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Erasmus Platform for Sustainable Value Creation

Working paper
The sustainability wage gap

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Abstract

A large literature documents a positive correlation between a firm's sustainability or ESG policies and firm value. However, the exact mechanism through which this relation arises remains ambiguous and it is often hard to establish the direction of causation. In this paper we propose and test a new channel, the *Sustainability Wage Gap* channel, through which firms can benefit from ESG investments by their ability to pay lower wages because of workers' preferences for sustainable jobs. Using administrative employer-employee matched data from Sweden and a new measure that quantifies the *environmental sustainability* of different economic activities, we show that workers earn between 10-20% lower wages in firms that operate in more sustainable sectors. Motivated by survey evidence on the heterogeneity of workers' preferences for sustainable jobs, we also show that this *Sustainability Wage Gap* is larger for high-skilled workers, especially for those with high non-cognitive skills, and increasing over time. Providing a battery of additional tests, we argue that our evidence is difficult to reconcile with many alternative interpretations that have been suggested by previous literature.

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1 Introduction

A large and growing literature documents a positive correlation between a firm's sustainability or environmental, social, and governance (ESG)[2] policies and firm value (e.g., Edmans 2011; Edmans, Li, and Zhang, 2020; Servaes and Tamayo, 2013; Lins, Servaes, and Tamayo, 2017; Friede, Busch, and Bassen, 2015). However, the exact mechanisms through which ESG translates into firm value remain ambiguous and it is often hard to establish the direction of causation (Hong, Kubik, and Scheinkman, 2012). While prior research documents mostly correlational evidence, some papers have attempted to identify specific mechanism through which sustainability translates into firm value. Servaes and Tamayo (2013) stress that a firm's sustainability policies can affect consumer behavior, thereby enhancing cash flows and firm value. Other papers focus on on the effect of sustainability on discount rates and provide evidence that better sustainability policies are associated with lower cost of capital (e.g., Chava, 2014; Dunn, Fitzigbbons, and Pomorski, 2017; Albuquerque, Koskinen, and Zhang, 2019).

In this paper we uncover and provide evidence of a new channel through which sustainability affects the cash flows of a firm by influencing a key stakeholder, namely workers. We hypothesize that firms' sustainability translates into lower labor costs and hence higher firm value because more sustainable firms are able to attract and retain talent with explicit sustainability preferences at lower wages (the *Sustainability Wage Gap*). Besides the financial benefits that the Sustainability Wage Gap implies for firms, prior research has also argued that more talented people typically organize economic production (see Murphy, Shleifer, and Vishny (1991)). Hence, accommodating the sustainability preferences of workers might be a decisive factor for firms to attract and retain the most talented workers and remain competitive, in particular given that anecdotal evidence suggests that younger cohorts (e.g., Millennials) care more about such issues and are climbing the corporate ladder.

We motivate our analysis by providing survey evidence that many individuals care about the sustainability characteristics of their jobs. Using the same survey data, we also show that these sustainability preferences are related to labor outcomes. More specifically, we use data from three waves of a representative labor survey on attitudes towards work carried out by the

[2] As discussed more comprehensively in Section 2.1, Environmental, Social and Governance (ESG), Corporate Social Responsibility (CSR), and Sustainability are all related concepts that are 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—their overall societal impact. Measures of ESG, CSR, and sustainability also tend to be positively correlated and we choose to refer to them collectively as "Sustainability" or "ESG".

