G) pillars of the ESG ratings as well as of the composite rating in Panel C. Columns (1) and (2) show that firms that are doing well with respect to the social rating are also paying lower wages on average. A one standard deviation better rating corresponds to 1.39% (1.01%) lower wages for MSCI (Refinitiv). Again, the effects are of similar magnitude across providers. While those findings are consistent with a social preference channel, i.e., workers are willing to give up parts of their wage to work for a company that is doing well in terms of social policies (e.g., does not engage in child labor),

[25] As an example, Refinitiv states that their "ESG Scores are designed measure a company's relative ESG performance, commitment, and effectiveness across the three E, S and G pillars."

[26] Section 4 in the Internet Appendix provides more details and further descriptive statistics on the ESG rating data.

[27] As a "sanity" test, we also use industry-fixed effects at the 1-digit level in unreported analyses. Compared to the 2-digit and 3-digit versions, the coefficient estimates have a flipped sign (MSCI) or are smaller by a magnitude of 10 (Refinitiv). This is expected (and in a way reassuring) given that the ESG scores are relative to industry peers.

the interpretation is less clear. The S component is likely to pick up compensating differentials as well. For instance, the S component includes career development and training, working conditions, and health and safety.

With respect to the governance pillar, we do not have a strong prior as sustainability preferences are expected to be less related to governance aspects. Interestingly and consistently across the two ratings, we find positive associations between the governance ratings and wages (see columns (3) and (4) in Panel C). A one standard deviation increase in the governance rating is associated with 0.70% (1.91%) higher wages for MSCI (Refinitiv). While we cannot be affirmative, we do not believe that the higher wages are driven by preferences (i.e., preferences *against* good governance). It is more likely, that other mechanisms explain this association. For instance, we know from a large literature on corporate governance that good corporate governance is associated with higher firm performance (e.g., Gompers Ishii, and Metrick 2003 or Bebchuk, Cohen, and Ferrell. 2009), maybe because good governance is causing high performance (Cunat, Gine, and Guadalupe 2012) or maybe because of omitted variables or reverse causation (Hermalin and Weisbach 1998; Adams, Hermalin, and Weisbach 2010). In any case, the positive association between the G component of the ESG rating and the wages might be reflective of the high performance of firms with high governance scores. The composite score, being a combination of all three ESG pillars, is negatively correlated with wages (see columns (5) and (6)). A one standard deviation increase in the composite score is associated with 0.29% (0.88%) lower wages for MSCI (Refinitiv) firms. This last finding suggests that the composite rating depends predominantly on the E and S and less on the G pillar.

Overall, the evidence using a firm-level measure of the quality of environmental policies is consistent with our findings using the sector-level sustainability measure. An important implication of the firm evidence of this section is that firms can attract talent at lower wages by investing into environmentally friendly (and maybe also into pro-social) policies, and thus might be able to "do well by doing good."

VIII Conclusion

In this paper, we hypothesize that workers value the environmental sustainability of their jobs and accept lower wages to work in more environmentally sustainable firms and sectors. Using administrative employer-employee matched data from Sweden and sustainability measures at the firm- and sector level, we provide evidence that firms with better sustainability

characteristics tend to pay lower wages (about 10%) and attract and retain workers that are more skilled. We coin this empirical regulatiry as the Sustainability Wage Gap.

Supported by evidence from three waves of a large and representative survey on work orientations from the International Social Survey Programme (ISSP), we argue that workers are willing to give up part of their financial compensation because they derive nonpecuniary benefits related to their preferences to work in more sustainable firms or sectors. Those preferences are more pronounced for highly skilled workers. Consistent with the ISSP survey, we then document important heterogeneities in the Sustainability Wage Gap and show that the wage gap is indeed more pronounced for workers that are more highly skilled and increasing over time. Providing a battery of additional tests, we argue that our results are difficult to reconcile with many alternative interpretations suggested in prior research.

The Sustainability Wage Gap carries important implications for firm value. While many prior studies document a positive correlation between a firm's sustainability characteristics and its financial performance, few studies manage to credibly identify actual mechanisms through which sustainability translates into higher financial performance. We belive to provide evidence of a specific mechanism through which sustainability can positively affect firms' bottom line, namely through lowering a firm's wage bill. We argue that most other explanations such as a customer awareness channel or lower discount rates are not consistent with the presented evidence on wages. Moreover, we exploit detailed worker-, occupation, and sector-level data as well as heterogeneity of workers' preferences to address remaining concerns related to omitted variables.

Our findings are particularly relevant for firms today as younger cohorts such as generations Y (Millennials) and Z are entering the labor market and climbing the corporate ladder. Accommodating the sustainability preferences of these younger workers—who arguably care more about sustainability aspects than preceding generations such as Baby Boomers or the Silent Generation—might be a decisive factor for firms to attract and retain the most talented workers and hence remain competitive in the future.

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Figures

Figure I: Wages and Sustainability

This figure shows a binned scatterplot of the relation between wages and sustainability. *Wages* are measured in (deflated) Swedish Kronor (SEK) terms. *Sustainability* is an industry-level sustainability measure ranging from 1=Unsustainable to 5=Sustainable. We control for occupation, education, potential experience, and cognitive and non-cognitive skills. Given that we have more precise skill measures for men, we focus on men. The sample period spans the last three years for which we have data (2015-2017). Data come from Statistics Sweden (SCB) and the sustainability survey.

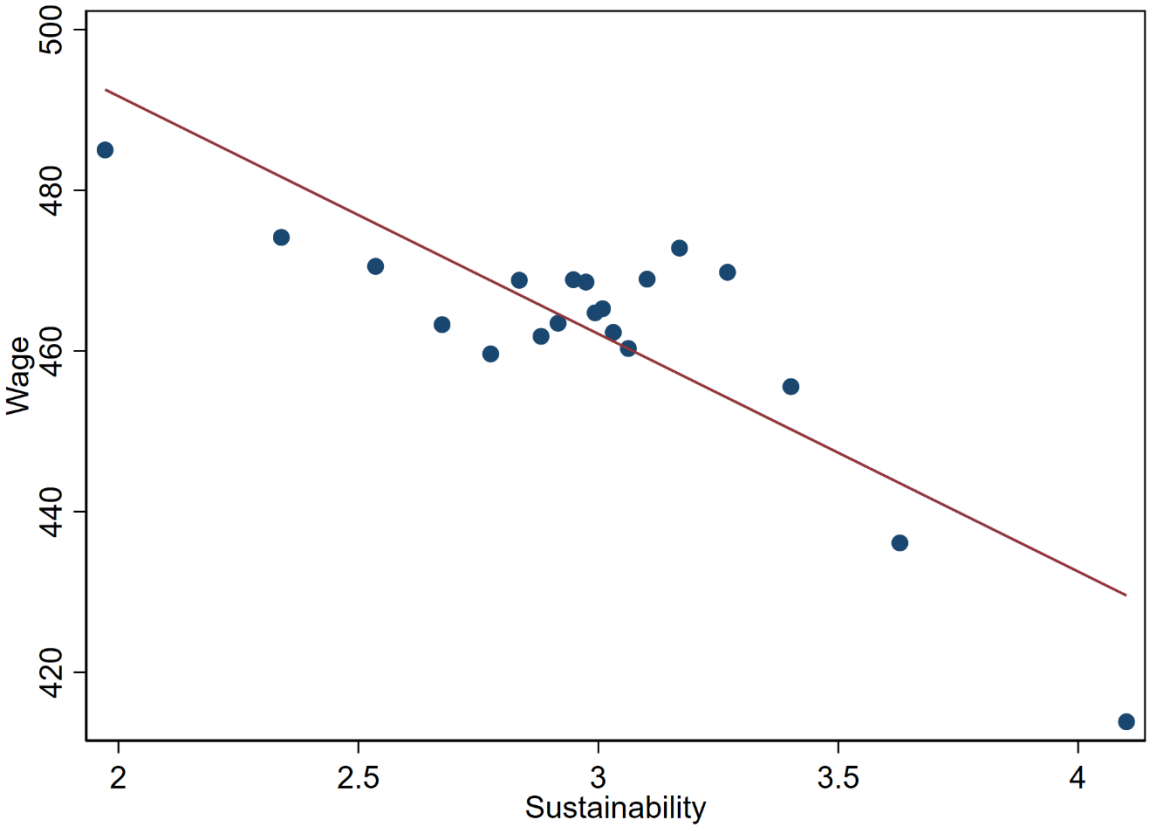
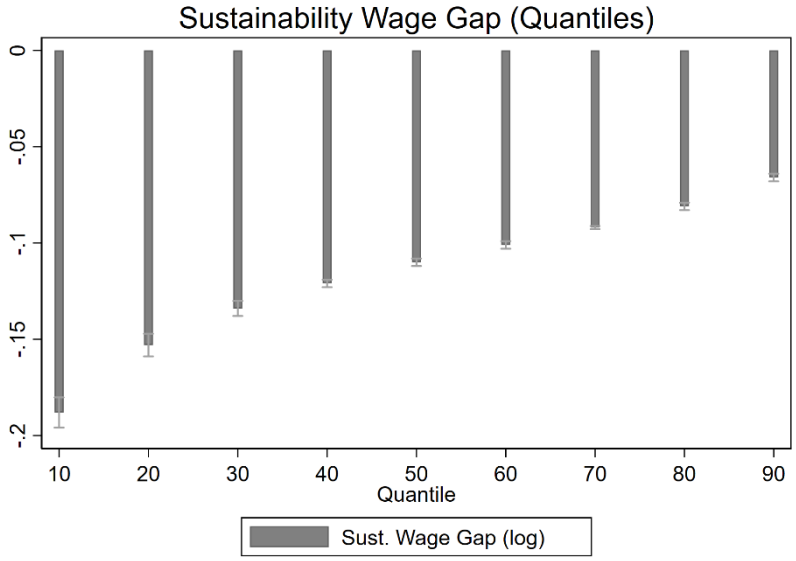


Figure II: Sustainability Wage Gap (Quantiles)

This figure shows the Sustainability Wage Gap for different quantiles of the wage distribution. We plot the coeffcient estimates obtained for the baseline *Sustain. (high)* dummy variable from estimating Mincerian-like wage regressions. In Panel A, the dependent variable is *Log(Wages)* which is regressed on the dummy variable for sustainability *Sustain. (high)*, which equals one if the industry belongs to the top quintile of the sustainability distribution (i.e., most sustainable sectors). We control for years of schooling and potential experience, cognitive and non-cognitive skills, as well as occupation-year fixed effect (at the 4-digit level). In Panel B, we use deflated wages as the outcome. Please note that for computational reasons we worked with a random subsample. The detailed regression results are reported in Internet Appendix Table IA.2. All variables are described and defined in Appendix Table C.1.

Panel A: Log(Wages)



Panel B: Wages

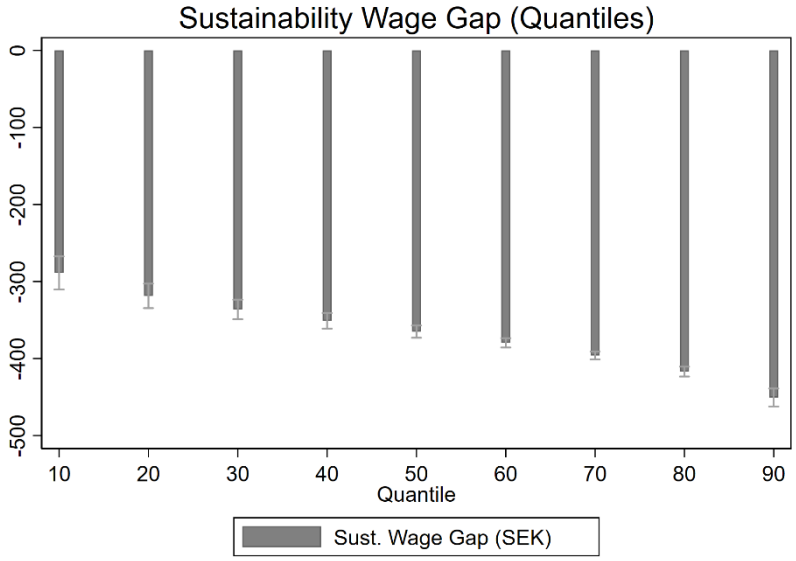
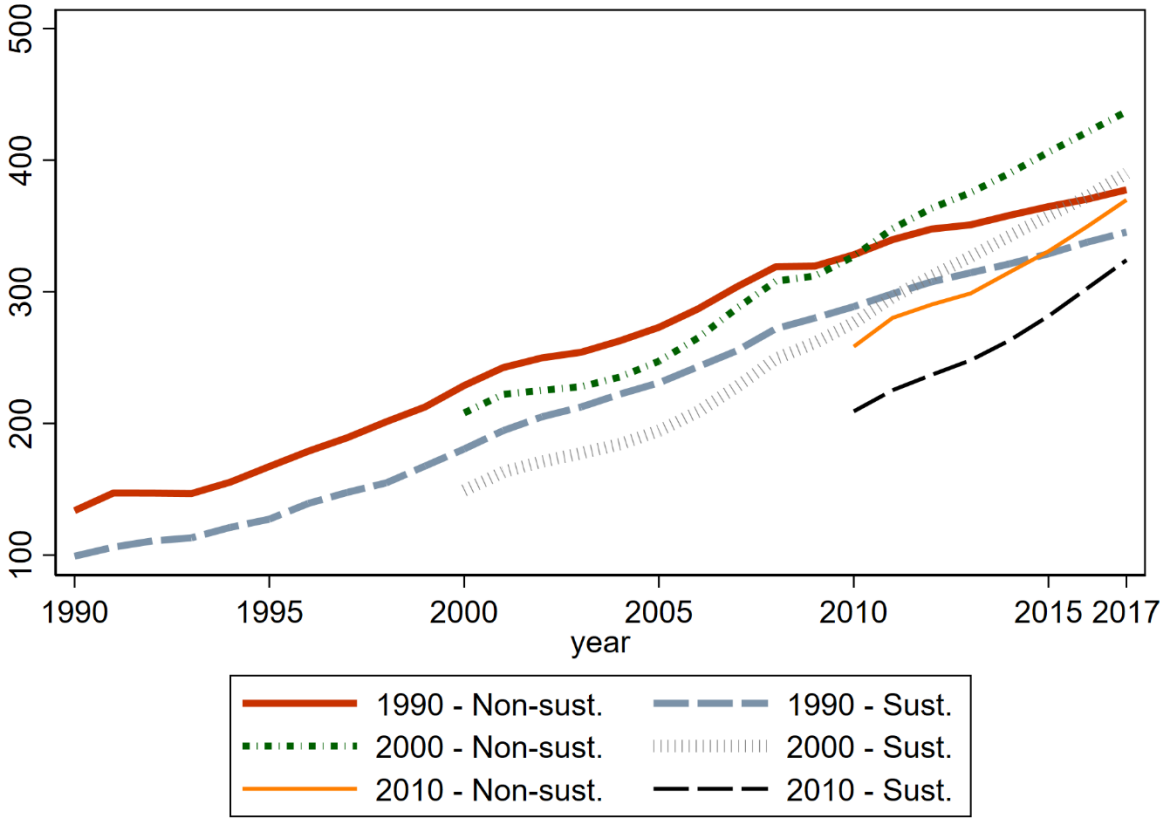


Figure III: Wage Profiles

This figure shows the wage profiles of three cohorts (1990, 2000, and 2010) of 30-year old men. Individuals are grouped into "Sustainable" and "Non-sustainable" groups based on the sustainability of their employment at the beginning of the sample. Individuals stay in those groups irrespective of their future career development including firm changes, sector changes, fulltime vs parttime work or unemployment. For each group we plot the mean wage over time. Data come from Statistics Sweden (SCB) and the sustainability survey.



Tables

Table I: Descriptive Statistics (Administrative employer-employee matched data)

This table reports descriptive statistics of the main variables used in the worker-level analysis. Panel A examines the wage-related data. Panel B shows summary statistics of demographic variables and the talent measure. Panel C displays descriptive statistics of the industry-level sustainability measures. Detailed definitions and explanations of all variables is provided in Appendix Table C.1.

	Obs in millions	**mean**	**sd**	**p10**	**p25**	**p50**	**p75**	**p90**
Panel A: Labor-related variables								
Ln(Wages)	56	7.67	0.65	6.85	7.41	7.76	8.03	8.33
Stay in job	52	82.6%	38.0%	0.0%	100.0%	100.0%	100.0%	100.0%
Voluntary turnover	14	8.9%	28.5%	0.0%	0.0%	0.0%	0.0%	0.0%
Panel B: Demographic and education variables								
Female	56	50.5%	50.0%	0.0%	0.0%	100.0%	100.0%	100.0%
Age	56	42.49	12.60	25.00	32.00	43.00	53.00	60.00
Married	56	45.0%	49.8%	0.0%	0.0%	0.0%	100.0%	100.0%
Divorced	56	10.8%	31.1%	0.0%	0.0%	0.0%	0.0%	100.0%
Children	56	53.7%	49.9%	0.0%	0.0%	100.0%	100.0%	100.0%
Schooling	56	12.31	2.63	9.00	10.50	12.00	13.50	16.00
UNI	56	23.40%	42.30%	0.00%	0.00%	0.00%	0.00%	100.00%
Pot. Exp.	56	23.32	12.68	6.00	13.00	23.00	34.00	41.00
Cog. Skills	18	5.13	1.92	3.00	4.00	5.00	6.00	8.00
Cog. = 9	18	4.20%	20.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Cog. = 8 or 9	18	11.80%	32.20%	0.00%	0.00%	0.00%	0.00%	100.00%
Non-cog. Skills	17	5.09	1.71	3.00	4.00	5.00	6.00	7.00
Non-cog. = 9	17	1.60%	12.50%	0.00%	0.00%	0.00%	0.00%	0.00%
Non-cog. = 8 or 9	17	7.50%	26.40%	0.00%	0.00%	0.00%	0.00%	0.00%
Pred. cog. Skills	31	4.42	2.84	1.00	2.00	4.00	7.00	8.00
Panel C: Sustainability measures from KMW survey								
Sustain. (high)	56	47.1%	49.9%	0.0%	0.0%	0.0%	100.0%	100.0%
Sustain. (cont.)	56	3.315	0.819	2.314	2.729	3.154	4.022	4.45
Sustain. (high - empl.)	56	22.3%	41.6%	0.0%	0.0%	0.0%	0.0%	100.0%

Table II: The Sustainability Wage Gap – Baseline Results

The table shows results from estimating Mincerian-like wage regressions. The dependent variable is log of wage which is regressed on the dummy variable *Sustain. (high)*, which equals one if the industry belongs to the top quintile of the sustainability distribution (i.e., most sustainable sectors). Panel A (B) estimates the specifications for the subsample of men (women). We control for year of schooling and potential experience. In Column (2) through (5) we add skill controls (*Cog./Non-cog skills.* for men and *Predicted cognitive* skills for women). In addition, the specifications across the columns include different fixed effects in the estimation. In columns (3) to (6), we include occupation-year fixed effects at different levels of granularity. *Occ8* corresponds to eight unique occupational groups, *Ssyk3* is a 3-digit level classification using 113 unique occupations, and *Ssyk4* (4-digits) is the most granular classification, corresponding to a total of to 354 unique occupations. Column (6) controls for unobserved worker heterogeneity. All variables are described and explained in Appendix Table C.1. Standard errors are clustered at the firm-level. ***, **, * indicates statistical significance at the 1, 5 and 10% level, respectively.

Panel A: Men

	Ln(Wages)					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Sustain. (high)	-0.189***	-0.199***	-0.162***	-0.116***	-0.101***	-0.055***
	(0.010)	(0.009)	(0.007)	(0.005)	(0.005)	(0.002)
Schooling	0.070***	0.063***	0.036***	0.030***	0.029***	0.046***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
Pot. Experience	0.065***	0.060***	0.051***	0.047***	0.046***	-0.013***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.003)
Pot. exp. (squared)	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Obs	25,877,063	16,127,269	14,449,481	18,092,264	16,127,255	16,029,204
Skills	No	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	No
Year f.e.	Yes	Yes	No	No	No	No
Year##Occ. f.e.	No	No	Occ8	Ssyk3	Ssyk4	Ssyk4
Person f.e.	No	No	No	No	No	Yes
R-squared	0.254	0.288	0.376	0.402	0.426	0.718

Panel B: Women

	Ln(Wages)					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Sustain. (high)	-0.169***	-0.186***	-0.132***	-0.087***	-0.081***	-0.021***
	(0.010)	(0.008)	(0.006)	(0.006)	(0.005)	(0.003)
Schooling	0.067***	0.064***	0.023***	0.029***	0.026***	0.148***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.004)
Pot. Experience	0.056***	0.052***	0.042***	0.039***	0.038***	0.113***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.004)
Pot. exp. (squared)	-0.001***	-0.001***	-0.001***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Obs	26,410,017	14,365,662	11,972,313	15,199,462	14,365,602	14,276,399
Skills	No	Pred. cog.	Pred. cog.	Pred. cog.	Pred. cog.	No
Year f.e.	Yes	Yes	No	No	No	No
Year##Occ. f.e.	No	No	Occ8	Ssyk3	Ssyk4	Ssyk4
Person f.e.	No	No	No	No	No	Yes
R-squared	0.237	0.272	0.321	0.334	0.346	0.565

Table III: Moving into Sustainable and Unsustainable Sectors

The table analyzes worker-level determinants for moving into the most sustainable sectors (Sustainability score = 5) in Column (1) and most unsustainable sectors (Sustainability score = 1) in Column (2). The sample focuses on workers who move across firms. *Child born* is a dummy variable equal to one if the worker is becoming a parent +/- 2 years around the move. Similarly, *Married* and *Divorced* are dummy variables equal to one if the person got married or divorced during that period. We include education in years as a control as well as age groups fixed effects, cognitive and non-cognitive skill category fixed effects, and year fixed effects in the models. ***, **, * indicates statistical significance at the 1, 5, and 10% level, respectively.

	Move into the most *Sustainable* Sector (1)	**Move into the most *Unsustainable* Sector (2)**
Child born	-0.004***	0.001**
	(0.000)	(0.000)
Married	0.000	0.002***
	(0.001)	(0.000)
Divorced	0.004***	-0.001**
	(0.001)	(0.001)
Obs	3,833,612	3,833,612
Sample	Men	
Age groups (5yrs)	Yes	Yes
Education	Yes	Yes
Skill dummies	Cog./Non-cog.	Cog./Non-cog.
Year f.e.	Yes	Yes
R-squared	0.003	0.003

Table IV: The "Sustainability Wage Gap" – Functional form

The table displays estimation results for different functional forms of our sustainability measure. Columns (1) to (4) are estimated for men and we provide the corresponding analysis for women in columns (5) to (8). In Column (1) we use the continuous version of our environmental sustainability measure. In columns (2) and (3) we split the continuous variable into quintiles and terciles. In Column (4), the sustainability measure is a worker-weighted dummy which equals one if the sustainability score of a worker's job belongs to the top 20% of all workers' jobs. We use the same specifications in the estimation for the female subsample in columns (5) to (8). *Year##Occupation* fixed effects are based on the 4-digit classification *Ssyk4*, corresponding to 354 unique occupations. All variables are defined and explained in Appendix Table C.1. Standard errors are clustered at the firm-level. ***, **, * indicates statistical significance at the 1, 5 and 10% level, respectively.

	Ln(Wages)							
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Schooling	0.029***	0.029***	0.027***	0.028***	0.026***	0.026***	0.024***	0.025***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Pot. experience	0.046***	0.046***	0.045***	0.046***	0.038***	0.038***	0.037***	0.038***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pot. exp. (squared)	-0.001***	-0.001***	-0.001***	-0.001***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sustain. (cont.)	-0.067***				-0.054***			
	(0.003)				(0.004)			
Sustain. quintile = 2		-0.033***				-0.084***		
		(0.009)				(0.014)		
Sustain. quintile = 3		-0.039***				-0.058***		
		(0.008)				(0.014)		
Sustain. quintile = 4		-0.049***				-0.087***		
		(0.010)				(0.015)		
Sustain. quintile = 5		-0.137***				-0.150***		
		(0.009)				(0.014)		
Sustain. tercile = 2			-0.046***				-0.038***	
			(0.006)				(0.010)	
Sustain. tercile = 3			-0.088***				-0.093***	
			(0.007)				(0.010)	
Sustain. (high - empl.)=1				-0.111***				-0.049***
				(0.007)				(0.004)
Obs	16,127,255	16,127,255	15,707,683	16,127,255	14,365,602	14,365,602	13,790,879	14,365,602
Sample	Men				Women			
Skills	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Pred. cog.	Pred. cog.	Pred. cog.	Pred cog.
Year##Occ. f.e.	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4
R-squared	0.426	0.426	0.418	0.425	0.347	0.347	0.339	0.346

Table V: Education, Skills, and Cohorts

The table displays differential effects of sustainability on wages for groups with various education and skill levels. In columns (1)-(3) we focus on groups with different educational background, i.e. groups with or without a university degree and different levels of cognitive and non-cognitive skills. In columns (4)-(6), we estimate specifications on different cohorts to test the hypothesis whether the Sustainability Wage Gap for highly educated and talented workers is increasing over time. All specifications are estimated only for the male subsample. *Year##Occupation* fixed effects are based on the 4-digit classification *Ssyk4*, corresponding to 354 unique occupations. All variables are defined and explained in Appendix Table C.1. Standard errors are clustered at the firm-level. ***, **, * indicates statistical significance at the 1, 5 and 10% level, respectively.

	Ln(Wages)					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Schooling		0.025***	0.025***		0.025***	0.025***
		(0.001)	(0.001)		(0.001)	(0.001)
Potential Experience	0.044***	0.045***	0.045***	0.045***	0.045***	0.045***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pot. exp. (squared)	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
UNI=1	0.124***			0.218***		
	(0.003)			(0.007)		
UNI=1 # Sustain. (high)=1	-0.036***			-0.004		
	(0.005)			(0.010)		
Cog89=1		0.022***			-0.008	
		(0.002)			(0.005)	
Cog89=1 # Sustain. (high)=1		-0.015***			-0.006	
		(0.004)			(0.007)	
Noncog89=1			0.076***			0.027***
			(0.002)			(0.004)
Noncog89=1 # Sustain. (high)=1			-0.016***			0.012**
			(0.003)			(0.006)
Sustain. (high)=1 # Year				-0.001**	-0.002***	-0.001***
				(0.000)	(0.000)	(0.000)
UNI=1 # Year				-0.005***		
				(0.000)		
UNI=1 # Sustain.(high)=1 # Year				-0.002***		
				(0.000)		
Cog89=1 # Year					0.001***	
					(0.000)	
Cog89=1 # Sustain. (high)=1 # Year					-0.000	
					(0.000)	
Noncog89=1 # Year						0.003***
						(0.000)
Noncog89=1 # Sustain.(high)=1 # Year						-0.001***
						(0.000)
Obs	16,582,560	17,620,365	16,671,553	16,582,560	17,620,365	16,671,553
Sample				Men		
Skills	Cog./Non-cog.	No	No	Cog./Non-cog.	No	No
Year##Occ. f.e.	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4
Firm f.e.	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.569	0.565	0.568	0.569	0.565	0.568

Table VI: Attracting and Retaining Talent

This table investigates the effect of workers' preferences for sustainability on the likelihood of joining and staying with the same firm. The outcome variables in Panel A are dummy variables which are equal to one if the worker has a university degree (Column (1)), a PhD (Column (2)), cognitive skills of 9 (Column (3)), cognitive skills of 8 or 9 (Column (4)), non-cognitive skills of 9 (Column (5)) and non-cognitive skills of 8 or 9 (Column (6)). Talent measures of 8 or 9 correspond approximately to the top five percent of the skill distribution. In Panel B, the outcome is defined as a dummy variable which is equal to one if a worker is still working in the same firm in the subsequent year. In Panel C, the outcome is a dummy variable that is equal to one if the worker left the firm voluntarily. *Year##Occupation* fixed effects are based on the 4-digit classification *Ssyk4*, corresponding to 354 unique occupations. Standard errors are clustered at the firm-level. All variables are defined in Appendix Table C.1. ***, **, * indicates statistical significance at the 1, 5 and 10% level, respectively.

Panel A: Attracting Talent

	UNI=1	**PhD=1**	**Cog9=1**	**Cog89=1**	**Noncog9=1**	**Noncog89=1**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Sustain. (high)	0.018***	0.005***	0.001	0.003*	0.003***	0.008***
	(0.002)	(0.001)	(0.001)	(0.002)	(0.000)	(0.001)
Schooling	0.103***	0.010***	0.016***	0.039***	0.004***	0.014***
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Pot. experience	-0.001***	0.001***	0.000**	-0.000**	-0.000***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pot. exp. (squared)	0.000***	-0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln(Wages)	0.015***	0.005***	0.004***	0.009***	0.008***	0.028***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Obs	27,645,708	27,645,708	18,231,600	18,231,600	17,241,940	17,241,940
Sample				Men		
Year##Occ. f.e.	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4
R-squared	0.669	0.346	0.090	0.170	0.022	0.057

Panel B: Stay in Firm

	Stay in firm					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Schooling			-0.001***	-0.004***	-0.001***	-0.004***
			(0.000)	(0.000)	(0.000)	(0.000)
Potential Experience	0.014***	0.008***	0.014***	0.008***	0.014***	0.008***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pot. exp. (squared)	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln(Wages)		0.128***		0.129***		0.128***
		(0.002)		(0.002)		(0.002)
UNI=1	-0.004***	-0.020***				
	(0.001)	(0.001)				
UNI=1 # Sustain. (high)=1	0.017***	0.022***				
	(0.002)	(0.002)				
Cog89=1			-0.005***	-0.008***		
			(0.001)	(0.001)		
Cog89=1 # Sustain. (high)=1			0.002*	0.004***		
			(0.001)	(0.001)		
Noncog89=1					-0.014***	-0.024***
					(0.001)	(0.001)
Noncog89=1 # Sustain. (high)=1					0.009***	0.011***
					(0.001)	(0.001)
Obs	16,554,250	16,554,250	17,590,473	17,590,589	16,643,029	16,643,029
Sample			Men			
Skills	Cog./Non-cog.	Cog./Non-cog.	No	No	No	No
Year##Occ. f.e.	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4
Firm f.e.	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.164	0.180	0.161	0.181	0.164	0.180

Panel C: Voluntary Turnover

	Voluntary Turnover					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Schooling			0.002***	0.002***	0.002***	0.002***
			(0.000)	(0.000)	(0.000)	(0.000)
Potential Experience	-0.004***	-0.003***	-0.003***	-0.003***	-0.004***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pot. exp. (squared)	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln(Wages)		-0.005***		-0.004***		-0.004***
		(0.001)		(0.001)		(0.001)
UNI=1	0.012***	0.013***				
	(0.001)	(0.001)				
UNI=1 # Sustain. (high)=1	-0.006***	-0.006***				
	(0.001)	(0.001)				
Cog89=1			-0.001**	-0.001*		
			(0.000)	(0.000)		
Cog89=1 # Sustain. (high)=1			0.001	0.001		
			(0.001)	(0.001)		
Noncog89=1					0.013***	0.013***
					(0.000)	(0.000)
Noncog89=1 # Sustain. (high)=1					-0.004***	-0.004***
					(0.001)	(0.001)
Obs	16,554,250	16,554,250	17,590,473	17,590,589	16,643,029	16,643,029
Sample			Men			
Skills	Cog./Non-cog.	Cog./Non-cog.	No	No	No	No
Year##Occ. f.e.	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4
Firm f.e.	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.126	0.126	0.118	0.123	0.125	0.125

Table VII: Robustness Tests (Subsamples)

The table shows robustness tests on different subsamples. Column (1) displays the results considering only the most recent years of the sample (after 2015). In Column (2), we show the results on a subsample of full-time workers only. We run the same specification considering only occupations with low sector specific concentration (HHI<0.25 in terms of occupation) in Column (3) and considering sectors that are easier for workers to move out (HHI<0.25) in Column (4). Column (5) and (6) examine the effect on workers who change jobs because of their firm going bankrupt or experiencing large labor reductions exceeding 75% of the firm's workforce. *Year##Occupation* fixed effects are based on the 4-digit classification *Ssyk4*, corresponding to 354 unique occupations. All variables are defined in Appendix Table C.1. Standard errors are clustered at firm-level. ***, **, * indicates statistical significance at the 1, 5 and 10% level, respectively.

	Ln(Wages)					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Sustain. (high)	-0.109***	-0.103***	-0.114***	-0.090***	-0.119***	-0.103***
	(0.002)	(0.009)	(0.005)	(0.005)	(0.023)	(0.007)
Schooling	0.021***	0.028***	0.031***	0.029***	0.023***	0.026***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.004)	(0.001)
Pot. exp.	0.053***	0.040***	0.048***	0.047***	0.028***	0.043***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.002)	(0.001)
Pot. exp. (sq.)	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Obs	1,055,356	5,788,073	11,207,171	12,428,990	13,365	267,334
Sample			Men			
Restriction	> 2015	Fulltime workers	HHI (occ) < 0.25	HHI (SNI3) < 0.25	Bankcr.	>75% labor reduction
Skills	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.
Year##Occ. f.e.	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4
R-squared	0.334	0.539	0.425	0.417	0.282	0.441

Table VIII: Compensating Differentials

The table reports the regression results taking different compensating wage differentials into account. Compared to the baseline regression from Table II, industry averages (and their squares) related to firing risk, health risk, and family outcomes (measuring work flexibility) are included as additional controls. *Year##Occupation* fixed effects are based on the 4-digit classification *Ssyk4*, corresponding to 354 unique occupations. All variables are defined in Appendix Table C.1. Standard errors are clustered at firm-level and ***, **, * indicates statistical significance at the 1, 5 and 10% level, respectively.

	Ln(Wages)				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Sustain. (high)	-0.114***	-0.096***	-0.100***	-0.127***	-0.111***
	(0.005)	(0.005)	(0.005)	(0.006)	(0.010)
Schooling	0.028***	0.029***	0.029***	0.028***	0.028***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Potential Experience	0.045***	0.046***	0.046***	0.046***	0.045***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pot. exp. (squared)	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Obs	16,127,255	16,127,255	15,707,683	16,127,255	14,365,602
Sample			Men		
Controls	Firing	Sick days	Hospitalization	Married, divorced, children	All previous controls
Skills	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.
Year##Occ. f.e.	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4
R-squared	0.426	0.426	0.418	0.425	0.347

Table IX: Firm-level ESG Ratings (MSCI / Refinitiv) and Wages

This table shows summary statistics for the firm-level ESG ratings from MSCI and Refinitiv as well as regression results relating wages to firm-level ESG ratings. Panel A displays summary statistics of the ESG rating data for each data provider. The sample period for the data runs from 2002 to 2017. Panel B shows Mincerian-like wage equations in which we relate wages to the environmental ratings from MSCI (columns (1) and (2)) and Refnitiv (columns (3) and (4)). Moving from specifications in columns (1) and (3) to (2) and (4), we change the level of granularity of the industry classification from two to three digits. In Panel C we report results of Mincerian-like wage regressions using the social, governance, and the composite ESG ratings from both Refinitiv and MSCI as the main explanatory variables. *Year##Occupation* fixed effects are based on the 4-digit classification *Ssyk4*, corresponding to 354 unique occupations. All variables are defined in Appendix Table C.1. Standard errors are clustered at the firm-level. ***, **, * indicates statistical significance at the 1, 5 and 10% level, respectively.

Panel A: Summary Statistics

	count	**mean**	**sd**	**p5**	**p25**	**p50**	**p75**	**p95**
Composite ESG (Refinitiv)	617	0.632	0.294	0.09	0.39	0.75	0.89	0.94
Environmental pillar (Refinitiv)	617	0.662	0.301	0.14	0.38	0.80	0.93	0.95
Social pillar (Refinitiv)	617	0.626	0.289	0.11	0.37	0.71	0.90	0.95
Governance pillar (Refinitiv)	617	0.497	0.227	0.09	0.33	0.53	0.68	0.83
Composite ESG (MSCI)	790	4.91	1.45	2.00	4.00	5.00	6.00	7.00
Environmental pillar (MSCI)	790	5.61	1.89	2.70	4.40	5.40	6.80	9.29
Social pillar (MSCI)	747	5.43	1.73	2.30	4.47	5.40	6.60	8.24
Governance pillar (MSCI)	747	6.30	1.75	3.39	5.00	6.39	7.60	8.82

Panel B: Environmental Rating

	Ln(Wages)			
	(1)	**(2)**	**(3)**	**(4)**
Sustainability	-0.014***	-0.026***	-0.063***	-0.055***
	(0.001)	(0.001)	(0.003)	(0.004)
Schooling	0.035***	0.034***	0.038***	0.037***
	(0.000)	(0.000)	(0.000)	(0.000)
Potential experience	0.047***	0.047***	0.048***	0.048***
	(0.000)	(0.000)	(0.000)	(0.000)
Pot. Exp. (Squared)	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Obs	1,426,168	1,426,110	1,128,860	1,128,826
R-squared	0.453	0.456	0.469	0.473
Sustainability	Environmental pillar (MSCI)		Environmental pillar (Refinitiv)	
Sample	Males	Males	Males	Males
Year##Occ. f.e.	Ssyk4	Ssyk4	Ssyk4	Ssyk4
Year##Industry f.e.	ind2	ind3	ind2	ind3
Skills f.e.	Cog/Non-cog	Cog/Non-cog	Cog/Non-cog	Cog/Non-cog

Panel C: Social, governance, and composite rating

	Ln(Wages)					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Sustainability	-0.008***	-0.035***	0.004***	0.084***	-0.002***	-0.030***
	(0.000)	(0.003)	(0.000)	(0.003)	(0.001)	(0.003)
Schooling	0.035***	0.038***	0.035***	0.038***	0.035***	0.038***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Potential experience	0.047***	0.048***	0.047***	0.048***	0.047***	0.048***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pot. exp. (sq.)	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Obs	1,327,202	1,128,860	1,327,202	1,126,966	1,426,168	1,128,860
R-squared	0.449	0.469	0.449	0.470	0.452	0.469
Sustainability	Social pillar (MSCI)	Social pillar (Refinitiv)	Gov. pillar (MSCI)	Gov. pillar (Refinitiv)	Comp. ESG (MSCI)	Comp. ESG (Refinitiv)
Sample	Males	Males	Males	Males	Males	Males
Year##Occ. f.e.	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4
Year##Industry f.e.	ind2	ind2	ind2	ind2	ind2	ind2
Skills FE	Cog/Non-cog	Cog/Non-cog	Cog/Non-cog	Cog/Non-cog	Cog/Non-cog	Cog/Non-cog

Appendix A: Sustainability, CSR, and ESG

A variety of concepts have been used in the debate on the societal impact of firms. These concepts typically center around the issues of externalities, the role of non-shareholding stakeholders, inter-generational equity, and whether and how firms take into consideration environmental, social, and governance issues. One of these concepts is corporate social responsibility (CSR). While there is no agreement on how to define CSR exactly, it is typically understood to relate to the extent to which firms integrate social and environmental concerns over and beyond what is required by the law.[28] More recently, the concept of corporate sustainability has gained more traction. Like CSR, corporate sustainability also lacks a tightly circumscribed definition, but it is also thought to be about the social and environmental impacts of firms. Importantly, in addition to environmental and social aspects, sustainability also incorporates dimensions of firm governance as well as notions related to the time horizon and inter-generational equity. Sustainability is sometimes equated with the umbrella term ESG.[29]

Given that CSR, sustainability, and ESG are somewhat vague concepts and different people may refer to different things when talking about sustainability, we think that it is difficult to cleanly delineate and formally define these concepts. However, we believe that they are concerned with similar matters, above all how firms address social and environmental issues—or more generally—firms' overall societal impact. In our paper, we assume that measures of CSR, sustainability, and ESG tend to be positively correlated, and we choose to refer to them collectively as "Sustainability" or "ESG." We also use several measures to capture different aspects of sustainability. First, we use data from the ISSP labor survey to capture the societal (or non-financial) preferences of worker preferences for sustainability. Secondly, we use measures that capture the environmental sustainability of a firm's primary activity via our sustainability survey (see also Appendix B). Finally, we use best-in class ESG scores from

[28] For example, the European Commission has defined CSR as "a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis" (see https://bit.ly/3hcMhlC). According to Kitzmueller and Shimshack (2012), the Worldbank's understanding of CSR is about "commitment of businesses to behave ethically and to contribute to sustainable economic development by working with all relevant stakeholders to improve their lives in ways that are good for business, the sustainable development agenda, and society at large."

[29] Lately, the umbrella concept of ESG has received a lot of attention in the Finance industry. The origins of ESG go back to the early days of the UN Global Compact—a non-binding United Nations pact to encourage businesses worldwide to adopt sustainable and socially responsible policies. In the context of the Global Compact, then United Nations Secretary General Kofi Annan sent a letter to leading financial institutions in 2005 asking them "to better integrate environmental, social, and governance issues in analysis, asset management and securities brokerage" (see Gobal Compact 2004), which essentially coined the concept of ESG.

commercial data providers that capture the quality of a firm's ESG policies relative to industry peers.

Appendix B: Survey on Sustainability – Overview

In order to obtain a measure of people's attitude on environmental sustainability of economic activities, we run a survey. In this survey we ask participants about how important environmental policies are for them when making job choices and also ask them to classify industrial sectors in terms of their environmental sustainability. Appendix D displays the survey questions in greater detail.

In the first part of the survey, we asked respondents to evaluate the importance of environmental policies when making job choices, both in absolute terms and relative to other aspects (e.g., job safety, work life balance). We also ask respondents to state a maximum wage concession they would accept for working in a more sustainable firm.

In the second and main part of the survey, participants classify 35 randomly drawn industries out of total of 95 industries in terms of their environmental sustainability. Participants are asked to rate industries from 5=sustainable to 1=unsustainable. Respondents can also choose a "do not know" option. The survey was executed among a group of second year bachelor students in December 2019. The 95 economic sectors that make up 98% of employment in our administrative wage data.

Table B.1 shows summary statistics of the participants. In total, 124 students participated in the survey. 54% were female and the mean/median age 21 years. The median participant answered the survey in about 7 minutes, which is close to the time we spent in our own pilot runs. The average time taken is very high, which is due to one participant taking a long time to finish the survey.

Panel A (Panel B) of Table B.2 provides an overview of the ten most sustainable (unsustainable) industries according to the survey participants. Each participant rated 35 different industries, resulting in, on average, approximately 42 assessments per industry. Overall, the ranking appears plausible. The worst rated sectors are related to fossil energy sources, production involving chemicals, and air transport. In contrast, the highest rated sectors are related to health, education, and recycling. Please note that we do not claim that our survey necessarily measures the "true" / scientific sustainability of a sector, but it measures the perception of their sustainability in the population. We argue, however, that it is the perceived sustainability that is relevant for the labor decisions of workers.

We repeated the sustainability survey with a second cohort of Bachelor students attending the same course in December 2020. Figure B.1 shows a scatter plot between the industry

classifications in the 2019 and 2020 cohort. The graph shows that the classification of sectors is extremely stable over time. The correlation is about 0.92.

We also report the percentage of individuals who were unable to rate a particular industry (% of "do not know"). Those percentages are relatively low in the tails of the sustainability distribution but higher for sectors ranked in the middle. Figure B.2 illustrates this empirically plotting the fraction of “do not know” by quintiles of the average sustainability of the sector (from low sustainability to high sustainability sectors). The figure shows indeed a hump-shaped relationship, with more certainty for the highest and lowest rated sectors. For that reason, we expect our measure to be more informative in the tails.

Table B.3 illustrates how important the survey respondents deem the role of ESG characteristics of a potential employer on their labor choices. The evidence shows that the environmental sustainability of firms’ products or policies is an important point of consideration for most participants. The median response to the question of how important the environmental sustainability of a firm’s products is when choosing an employer is 4=”Important”. Respondents do not seem to distinguish between the importance of the environmental sustainability of products and processes. Consistent with the main hypothesis of our paper, about 60% would accept lower wages to work for a more sustainable firm. The median wage concession is 15%.

Table B.1: Summary Statistics

This table presents summary statistics for the participants in the sustainability survey. The participants are bachelor students in Economics and Management.

	mean	median	N
Female	54%		124
Birthyear	1998	1998	123
Survey duration (in sec)	2561,63	429	124

Table B.2: Sustainability classification of sectors (Bottom 10 and Top 10)

Panel A lists the top 10 sustainable industries from the survey. Panel B presents the bottom 10 sustainable industries. *, **, ***: Significance at 10, 5 and 1%, respectively.

Panel A: Sustainability of industries (Top 10)

		mean	median	% of "do not know"	t-test (H0: mean =3)	p-value	Significance level
1	Education	4.45	5	0.00	10.47	0.0000	***
2	Physical well-being activities	4.44	5	0.00	14.21	0.0000	***
3	Recycling of metal waste and scrap and non-metal waste and scrap	4.33	5	4.26	10.49	0.0000	***
4	Recreational, cultural and sporting activities	4.17	4	0.00	7.67	0.0000	***
5	Research and development	4.02	4	2.17	7.92	0.0000	***
6	Social work activities	4.02	4	2.13	8.64	0.0000	***
7	Human health activities	3.91	4	2.27	5.08	0.0000	***
8	Collection, purification and distribution of water	3.85	4	2.08	5.29	0.0000	***
9	Legal, accounting and management consultancy	3.84	4	1.96	6.68	0.0000	***
10	Veterinary activities	3.72	4	2.70	3.51	0.0012	**

Panel B: Sustainability of industries (Bottom 10)

		mean	median	% of "do not know"	t-test (H0: mean =3)	p-value	Significance level
1	Manufacture of refined petroleum products	1.52	1	2.33	9.40	0.0000	***
2	Extraction of crude petroleum and natural gas	1.54	1	4.65	9.12	0.0000	***
3	Mining of uranium	1.64	1	6.00	8.40	0.0000	***
4	Mining of coal	1.65	1	10.42	8.87	0.0000	***
5	Manufacture of tobacco products	1.68	1	0.00	9.75	0.0000	***
6	Retail sale of automotive fuel	1.68	1	9.52	7.78	0.0000	***
7	Manufacture of chemicals and chemical products	1.74	2	6.52	10.05	0.0000	***
8	Manufacture of aircraft and spacecraft	1.75	2	1.85	9.66	0.0000	***
9	Air transport	1.78	1	1.96	6.68	0.0000	***
10	Manufacture of textiles	1.79	2	0.00	8.44	0.0000	***

Table B.3: Survey responses: Labor choices and wages

The table summarize selected responses to the questions related to labor choices and wages. The scale of responses for Questions 1 and 2 goes from 1 (not important at all) to 5 (very important). Responses to Question 3 can take on values of 0 (No) and 1 (Yes). Responses to Questions 4 and 5 go from 0 to 100 %.

	mean	**median**	**N**
Question 1: When considering a potential employer, how important is the environmental sustainability of the employer's products to you?	3.65	4	124
Question 2: When considering a potential employer, how important are the employer's environmental policies (recycling, greenhouse gas emissions) to you?	3.71	4	124
Question 3: Would you consider accepting a lower wage to work for a firm that is more environmentally sustainable?	0.61	1	124
Question 4: If yes, what is the maximum reduction in wage you would accept in order to work for a more environmentally sustainable firm (in %)?	10.54	10	124
Question 5: If yes, what is the maximum reduction in wage you would accept in order to work for a more environmentally sustainable firm (in %)? **(conditional responding yes to Q3)**	17.20	15	76

Figure B.1: Survey-based measure of Sustainability 2019 vs. 2020

This figure shows a scatterplot of the relation between the environmental sustainability of different economic sectors in the survey carried out in 2020 versus the survey carried out in 2019.

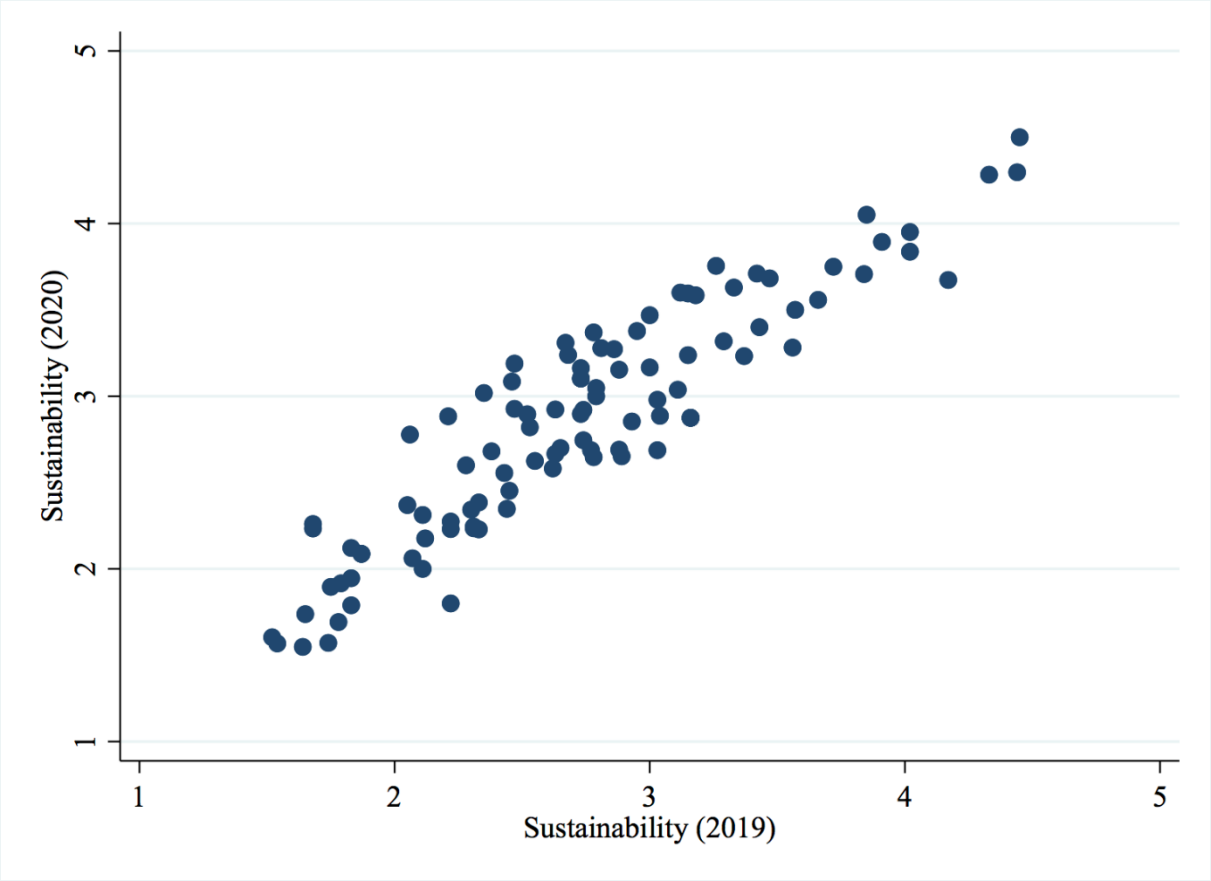
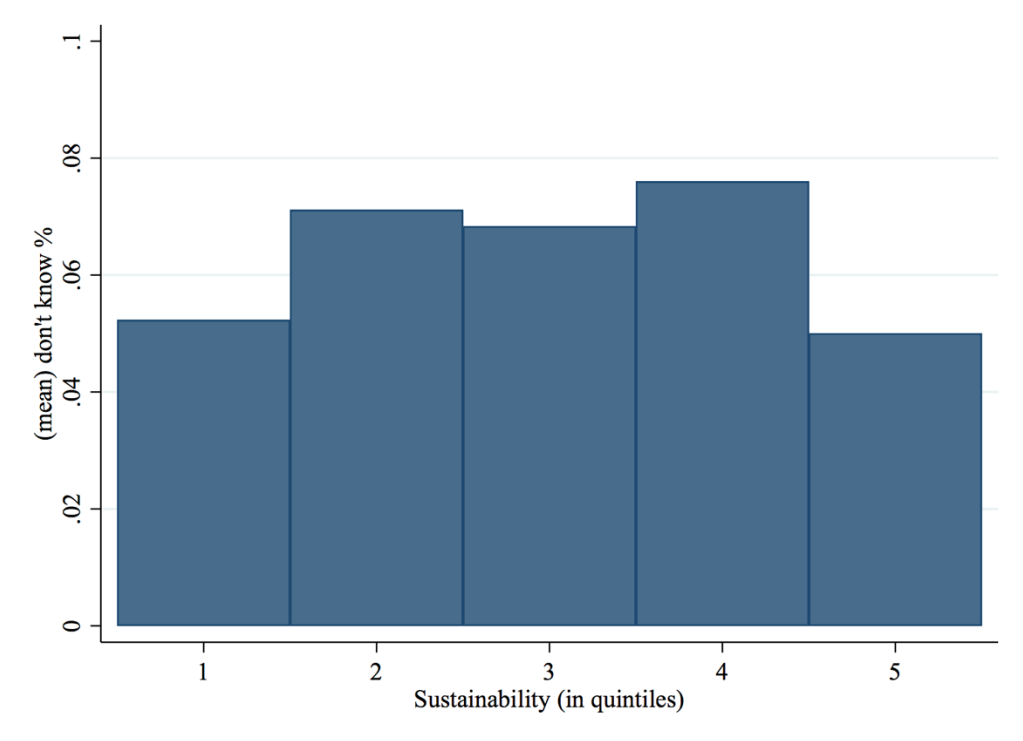


Figure B.2: Sustainability vs. “Do not know”

The bar chart shows the relationship between sustainability of industries and the percentage of “don not know” answers. We split the 95 industries into sustainability quintiles and plot the average percentage of “do not know” answers for each of the quintiles.



Appendix C: Variable Descriptions

Table C.1: Variable Description

This tables presents the definitions and sources of the main variables used in our study.

International Social Survey Programme (ISSP):

Name of variable	Definition	Source
hlpsoc	The importance attached to a job that is useful to society. The scale is from 1 (not important) to 5 (very important).	ISSP
hlpsoc*	Dummy variable that takes on the value of 1 if the importance level of *hlpsoc* equals * (e.g.: *hlpsoc45*).	ISSP
wrkearn	The level of agreement with the statement "A job is just a way of earning money - no more". The scale is from 1 (Strongly disagree) to 5 (Strongly agree).	ISSP
wrkearn*	Dummy variable that takes on a value of 1 if the level of agreement with the statement "A job is just a way of earning money - no more" (*wrkearn)* is equal to * (e.g.: *hlpsoc12*).	ISSP
rhlpsoc	The level of agreement with the statement "My job is useful to society". The scale is from 1 (Strongly disagree) to 5 (Strongly agree).	ISSP
rhlpsoc*	Dummy variable that takes on a value of 1 if the level of agreement with the statement "My job is useful to society" equals to *. (e.g.: *rhlpsoc45*)	ISSP
stayorg	The level of agreement with the statement "I would turn down another job that offered quite a bit more pay in order to stay with this organization". The scale is from 1 (Strongly disagree) to 5 (Strongly agree).	ISSP
stayorg*	Dummy variable that takes on a value of 1 if the level of agreement with the statement "I would turn down another job that offered quite a bit more pay in order to stay with this organization *(stayorg)* is equal to *. (e.g.: *stayorg45*)	ISSP
helporg	The level of agreement with the statement "I am willing to work harder than I have to in order to help the firm or organization I work for succeed". The scale is from 1 (Strongly disagree) to 5 (Strongly agree).	ISSP
helporg*	Dummy variable takes 1 if the level of agreement with the statement "I am willing to work harder than I have to in order to help the firm or organization I work for succeed" *(helporg)* is equal to *. (e.g.: *helporg45*)	ISSP

Employer-Employee matched Data:

Name of variable	Definition	Source
Panel A: Labor-related variables		
Ln(Wages)	Log of wage	LISA (SCB)
defdeklon	Deflated wage	LISA (SCB)
DekLon	Wage	LISA (SCB)
DispInk	Disposable income	LISA (SCB)
LoneInk	Gross salary	LISA (SCB)
full_deklon	Wage of full-time workers	LISA (SCB)
full_dispink	Disposable income of full-time workers	LISA (SCB)
full_loneink	Gross salary of full-time workers	LISA (SCB)
Stay in firm	Dummy variable that takes the value of 1 if the worker is still employed on in the same firm in the next year	LISA (SCB)
Volunt. Turnover	Dummy variable that takes the value of 1 if the worker left the firm voluntarily	LISA (SCB)
Firing	Firing rate in the industry level	LISA (SCB)
Sick days	Average gross sickness days at the industry-level	LISA (SCB)
Hospitalization	Rate of sickness/occupational injury/rehabilitation days at the industry-level	LISA (SCB)
Married	Marriage rate at the industry-level	LISA (SCB)
Divorced	Divorce rate at the industry-level	LISA (SCB)
Children	Rate of workers having children at home at the industry-level	LISA (SCB)
Child born	Dummy variable equal to one if the worker is becoming a parent +/- 2 years around the switching employers	LISA (SCB)
Parttime	Parttime worker rate at the industry-level	LISA (SCB)
ssyk*	Different level of Ssyk occupational classification ranging from Ssyk3 (113 unique occupations) to Ssyk4 (354 unique occupations)	LISA (SCB)
occ8	Occupation classification including 8 categories	LISA (SCB)
ind*	SNI industry classification at different digit levels (e.g. 2 and 3)	LISA (SCB)
Panel B: Demographic and education variables		
Female	Dummy variable that takes 1 if the individual is female	LISA (SCB)
Alder	Age	LISA (SCB)
Schooling	Years of schooling	LISA (SCB)
Potential_Experience	Years of potential experience	LISA (SCB)
UNI=1	Dummy variable takes 1 if the worker went to university	LISA (SCB)
PhD=1	Dummy variable takes 1 if the worker has a PhD degree	LISA (SCB)
Cog. Skills	Cognitive ability score, ranging from 1 to 9	Military enlistment test (SCB)

Cog. Skills*	Dummy variable which equals 1 if cognitive ability score equals to * (e.g., *Cog9*)	Military enlistment test (SCB)
Non-cog. Skills	Non-cognitive ability score, ranging from 1 to 9	Military enlistment test (SCB)
Non-cog. Skills*	Dummy variable which equals 1 if noncognitive ability score equals * (e.g., Non*cog9*)	Military enlistment test (SCB)
Pred. cog. Skills	Predicted cognitive skills, on a 1 to 9 Stanine scale	Military enlistment test (SCB) / LISA (SCB)

Sustainability Measures:

Name of variable	**Definition**	**Source**
Panel A: Survey-based sustainability measures		
Sustain. (high)	Dummy variable that takes a value of 1 if the sector is a high sustainability sector	Authors' survey
Sustain. High – firm year	Dummy variable takes 1 if the firm is in a high sustainability sector within a year	Authors' survey
Sustain. High - firm	Dummy variable that takes a value of 1 if the firm is in a high sustainability sector across years	Authors' survey
Sustain. (high- empl.)	Dummy variable that takes 1 if worker works in a sector that belongs to the top 20% of all workers	Authors' survey
Sustainability or (Sustain.)	Sector-level sustainability measure (continuous)	Authors' survey
Survey_quintile	Sector-level sustainability measure in quintiles	Authors' survey
Panel B: CSR firm level measures		
a4ir_sc	Total sustainbility scores of firms from Refinitiv. The rescaled scores are from 0 to 1.	Refinitiv
envscore_sc	Environmental subscores from Refinitiv. The rescaled scores are from 0 to 1.	Refinitiv
socscore_sc	Social subscores from Refinitiv. The rescaled scores are from 0 to 1.	Refinitiv
cgvscore_sc	Governance subscores from Refinitiv. The rescaled scores are from 0 to 1.	Refinitiv
iva_company_rating	Sustainability scores of firms from MSCI. Scores range from 0 to 10.	MSCI
environmental_pillar	Environmental subscores from MSCI. Scores range from 0 to 10.	MSCI
social_pillar_score	Social subscores from MSCI database. Scores range from 0 to 10.	MSCI
governance_pillar_score	Governance subscores from MSCI database. Scores range from 0 to 10.	MSCI

Appendix D: Survey on Sustainability - Questions

Q0 If you would like to be considered in the draw for the gift-vouchers (“Tirage au sort”), please provide your student number:

Q1 What is your gender?

- ○ Male (1)
- ○ Female (2)

Q2 Which year were you born?

Q3 What is the highest level of education that you have achieved?

- ○ High School (1)
- ○ Bachelors (2)
- ○ Masters (3)
- ○ PhD (4)
- ○ Other (5) _____

Q4 When considering a potential employer, how important is the environmental sustainability of the employer’s products to you?

- ○ Very important (5)
- ○ Important (4)
- ○ Moderately important (3)
- ○ Slightly important (2)
- ○ Not important (1)

Q5 When considering a potential employer, how important are the employer's environmental policies (recycling, greenhouse gas emissions) to you?

- ○ Very important (5)
- ○ Important (4)
- ○ Moderately important (3)
- ○ Slightly important (2)
- ○ Not important (1)

Q6 When making job choices, how important are the following aspects to you?

	Very important (5)	Important (4)	Moderately important (3)	Slightly important (2)	Not important (1)
Compensation & Benefits (1)	○	○	○	○	○
Work-life-balance (2)	○	○	○	○	○
Job safety (3)	○	○	○	○	○
Corporate culture and values (4)	○	○	○	○	○
Products (5)	○	○	○	○	○
Environmental sustainability (6)	○	○	○	○	○
Human Rights record of employer (7)	○	○	○	○	○
Diversity (8)	○	○	○	○	○

Q7 Would you consider accepting a lower wage to work for a firm that is more environmentally sustainable?

- ○ Yes (1)
- ○ No (2)

Q71 If yes, what is the maximum **reduction** in wage you would accept in order to work for a more environmentally sustainable firm (from 0% to 100%)?

Q8 How environmentally sustainable do you consider the following economic activity: [THIS IS AN EXAMPLE INDUSTRY]

Ind - 01 - Agriculture, hunting (Sample question)

- ○ Sustainable (5)
- ○ Somewhat sustainable (4)
- ○ Neutral (Neither sustainable nor unsustainable) (3)
- ○ Somewhat unsustainable (2)
- ○ Unsustainable (1)
- ○ Do not know (0)

THE SUSTAINABILITY WAGE GAP

Internet Appendix

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Contents

1 Additional Tests and Summary of Alternative Explanations

In this section we report additional tests and a summary of the implications that alternative explanations would have for wages and shareholder value.

In Table IA.1 we re-estimate the main specifications using alternative ways of clustering standard errors. Panel A (B) reports the results for men (women). While standard errors vary across specifications, results remain statistically significant throughout.

Table IA.2 shows how the distribution of worker wages varies by the sustainability of the sector she is working in. Panel A shows the analysis for the logarithm of wages and Panel B for wages. We document a sizeable wage gap across all quantiles of the wage distribution. In Panel A, we see that the size of the wage gap (in logs) is larger in absolute terms for low wages (e.g., -18.8% at the 10th quantile) and lower for high wages (e.g., -6.6% at the 90th quantile). In Panel B, we see that the sustainability wage gap is increasing in (deflated) Swedish Kronor (SEK) terms. For computational reasons, we can run the analysis on a 10% random subsample only. We include the same controls and fixed effects as in our baseline model (see Table II in the paper).

Table IA.3 summarizes channels which have been suggested in the literature through which investments in ESG policies might affect firm performance. Each row discusses one alternative channel. Column (2) provides references to related papers. Column (3) suggests alternative explanations which appear to be consistent with that specific channel. As discussed in the main text, reverse causation, i.e., profitable firms investing into ESG, is consistent with most channels. In columns (4) and (5), we discuss the implications of that channel for workers (mostly wages) and for investors. We argue that most of those alternative channels would predict higher wages (or at least not lower wages) for workers in high ESG industries or firms.

Table IA.1: The "Sustainability Wage Gap" – Different ways of clustering

The table displays our baseline results using alternative ways of clustering standard errors. The level of clustering is indicated in the columns. Panel A (B) reports the results for men (women). ***, **, * indicates statistical significance at the 1, 5, and 10% level, respectively.

Panel A: Men

	Ln(Wages)					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Sustain. (high)	-0.121***	-0.121***	-0.101***	-0.101***	-0.101***	-0.101***
	(0.027)	(0.001)	(0.002)	(0.002)	(0.020)	(0.020)
Schooling	0.027***	0.027***	0.029***	0.029***	0.029***	0.029***
	(0.002)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)
Potential exp.	0.059***	0.059***	0.046***	0.046***	0.046***	0.046***
	(0.003)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)
Pot. exp. (squared)	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Obs	16,701,117	16,701,117	16,127,255	16,127,255	16,127,255	16,127,255
Sample	Men					
Clustering	Ind3	Person	Firm-Year	Person, Firm-Year	Ind3, Firm-Year	Ind3, Firm
Skills	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.
Occ. - year f.e.	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4
R-squared	0.391	0.391	0.426	0.426	0.426	0.426

Panel B: Women

	Ln(Wages)					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Sustain. (high)	-0.087**	-0.087***	-0.081***	-0.081***	-0.081***	-0.081***
	(0.034)	(0.001)	(0.002)	(0.002)	(0.023)	(0.023)
Schooling	0.018***	0.018***	0.026***	0.026***	0.026***	0.026***
	(0.005)	(0.000)	(0.000)	(0.000)	(0.003)	(0.003)
Potential exp.	0.053***	0.053***	0.038***	0.038***	0.038***	0.038***
	(0.002)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)
Pot. exp. (squared)	-0.001***	-0.001***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Obs	15,200,061	15,200,061	14,365,602	14,365,602	14,365,602	14,365,602
Sample	Women					
Clustering	Ind3	Person	Firm-Year	Person, Firm-Year	Ind3, Firm-Year	Ind3, Firm
Skills	Pred. cog	Pred. cog	Pred. cog	Pred. cog	Pred. cog	Pred. cog
Occ. - year f.e.	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4
R-squared	0.354	0.354	0.346	0.346	0.346	0.346

Table IA.2: The "Sustainability Wage Gap" – Quantile Regressions

The table displays our baseline results for different quantiles of the wage distribution. Panel A shows the wage gap for log wages and Panel B for wages. ***, **, * indicates statistical significance at the 1, 5, and 10% level, respectively.

Panel A: Log(Wages)

	Ln(Wages)								
	Q(10)	**Q(20)**	**Q(30)**	**Q(40)**	**Q(50)**	**Q(60)**	**Q(70)**	**Q(80)**	**Q(90)**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Sustain. (high)	-0.188***	-0.153***	-0.134***	-0.121***	-0.110***	-0.101***	-0.092***	-0.081***	-0.066***
	(0.004)	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
Schooling	0.022***	0.024***	0.026***	0.026***	0.027***	0.028***	0.028***	0.029***	0.030***
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Potential Experience	0.096***	0.076***	0.066***	0.058***	0.053***	0.047***	0.042***	0.037***	0.028***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pot. exp. (squared)	-0.002***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Obs	1776718	1776718	1776718	1776718	1776718	1776718	1776718	1776718	1776718
Sample					Men				
Skills	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.
Occ. - year f.e.	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4

Panel B: Wages

	Wages								
	Q(10)	**Q(20)**	**Q(30)**	**Q(40)**	**Q(50)**	**Q(60)**	**Q(70)**	**Q(80)**	**Q(90)**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Sustain. (high)	-288.909***	-318.656***	-336.283***	-351.060***	-365.080***	-379.587***	-395.990***	-416.949***	-450.585***
	(10.964)	(8.128)	(6.495)	(5.182)	(4.035)	(3.064)	(2.565)	(3.266)	(5.938)
Schooling	49.738***	83.781***	103.954***	120.866***	136.910***	153.512***	172.284***	196.270***	234.763***
	(2.302)	(1.706)	(1.363)	(1.088)	(0.848)	(0.645)	(0.542)	(0.690)	(1.252)
Potential Experience	121.473***	124.032***	125.549***	126.820***	128.026***	129.274***	130.685***	132.488***	135.382***
	(1.033)	(0.766)	(0.612)	(0.488)	(0.380)	(0.289)	(0.241)	(0.308)	(0.559)
Pot. exp. (squared)	-2.166***	-2.150***	-2.140***	-2.132***	-2.124***	-2.116***	-2.106***	-2.095***	-2.076***
	(0.030)	(0.022)	(0.018)	(0.014)	(0.011)	(0.008)	(0.007)	(0.009)	(0.016)
Obs	1776718	1776718	1776718	1776718	1776718	1776718	1776718	1776718	1776718
Sample					Men				
Skills	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.	Cog./Non-cog.
Occ. - year f.e.	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4

Table IA.3: Potential ESG Channels and Expected Labor Market Outcomes

The table summarizes channels of how improvements in ESG policies might affect financial performance of firms and their respective implications for wages.

Mechanism	**Literature**	**Alternative explanation**	**Implications for Workers (Wages)**	**Investors**
Higher cash flows (e.g., because consumers are willing to pay more for sustainable products or firm gets lower priced inputs from suppliers)	e.g., Servaes and Tamayo (2013)	Products are not comparable because sustainable products are of higher quality; reverse causation	• Average wages: Higher wages because of higher value added and rent sharing between shareholders and workers • Wages for high-skilled workers: unclear • Trends over time: unclear	Higher value / returns
ESG lowers discount rate because of investor preferences or subsidies	e.g., Pastor, Stambaugh, Taylor (2020)	Reverse causation	• Average wages: Higher wages because of higher value added and rent sharing • Wages for high-skilled workers: unclear • Trends over time: unclear	Negative for (some) investors
ESG lowers discount rate because of lower systematic risk	E.g., Albuqueurque, Koskinen, Zhang (2019)	Reverse causation	• Average wages: Lower wages because of reduced wage / firing risk • Wages for high-skilled workers: would expect that low-skilled workers would benefit more from reduction in risk. High-talent workers have better outside options and lower unemployment risk. • Trends over time: unclear	Higher value / returns
"Reverse causation": Well performing firms invest more in ESG	E.g., Hong, Kubik, and Scheinkman (2012)		• Average wages: Higher wages because of higher value added and rent sharing • Wages for high-skilled workers: unclear • Trends over time: unclear	Higher value / returns

Growing the pie	E.g., Edmans (2011, 2020)		• Average wages: Higher wages because of higher value added and rent sharing • Wages for high-skilled workers: unclear • Trends over time: Growing if more firms grow the pie	Higher value / returns

2 Data International Social Survey Programme (ISSP)

The International Social Survey Programme (ISSP) is a cross-national collaborative programme running annual surveys on topics important to the social sciences. We focus on the "Work Orientations" module, which elicits respondents' attitudes toward work and private life, as well as their work organization and working conditions. In total, there are four waves of the Work orientations module of the ISSP fielded in 1989, 1997, 2005, and 2015. We will introduce the data and report the Swedish evidence in Section 2.1. In Section 2.2, we replicate all figures and tables from the ISSP survey for the U.S. respondents to show the broader validity of the Swedish evidence.

2.1 ISSP –Swedish Evidence

Sweden joined the ISSP in 1997. In Table IA.4, we provide summary statistics on some demographic characteristics of the Swedish ISSP participants.

Table IA.4: ISSP Summary statistics

This table shows summary statistics of Swedish participants pooled across the three ISSP Work orientations surveys. The data are obtained from the ISSP surveys in 1997 (N=1,275), 2005 (N=1,371), and 2015 (N=1,162).

	count	mean	sd	min	p25	p50	p75	max
Age	3808	47.73	16.16	18	35	48	61	79
Female	3808	0.51	0.50	0	0	1	1	1
University degree	3807	0.27	0.45	0	0	0	1	1
Employed (at least part time)	3808	0.63	0.48	0	0	1	1	1
Currently working for pay	3678	0.64	0.48	0	0	1	1	1

The Work Orientations module provides information on a wide range of work-related issues, such as: the centrality of work in one's life; values that are linked to paid work; preferences for different employment arrangements; attitudes towards solidarity between employees and workmates as well as perceptions of conflicts between management and employees; work-life balance; characteristics of respondents' main job etc. Given the focus in our paper, we choose survey responses that can be grouped in the following three categories: (i) general attitudes and preferences about work, (ii) beliefs about respondent's current job, and (iii) survey responses that represent labor market outcomes. The relevant ISSP survey questions are listed in Figure IA.1 below.

Figure IA.1: ISSP Questions
This figure shows the main questions of the ISSP survey that we consider in our analysis.

Group 1: Respondents' general preferences and attitudes about work

Question 1: How much you agree or disagree with each of the statement, thinking of work in general:

- A job is just a way of earning money – no more
  - Strongly agree (5), Agree (4), Neither agree nor disagree (3), Disagree (2), Strongly disagree (1); Can't choose

Question 2: How important is …

- A job that allows someone to help other people.
- A job that is useful to society
  - Very important (5), Important (4), Neither important nor unimportant (3), Not important (2), Not important at all (1); Can't choose

Group 2: Beliefs about current job

Question 3: How much you agree or disagree that it applies to your job.

- My job is useful to society.

Group 3: Labor outcomes

Question 4: To what extent do you agree or disagree with each of the following statements?

- I am willing to work harder than I have to in order to help the firm or organization I work for succeed.
- I would turn down another job that offered quite a bit more pay in order to stay with this organization.

Table IA.5 shows summary responses for the main questions (see Figure IA.1). We provide summary statistics for the raw data, but we also coded dummy variables for the two highest (lowest) categories of agreement (e.g., *Hlpsoc45*). Later, we use some of these dummies to split the sample (e.g., in Table IA.6). Panel A of Table IA.5 shows that a majority of people care about non-financial aspects of their jobs: 63% state that they agree / strongly agree with the statement that it is important that a job is useful for society and, at the same time, 59% disagree

/ strongly disagree with the statement that a job is just a way of making money. Accordingly, about two-thirds work in jobs that they consider to be useful to society (Panel B). We argue that this is evidence that workers care about the "sustainability" of their jobs. Last, there is evidence that some people are willing to turn down a better paying job to stay at their firm or to work harder to help their company. In Table IA.6 we will test whether there are systematic differences in those labor outcomes of individuals with high / low sustainability preferences.

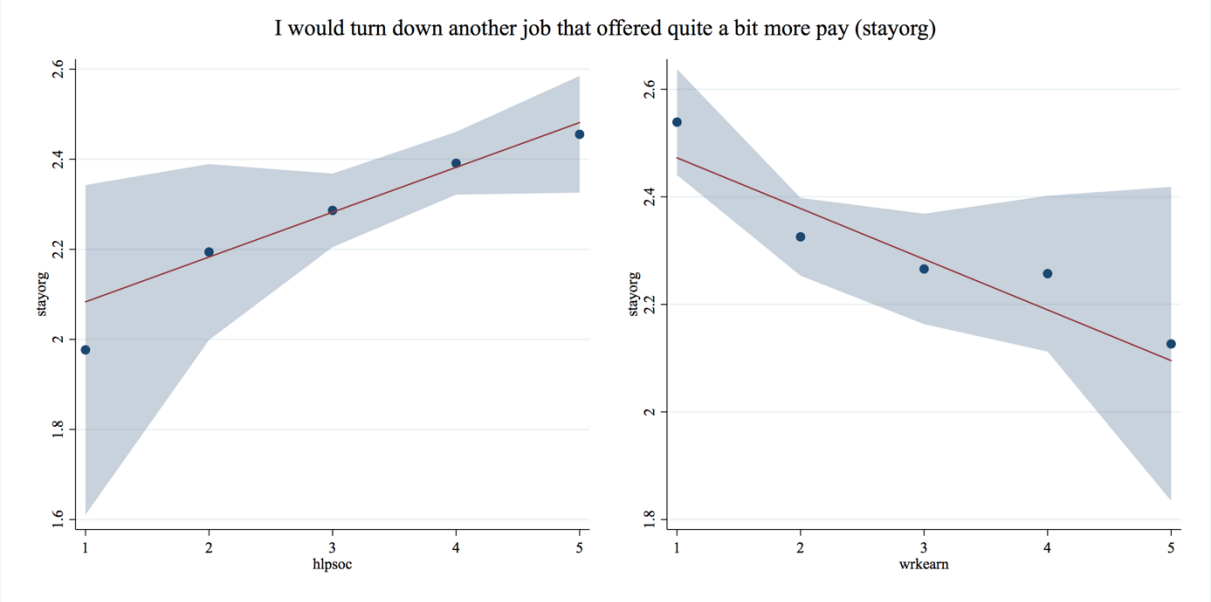
Table IA.5: ISSP Answers to Main Questions
ISSP variables are scaled from 1 (strongly disagree) to 5 (strongly agree). Respondents also can select a "can't choose" option, which we set to missing.

	N	mean	sd	min	p25	p50	p75	max
Panel A: General work preferences								
Job is useful to society (hlpsoc)	3666	3.68	0.89	1	3	4	4	5
Job is useful to society (4,5) (hlpsoc45)	3666	0.63	0.48	0	0	1	1	1
Job just way earn money (wrkearn)	3600	2.42	1.11	1	2	2	3	5
Job just way earn money (1,2) (wrkearn12)	3600	0.59	0.49	0	0	1	1	1
Panel B: Beliefs about current job								
My job is useful to society (rhlpsoc)	2377	3.86	0.99	1	3	4	5	5
My job is useful to society (4,5) (rhlpsoc45)	2377	0.69	0.46	0	0	1	1	1
Panel C: Labor outcomes								
Turn down job have higher pay (stayorg)	2136	2.35	1.11	1	1	2	3	5
Turn down job have higher pay (4,5) (stayorg45)	2136	0.16	0.36	0	0	0	0	1
Work harder (helporg)	1586	3.35	0.98	1	3	3	4	5
Work harder (4,5)(helporg45)	1586	0.46	0.5	0	0	0	1	1

Next we turn to showing that individuals who care more about societal aspects of jobs and thus exhibit stronger sustainability preferences also display labor choices consistent with our main hypothesis, that is they are more likely to turn down a higher paying job in order to stay in their current job. To illustrate this point, Figure IA.2 shows binned scatter plots of how the responses to the survey question *"I would turn down another job that offered quite a bit more pay in order to stay with this organization (stayorg)"* stack up against the stated belief that it is important that jobs are useful to society (left graph) and the belief that jobs are simply a way of warning money (right graph). Higher values indicate either stronger agreement with the statement or more importance attached to it. The left panel of Figure IA.2 is consistent with the view that individuals who value the societal usefulness of jobs more are also more willing to turn down another better paying job. In line with this finding, the right panel of Figure IA.2

shows that that people who value monetary aspects of jobs less are also more willing to stay in a lower paying job.

Figure IA.2: Relation between sustainability preference and labor choices
Using ISSP survey data, this figure shows the relation between workers' sustainability preferences and the stated propensity to turn down a higher paying job. The left subfigure shows a binned scatter plot of the relation between the agreement with the statement *"My job is useful to society (hlpsoc)"* and the agreement with the statement *"I would turn down another job that offered quite a bit more pay in order to stay with this organization (stayorg)."* The graph on the right reports a binned scatter plot of the relation between the agreement with the statement *"A job is just a way of earning money - no more (wrkearn)"* and the stated intention to turn down a higher paying job *(stayorg)*. Higher values indicate more importance to the statement or stronger agreement with it. The data come from three consecutive waves of the Work Orientation module of the International Social Survey Programme (ISSP) survey in 1997, 2005, and 2015. The shaded areas display the 95% confidence intervals for bin-specific average values for the variable plotted on the y-axis.



We also examine whether the documented differences in the extent to turn down a higher paying job are statistically significant across the different response groups. Panel A of Table IA.6 presents a univariate analysis of labor market outcomes with respect to non-financial (or sustainability) preferences. Columns (1) and (3) show mean values for individuals with strong non-financial preferences, while columns (2) and (4) show corresponding mean values for those with weak non-financial preferences. We also test for differences between those groups. We analyze the raw survey responses as well as dummy variables that measure whether a person agrees/strongly agrees (responses 4 and 5) with a statement. We compare the average value of *stayorg* (i.e., the response to the question of whether an individual would stay on with the

organization even if offered a higher paying job) for individuals who value sustainability issues highly (responses of 4 or 5 to *hlpsoc*) against those who value the sustainability aspects less highly (values 1, 2, or 3). The difference in the average values is highly statistically significant. We repeat the same exercise for our second preference variable *wrkearn* and also find significantly different mean values for *stayorg* across the two groups. In the same table, we also conduct mean difference tests to examine whether other survey responses capturing labor outcomes are related to our two sustainability preference variables.

We find that individuals who state to have stronger preferences for societal and weaker preferences for monetary aspects of their job are also more likely to work harder to help their organization.[1] These additional tests are interesting in their own right as they suggest that workers with sustainability preferences may not only be willing to work at lower wages (something that we will be able to measure in our administrative wage data) but also that they exert more effort (something that we cannot observe in our main administrative data).

Overall, we perform twelve different tests. In 9 out of those 12 tests, the point estimate is consistent with the hypothesis that workers with stronger non-financial (or sustainability) preferences are willing to work at lower wages and to spend more effort.[2] Results are strongest for wage-related outcomes (rows 1 and 2). When we analyze variables that aim to capture effort (work harder) in rows 3 and 4, results are weaker. We find significant differences for "work harder" using one measure of non-financial preferences (rows 2 and 3 and columns (3) and (4)). Taking all tests together, our analysis suggests that workers with stronger preferences for non-financial (or sustainability) aspects of their job are willing to work at lower wages and put in more effort.

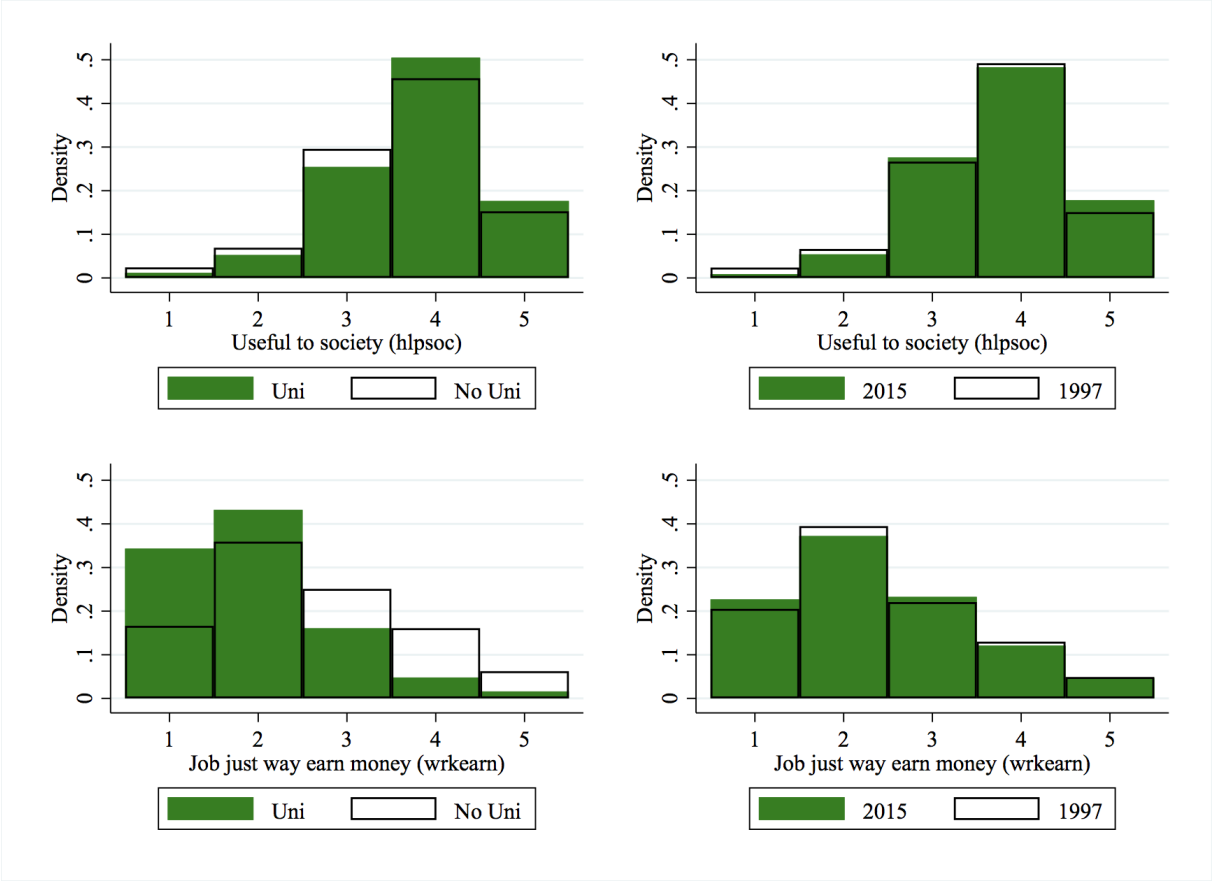
Next, we investigate whether the preferences for sustainability aspects of jobs is systematically related to meaningful worker characteristics. For instance, anecdotal evidence suggests that firms find it increasingly difficult to retain talent and that "Millennials" (i.e., cohorts born after 1980) have strong preferences for meaning or purpose in their jobs. Documenting such potential heterogeneities would be interesting for two reasons. First, those cohorts have entered the labor market and are climbing up the corporate ladder and, hence, accommodating those preferences is increasingly important for firms to attract and retain the

[1] Please note that, in one split, the differences are negative though not significant. However, when we replicate the tests with the ISSP data for U.S. (see Table IA.9) for which we have more power, we find consistent results across all specifications, suggesting that workers with stronger preferences for societal aspects of their jobs are also more willing to work harder. Overall, the U.S. analysis is also important in adding external validity to our tests by showing that the patterns we document are not restricted to Sweden.

[2] In three cases we obtain non statistically significant point estimates.

most talented worker, in particular in today's more knowledge based economy. Second, such heterogeneity in sustainability preferences leads to additional predictions which we can test in the data and may allow us to rule out some other alternative explanations.

Figure IA.3: Heterogeneity of preferences
This figure shows the distribution of ISSP respondents' sustainability preferences by education level and survey wave. Survey respondents are asked to express their their level of agreement with the several statements (from 1="Strongly disagree" to 5="Strongly agree"). We plot the survey responses to two different statements, namely *"How important is a job that is useful to society (hlpsoc)"* and *"A job is just a way of earning money- no more (wrkearn)"*. Data come from the Work Orientation module of the International Social Survey Programmme (ISSP) survey.



To examine heterogeneity in preferences, we make use of both cross-sectional differences in demographical information among ISSP survey participants as well as the time-series dimension of the ISSP survey. We find that the preferences for having a job that is societally useful are more pronounced for more educated people and in recent years: in Figure IA.3 we plot the distributions of the survey responses to the questions that we use to measure societal preferences, conditional on education (university degree vs. no university degree) and on the wave of the survey (1997 vs. 2015 wave). The top figures focus on the *hlpsoc*. The histograms

show that societal preferences vary in plausible dimensions, namely university graduates tend to care more about the societal usefulness of jobs. It also appears that preferences for societal usefulness is more pronounced in more recent waves of the survey (see upper right figure). Focusing on the subfigures in the lower part of the panel in which we plot the distribution of *wrkearn* stratified by the same demographic and temporal variables, we also find that university graduates are less likely to consider jobs only for the fact that they provide a means of earning money. In addition, it seems that the monetary aspects of jobs have become less important in the most recent wave of the survey in 2015 (as opposed to the first survey in 1997). We also conduct mean difference tests and find that these differences in preferences documented in the figures are generally statistically significant. Panel B of Table IA.6 shows the corresponding univariate tests: columns (1) and (2) analyze differences between university graduates and non-graduates. Column (3) and (4) contrast responses between survey cohorts. The signs of all point estimates are consistent with the evidence in the histograms of Figure IA.3, but the effects are generally more significant when we split by education; this might be partly driven by the sample size in the tests that compare cohorts. Overall, however, the analyses point in the direction that higher educated individuals and individuals from younger cohorts have indeed stronger non-financial preferences and are more likely to work in jobs that are beneficial for society.

While the survey results show clear differences regarding the heterogeneity with respect to education, results regarding trends over time should be interpreted more cautiously. Even though the tests reveal statistically significant differences across waves, non-parametric comparisons (i.e., the histograms) suggest that those differences are not of big magnitude in some specifications. Moreover, we only compare two waves and it remains unclear how representative those waves are and whether potential changes in the preferences are monotonic or applicable to the whole cross-section. Indeed, there is anecdotal evidence that generational changes in preferences for sustainable jobs are more pronounced for highly skilled workers. Hence, in the empirical analysis of the administrative wage data, we focus on these subpopulations, using skill-measures that i) are very granular and ii) allow for a comparison over time.[3] Note also that our main evidence based comes from Sweden, for which we have detailed worker-level information. However, we believe that our previous results generalize to other countries as well. In fact, we believe that trends in the importance of societal aspects of

[3] We use cognitive and non-cognitive skills measures with time-invariant distributions. Scholars usually use education (e.g., university graduates) as a proxy for skill. As pointed out by Böhm, Metzger, and Strömberg (2020), due to a large expansion in education, those measures are difficult to compare in the time-series. We describe the advantages of our employed skills measures in more detail in Section IV of the paper and in section 7 of this Internet Appendix.

jobs are likely to be more pronounced in other countries, given that such aspects are likely to have played an important role in the Swedish population already in 1997 (i.e., the first year where for which we have ISSP data for Sweden). Hence, we replicate all survey analysis for ISSP survey respondents from the United States in the next section (see Figure IA.4 and Table IA.9). We find qualitatively similar results: i) workers have, on average, preferences for jobs with high sustainability, ii) those preferences are predictive of labor market outcomes (e.g., the willingness to give up wages or to work harder) similar to those in Sweden, and iii) as in Sweden, those preferences are more pronounced for more educated workers and increasing over time. Interestingly, the levels of time trends and documented differences between different subsamples are stronger in the U.S. compared to Sweden, suggesting that the Sustainability Wage Gap might even be bigger in the U.S.

Table IA.6: Univariate tests on labor market outcomes and heterogeneity of preferences

This table show the univariate tests on labor market outcomes. In Panel A, we present the t-tests on labor market outcomes such as *stayorg* (*"I would turn down another job that offered quite a bit more pay in order to stay with this organization"*), and *helporg ("I am willing to work harder than I have to in order to help the firm or organization I work for succeed")* by variables that capture an individual's non-financial preferences. In Panel B we show the sustainability preferences by education level (as measured through a University degree) and different cohorts (1997 versus 2015). ISSP variables can take on values from 1 (strongly disagree) to 5(strongly agree). ***, **, * indicates statistical significance at the 1, 5, and 10% level, respectively.

Panel A: Sustainability preferences and labor market outcomes

	hlpsoc45	**hlpsoc123**	**High-low**		**wrkearn12**	**wrkearn345**	**High-low**	
	(1)	**(2)**	**(1)-(2)**		**(3)**	**(4)**	**(3)-(4)**	
Turn down job higher pay (stayorg)	2.41	2.26	0.15***	3.09	2.41	2.25	0.16***	3.07
Turn down job have higher pay (4,5) (stayorg45)	0.17	0.13	0.04***	2.69	0.16	0.15	0.01	0.32
Work harder (helporg)	3.33	3.39	-0.06	-1.14	3.47	3.13	0.34***	6.64
Work harder (4,5)(helporg45)	0.44	0.48	-0.04	-1.41	0.52	0.34	0.17***	6.66
My job useful to society (rhlpsoc)	4.15	3.40	0.75***	18.56	3.91	3.75	0.17***	3.83
My job useful to society (4,5) (rhlpsoc45)	0.81	0.49	0.33***	16.69	0.70	0.65	0.06***	2.78
Observations	1891	1152	3043		1843	1168	3011	

Panel B: Heterogeneity of sustainability preferences

	Uni	No uni	Uni - No uni		2015	1997	2015 - 1997	
	(1)	(2)	(1)-(2)		(3)	(4)	(3)-(4)	
Useful society (hlpsoc)	3.78	3.65	0.14***	4.33	3.77	3.68	0.09**	2.44
Useful society (4,5) (hlpsoc45)	0.68	0.61	0.07***	4.08	0.66	0.64	0.02	0.9
Job just way earn money (wrkearn)	1.96	2.59	-0.63***	-17.37	2.39	2.42	-0.03	0.74
Job just way earn money (1,2) (wrkearn12)	0.78	0.53	0.25***	15.2	0.6	0.6	0.00	-0.04
Observations	1037	2724	3761		1150	1262	2412	

2.2 ISSP –U.S. Evidence

In this Section, we compare the Swedish ISSP evidence to the U.S. (Figure IA.4 and Tables IA.7 to IA.9). Table IA.7 provides summary statistics of the U.S. sample which is comparable in terms of demographics to the Swedish ISSP sample. The main take away is as follows: i) The levels of the sustainability preferences are higher in the U.S. than in Sweden (see Table IA.8), but there is similar heterogeneity of those preferences in the population; ii) Consistent with the Swedish evidence, preferences for sustainability have real labor consequences (see Table IA.9, Panel A); iii) Consistent with the Swedish evidence, the sustainability preferences are more pronounced for more educated individuals and increasing over time.

The average level of the sustainability preferences is higher in the U.S. than in Sweden. This could imply that U.S. citizens care, on average, more for societal aspects of their jobs as Swedes. Alternatively, there might be cultural differences of how citizens answer questions in the U.S. and in Sweden. More importantly, results are more comparable in relative terms when we compare labor market outcomes of workers with low vs. high preferences for sustainability and when we analyze the heterogeneity of those preferences with respect to education and generations. Again, if anything, differences are more pronounced in the U.S. than in Sweden.

Overall, preferences, heterogeneity in preferences as well as their effects on labor market outcomes appear to be comparable between the U.S. and Sweden. If we believe that U.S. and Swedish citizens answer questions similarly (and that there are no cultural differences in expressing preferences), we would actually expect to see even larger effects in the U.S. compared to Sweden, i.e., the Swedish evidence might be a lower bound for the U.S.

Table IA.7: ISSP Summary statistics (U.S.)

This table shows summary statistics of U.S. participants pooled across the three ISSP Work orientations surveys. The data are obtained from the ISSP surveys in 1997 (N=1,228), 2005 (N=1,518), and 2015 (N=1,477).

	count	mean	sd	p25	p50	p75
Age	5664	47.95	37.61	33	45	59
Female	5676	55%	50%	0%	100%	100%
University degree	5669	26%	44%	0%	0%	100%
Employed (at least part time)	5676	63%	48%	0%	100%	100%
Currently working for pay	4219	67%	47%	0%	100%	100%

Table IA.8: ISSP Answers to Main Questions (U.S.)

ISSP variables are scaled from 1 (strongly disagree) to 5 (strongly agree). Respondents also can select a "can't choose" option, which we set to missing.

	count	mean	sd	min	p25	p50	p75	max
Panel A: General work preferences								
Useful to society (hlpsoc)	5552	4.19	0.8	1	4	4	5	5
Useful society (4,5)(hlpsoc45)	5552	0.84	0.37	0	1	1	1	1
Job just way earn money (wrkearn)	5567	2.57	1.18	1	2	2	4	5
Job just way earn money (1,2) (wrkearn12)	5567	0.59	0.49	0	0	1	1	1
Panel B: Beliefs about current job								
My job useful to society (rhlpsoc)	3626	4.00	0.93	1	4	4	5	5
Useful to society (4,5) (hlpsoc45)	5552	0.84	0.37	0	1	1	1	1
Panel C: Labor outcomes								
Turn down job higher pay (stayorg)	2730	2.67	1.25	1	2	2	4	5
Turn down job have higher pay (4,5) (stayorg45)	2730	0.27	0.45	0	0	0	1	1
Work harder (helporg)	1940	4.1	0.89	1	4	4	5	5
Work harder (4,5)(helporg45)	1940	0.81	0.4	0	1	1	1	1

Table IA.9: Univariate tests on labor market outcomes and heterogeneity of preferences (U.S.)

This table show the univariate tests on labor market outcomes for the sample of U.S. ISSP respondents. In Panel A, we present the t-tests on labor market outcomes *stayorg* (*"I would turn down another job that offered quite a bit more pay in order to stay with this organization"*), and *helporg ("I am willing to work harder than I have to in order to help the firm or organization I work for succeed")* by variables that capture am individuals non-financial preferences. In Panel B we show the sustainability preferences by education level (as measured thorugh a University degree) and different cohorts. ISSP variables can take on values from 1 (strongly disagree) to 5(strongly agree). ***, **, * indicates statistical significance at the 1, 5, and 10% level, respectively.

Panel A: Sustainability preferences and labor market outcomes

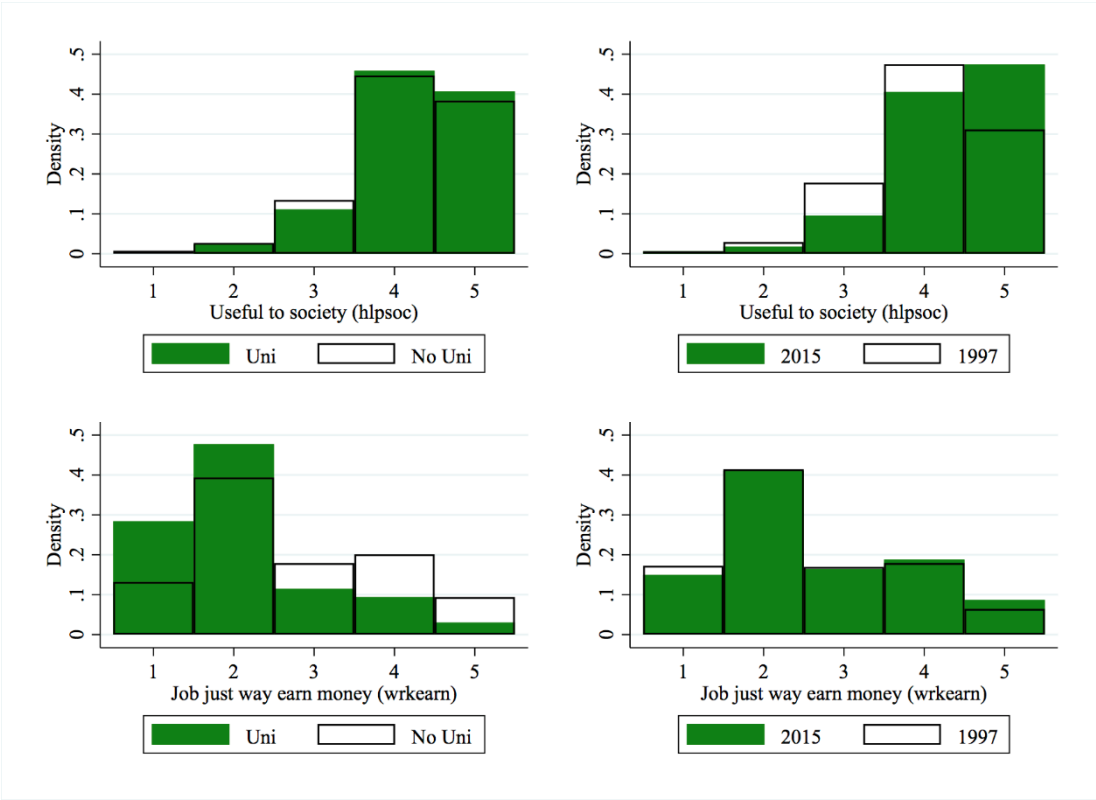
	hlpsoc45 (1)	**hlpsoc123 (2)**	**High-low (1)-(2)**		**wrkearn12 (3)**	**wrkearn345 (4)**	**High-low (3)-(4)**	
Turn down job higher pay (stayorg)	2.7	2.46	0.24***	3.70	2.79	2.48	0.31***	6.33
Turn down job have higher pay (4,5) (stayorg45)	0.29	0.21	0.08***	3.29	0.3	0.23	0.07***	3.84
Work harder (helporg)	4.12	3.92	0.20***	2.97	4.22	3.9	0.32***	7.80
Work harder (4,5)(helporg45)	0.82	0.71	0.11***	3.37	0.86	0.72	0.14***	7.27
My job useful to society (rhlpsoc)	4.11	3.44	0.67***	15.86	4.09	3.86	0.23***	7.04
My job useful to society (4,5) (rhlpsoc45)	0.81	0.49	0.32***	14.71	0.78	0.71	0.08***	4.99
Observations	3708	747	4455		2692	1782	4474	

Panel B: Heterogeneity of sustainability preferences

	Uni (1)	No uni (2)	Uni - No uni (2)-(1)		2015 (3)	1997 (4)	2015 - 1997 (4)-(3)	
Useful to society (hlpsoc)	4.25	4.17	0.08***	3.3	4.32	4.06	0.27***	8.61
Useful to society (4,5) (hlpsoc45)	0.87	0.83	0.03***	3.26	0.88	0.79	0.09***	6.36
Job just way earn money (wrkearn)	2.11	2.73	-0.62***	-19.13	2.65	2.55	0.10**	2.25
Job just way earn money (1,2) (wrkearn12)	0.76	0.53	0.24***	17.28	0.56	0.59	-0.03	-1.35
Observations	1472	4167	5639		1474	1211	2685	

Figure IA.4: Heterogeneity of preferences (U.S.)

This figure show the distribution of the U.S. ISSP respondents' work preferences by education level and survey wave. Survey respondents are asked to express their their level of agreement with the several statements (from 1="Strongly disagree" to 5="Strongly agree"). We plot the survey responses to two different statements, namely *"How important is a job that is useful to society (hlpsoc)"* and *"A job is just a way of earning money- no more(wrkearn)"*. Data come from from the Work Orientation module of the International Social Survey Programme (ISSP) survey.



3 Swedish Administrative Employer-Employee matched Data

Our main data source is from the Longitudinal Integration Database for Health Insurance and Labor Market Studies (LISA), provided by Statistics Sweden (SCB). It contains employment information (such as employment status, the identity of the employer, and job classification), tax records (including labor and capital income) and demographic information (such as age, education, and family composition) for all individuals 16 years of age and older, domiciled in Sweden as of November 1 each year, starting in 1990. In LISA, the sector where an individual works is reported according to the Swedish Standard Industrial Classification (SNI) code at the level of the establishment at which they are employed.

We also employ talent measures consist of estimates of cognitive and non-cognitive abilities from Swedish Defense Recruitment Agency (Rekryteringsmyndigheten) for cohorts enlisted between 1983 and 2010 and the Military Archives (Krigsarkivet) for cohorts enlisted between 1969 and 1983. They were typically taken at the age of 18 or 19 with the purpose of evaluating an individual's potential for military service based on medical, physical, cognitive, and psychological traits. Lindqvist and Vestman (2011) and Dal Bó, Finan, Folke, Persson, and Rickne (2017) provide further details on this data.

Our first talent measure is an individual's cognitive ability score (similar to IQ). Cognitive ability was assessed through subtests covering logic, verbal, spatial, and technical comprehension. The four test results were aggregated into an overall integer score ranging from 1 (lowest) to 9 (highest), according to a Stanine (standard nine) scale that approximates a normal distribution with a mean of 5 and standard deviation of 2.17 The second talent measure, the non-cognitive ability score, was assessed through a 25-minute semi-structured interview by a certified psychologist. The individual was graded on his willingness to assume responsibility, independence, outgoing character, persistence, emotional stability, and power of initiative. The psychologist would weigh these components together and assign an overall non-cognitive score on a 1 to 9 Stanine scale.

Individuals who scored sufficiently high on the cognitive test would also be evaluated for leadership ability, again on a 1 to 9 Stanine scale. The leadership score is meant to capture the suitability to become an officer. Since leadership was only assessed for a subset of individuals, we focus on cognitive and non-cognitive ability in our analysis. Since military enlistment scores are only consistently available for men, our analysis will mostly focus on male workers, but we also construct an alternative talent measure based on high-school grades that covers both genders. Since high school programs vary in length and difficulty, we first regress, for each

high-school graduation year separately, the cognitive military test score of males on a third order polynomial of high-school grades interacted with high-school track and age at graduation. The predicted score has a correlation of 0.644 with the actual cognitive score. We then use the estimated parameters to calculate predicted cognitive ability for both genders. We standardize the measure to percentiles (1 to 100) within each graduation year and for each gender, to account for possible grade inflation and the fact that females have higher grades on average.

We build a panel of Swedish firms for the 1998–2017 period from the Swedish Companies Registration Office (Bolagsverket), processed by the private data vendor PAR/Bisnode. The data include balance sheets and income statements of all Swedish limited liability companies (Aktiebolaget or AB). If a company is part of a corporate group, the group structure is reported in the annual reports. The size of the stakes needs to be reported if it exceeds 50%. If the stake is below 50%, the size does not have to be reported. The coverage of the group structure is generally of good quality. However, there are some company years with missing data. We infer group structure information for these gap years by using data available before and after the gap. In robustness checks, we also use the original data available only. Each company has one of three statuses: i) it can be independent, ii) it can be the top company of a business group, or iii) it can be a daughter company of a business group. For daughter companies, we also calculate identity and the percentage ownership stakes of all top mother companies. In our firm analysis, we look at business groups and consolidated accounts, i.e., we attribute all workers that belong to the same business group to the top company for which we have collected and merged ESG data by commercial data providers.

Table IA.10: Summary Statistics of worker level data

This table shows labor market outcomes, demographics, skills, and sustainability measures for the worker population from Sweden using administrative data. Variables are defined in Appendix Table A6.

	Obs in m.	Mean	s.d.	p25	p50	p75
Panel A: Labor-related variables						
Ln(Wages)	112.0	7.33	0.90	6.97	7.57	7.89
defdeklon	112.0	2075.51	1817.42	1063.89	1929.06	2681.67
DekLon	117.0	231.03	215.01	111.20	203.80	304.60
DispInk	117.0	2074.92	6649.11	1219.00	1722.00	2467.00
LoneInk	117.0	2267.63	1954.45	1097.00	2019.00	3014.00
full_deklon	25.4	320.14	203.08	223.50	284.60	365.80
full_dispink	25.4	2428.25	4421.67	1689.00	2163.00	2779.00
full_loneink	25.4	3160.14	1882.24	2226.00	2832.00	3622.00
Stay in job	100.0	80%	40%	100%	100%	100%
Panel B: Demographic and education variables						
Female	117.0	49%	50%	0%	0%	100%
Alder	117.0	40.88	13.54	30.00	41.00	52.00
Schooling	116.0	11.84	2.70	10.50	12.00	13.50
Potential Experience	117.0	21.93	13.51	10.00	21.50	33.00
Cog. Skills	35.5	5.13	1.92	4.00	5.00	6.00
Non-cog. Skills	33.7	5.09	1.72	4.00	5.00	6.00
Pred. cog. Skills	56.7	4.47	2.85	2.00	4.00	7.00
Panel C: Sustainability measures from the sustainability survey						
Sustain.	111.0	2.248	0.807	1.635	2.042	3.022
Sustain. (high)	111.0	44%	50%	0%	0%	100%
Sustain. (high - empl.)	111.0	20%	40%	0%	0%	0%

4 ESG Data (Firm-level)

4.1 Refinitiv (former Asset4)

We obtain firm-level sustainability scores from Refinitiv (formerly Thomson Reuters Asset4). Refinitiv[4] provide structured sustainability research data and scores at the firm-level. The scores are organized along three pillars, i.e. environmental, social, and governance (ESG). We use the overall score as well as the environmental, social, and governance pillar scores from Refinitiv (i.e., variables *a4ir*_sc, *envscore_sc*, *socscore_sc* and *cgvscore_sc*).[5] These pillar scores capture the overall social, governance and environmental quality of a company's policies. For instance, Refinitiv's social pillar score captures issues such as the firm's relationship with its workforce, respect of human rights, relations with communities, and product responsibility. In a similar spirit the environmental score captures issues such as firms' overall resource use, all sorts of environmental emissions (i.e., including CO2 emissions and water pollutant emissions), other environmental aspects of the production process such as the use of renewable energy and water use efficiency, as well as environmental innovation (which captures the extent to which the company offers environmentally friendly products and services). The methods as to how these scores are constructed are typically proprietary, but the set of relevant issues that feed into the construction of these scores are relatively well defined. Please note that that the scores are relative scores, relative to an industry peer group. For example, Refinitiv's ESG scores are "best in class" and are supposed to enable investors to choose companies that have better environmental and social policies than industry peers. Given that governance standards vary more strongly at the country-level, Refinitiv ranks firms relative to geographic peers when it comes to governance. For that reason, it is going to be important to adjust for industries, i.e., use industry-year fixed effects, in our analysis.

Table IA.11 shows summary statistics for the Refinitiv sample. Panel A shows that our Refinitiv sample consists of 617 firm-year observations. The number of firms for which we have ESG scores is growing over time, peaking at 48 firms in 2017. As pointed out before, the scores are relative to an industry peers. For that reason, it is important to exploit within industry variation in the estimation and rely on firms from industries with more than one firm. Panel B of Table IA.11 reveals that about 85% are in industries with more than one firm and, hence,

[4] See https://tmsnrt.rs/33QMXJS

will contribute to the estimation of the "sustainability wage gap". Last, Panel C shows summary statistics of the main score and the different ESG component scores for our sample.

Recent research points out that Refinitiv applies changes to the historical ratings (Berg, Fabisik, and Sautner 2020), rating providers "rewriting history" by changing historical ESG ratings (see Berg, Fabisik, and Sautner 2020). We also observe changes in the historic ratings of Refinitiv ESG over time. In our sample of Swedish firms, these are relatively minor and all our results remain qualitatively unchanged using different vintages Refinitiv's ESG ratings.

Table IA.11: Summary Statistics of Refinitiv Firms

The tables present the summary statistics of firms in the Refinitiv sample. Panel A shows the distribution of firms by years. Distribution of industries in the latest year (2017) is shown in Panel B. The industries are classified in the SNI 2-digit level. Panel C gives the scores and sub-scores of firms' sustainability.

Panel A: Distribution of firms by years

Year	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Firms	1	32	32	38	43	40	39	37	37

Year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**Total**
Firms	37	35	35	35	36	45	47	48	617

Panel B: Distribution of industries in SNI 2-digit level (2017)

Industry name	**Freq**	**Pct**	**Cum. Pct**
Wholesale trade	5	10.42	10.42
Financial intermediation	5	10.42	20.84
Manufacture of machinery and equipment	4	8.33	29.17
Manufacture of pulp, paper and paper products	3	6.25	35.42
Manufacture of basic metals	3	6.25	41.67
Real estate	3	6.25	47.92
Consultancy	3	6.25	54.17
Business activities	3	6.25	60.42
Manufacture of rubber and plastic products	2	4.17	64.59
Manufacture of motor equipment	2	4.17	68.76
manufacture of transport equipment	2	4.17	72.93
Construction	2	4.17	77.10
Retail trade	2	4.17	81.27
Communication	2	4.17	85.44
Manufacture of tobacco products	1	2.08	87.52
Manufacture of fabricated metal products	1	2.08	89.60
Manufacture and installation of electronic goods	1	2.08	91.68
Manufacture of optical equipment	1	2.08	93.76
Hotels and restaurants	1	2.08	95.84
Other transport and storage	1	2.08	97.92
Health and social work	1	2.08	100.00
Total	48	100.00	

Panel C: Summary Statistics

	count	mean	sd	p5	p25	p50	p75	p95
a4ir_sc	617	0.632	0.294	0.09	0.390	0.750	0.8886	0.939
envscore_sc	617	0.662	0.301	0.14	0.376	0.805	0.9301	0.952
socscore_sc	617	0.626	0.289	0.11	0.373	0.708	0.8967	0.945
cgvscore_sc	617	0.497	0.227	0.091	0.325	0.526	0.6844	0.83

4.2 MSCI

MSCI ESG Research Intangible Value Assessment (IVA) provides research, ratings and analysis of companies' risks and opportunities arising from environmental, social and governance (ESG) issues. The MSCI IVA scores are assessed across 37 ESG key issues (the issues are selected annually for each industry and weighted based on MSCI's materiality mapping framework) focusing on the relationship between a company's core business and the key industry ESG issues. For instance, the environment pillar includes climate change, natural resources, pollution and waste and environmental opportunities as the main issues. In the social pillar, human capital, product liability, stakeholder opposition and social opportunities are the main concerns. The score uses a scale from 0 to 10 for firms and is normalized with respect to industry peers.

Table IA.12 shows summary statistics for the MSCI sample. Panel A shows that our sample consists of 787 firm-year observations. The number of firms for which we have ESG scores is growing over time, peaking at 152 firms in our latest year, 2017. Panel B of Table IA.12 reveals that about 95% are in industries with more than one firm. Panel C shows summary statistics of the main score and the different ESG pillars of our sample.

Table IA.12: Summary Statistics of MSCI Firms

This table presents summary statistics for the MSCI data. Panel A shows the distribution of firms by years. Distribution of industries in the latest year (2017) is shown in Panel B. The industries are classified at the SNI 2-digit level. Panel C provides descriptive statistics of the scores and sub-scores of firms' sustainability according to MSCI.

Panel A: Distribution of firms by years

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Firms	2	3	9	10	23	30	35	39	35	34

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
Firms	31	25	24	28	35	84	90	101	152	790

Panel B: Distribution of industries of the latest year (2017)

Industry name	Freq	Pct	Cum. Pct
Consultancy	19	12.42	12.42
Wholesale trade	16	10.46	22.88
Real estate	16	10.46	33.34
Business activities	11	7.19	40.53
Manufacture of machinery and equipment	10	6.54	47.07
Financial intermediation	10	6.54	53.61
Retail trade	7	4.58	58.19
Manufacture of pulp, paper and paper products	5	3.27	61.46
Manufacture of basic metals	5	3.27	64.73
Manufacture and installation of electronic goods	5	3.27	68.00
Manufacture of motor equipment	5	3.27	71.27
Communication	5	3.27	74.54
Manufacture of optical equipment	4	2.61	77.15
Construction	4	2.61	79.76
Manufacture of rubber and plastic products	3	1.96	81.72
Education	3	1.96	83.68
Health and social work	3	1.96	85.64
Manufacture of food products	2	1.31	86.95
Manufacture of chemicals, chemical products	2	1.31	88.26
Manufacture of fabricated metal products	2	1.31	89.57
Manufacturing n.e.c.	2	1.31	90.88
Hotels and restaurants	2	1.31	92.19
Financial activities	2	1.31	93.50
Other community, social and personal service activities	2	1.31	94.81
Manufacture of tobacco products	1	0.65	95.46
Manufacture of wood and wood products	1	0.65	96.11
Manufacture of other electrical equipment	1	0.65	96.76
Manufacture of transport equipment	1	0.65	97.41
Sales and repair of moto vehicles	1	0.65	98.06
Land Transport	1	0.65	98.71
Water transport	1	0.65	99.36
Other transport and storage	1	0.65	100.00
Total	153	100.00	

Panel C: Summary Statistics

	count	mean	sd	p5	p25	p50	p75	p95
iva_company_rating	790	4.91	1.45	2	4.00	5.00	*6*	7
environmental_pillar	790	5.61	1.89	2.7	4.40	5.40	*6.8*	9.29
social_pillar_score	747	5.43	1.73	2.3	4.47	5.40	*6.6*	8.24
gov_pillar_score	747	6.30	1.75	3.39	5.00	6.39	*7.6*	8.82