International Social Survey Programme (ISSP) in order to provide evidence that individuals with more pronounced "sustainability preferences" state that they are also more willing to turn down better paying jobs. The analysis of the ISSP survey data also show that these preferences for sustainability are more pronounced for highly educated workers and for more recent cohorts.[3]

While the evidence based on the ISSP survey is informative and consistent with the main premise of our paper, it is not clear whether survey responses capture intentions only, or whether stated intentions also translate into true labor market outcomes. To address this concern, our main analysis makes use of administrative employer-employee matched data from Sweden. These data contain highly detailed information on wages, jobs, education, and measures of cognitive as well as non-cognitive skills. To test whether workers indeed accept lower wages to work in jobs that are considered to be more sustainable, we combine the administrative labor data with a novel measure that quantifies the environmental sustainability of economic activities. We develop this novel sustainability measure explicitly for the analysis in our paper and it is based on a sample of survey participants classifying economic activities in terms of their environmental sustainability. The survey-based sustainability classification covers 95 economic sectors that make up 98% of employment in our administrative wage data. In the wage regressions in which we examine the effect of our sustainability measure on worker pay, 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 measures for cognitive and non-cognitive ability as well as occupational information. To illustrate the main result graphically, Figure 1 shows a binned scatterplot of the relation between wages and sustainability. In this graph, we focus on data in the last three years for which we have administrative data (2015-2017) and the male sub-sample for which we have the most precise data on cognitive and non-cognitive skills. We control for occupation fixed effects, education, potential experience, and cognitive as well as non-cognitive skills. The figure displays a strong negative association between wages and our sustainability measure. We also examine heterogeneity in the documented *Sustainability wage gap* and, in line with the evidence from the ISSP survey data, find the gap to be larger for more

[3] Our main evidence comes from Sweden. In Section 2.2. of the paper as well as in Section 2.2. of the Appendix, we show that preferences for sustainability correlate with labor market outcomes in a very similar way in the U.S. and in Sweden. Moreover, we also show that the heterogeneity in sustainability preferences exhibit similar patterns in both countries. Hence, we believe that our results also generalize to other countries.

educated workers and growing over time. In further analysis, we also provide evidence that firms that belong to the most sustainable sectors are also better able to retain skilled workers.

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 create firm value. First, a simple reverse causation explanation and many other alternative explanations (e.g., higher margins through customer awareness), 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 for which we document consistent patterns in the heterogeneity of the *Sustainability wage gap,* patterns that cannot easily be explained by other alternative mechanisms.

Other possible concerns with our findings could be related to unobserved worker, job, firm, or sector heterogeneity. For instance, workers who select to work in 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 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 working 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 sustainability on the job. Given that some of our hypotheses predict differential effects for specific types of workers in the same firm, e.g., more versus less talented ones, 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 asking a sample of survey participants to 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 ratings (or scores) are generally only available for large listed firms and in the most recent periods. In addition, prior research has highlighted that methodologies to construct such measures can be opaque and divergent (see, for example, Berg, Koelbel and Rigobon, 2020). In contrast, our sustainability measure based on the classification of economic activities are available also for private companies and the methodology to construct them is intuitive, straightforward, and transparent. In addition, the environmental sustainability of a firm's main economic activity is also likely to be more comprehensible for potential workers than information captured by ESG ratings. Please note also that it is the sustainability measure of a sector as *perceived* by potential workers that should matter for the Sustainability Wage Gap, even if the objective or true sustainability of a sector is different.[4] Nonetheless, we also 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 research (see, for example, Liang and Renneboog, 2015; Pedersen, Fitzgibbons, and Pomorski, 2020). Consistent with the evidence based on our sector-level sustainability measure, the analysis using firm-specific ESG scores also shows that firms with better ESG scores pay lower wages, highlighting the important idea that investment into ESG is beneficial to firm value because it allows attracting and retaining higher 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 policies—and thus likely higher investment in ESG than their peers—are able to attract workers at lower cost compared to their peers. The tests using firm-level ESG ratings are also complementary to the tests based on sector-based measures because ESG ratings seek to assess the quality of the sustainability related policies and practices of firms and not of the sustainability of the products and services a firm sells, with the latter being quantified by our survey measure.

In this paper we contribute to several strands of the finance and economics literature. First, we add to the literature on the financial performance implications of sustainability by documenting a new channel through which sustainability can positively contribute to 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 non-monetary incentives and the meaning of work.

First, our paper contributes to the ESG literature that documents a positive correlation between firms' ESG policies and firm performance. Friede, Busch, and Bassen (2015) conduct a meta-analysis of more than 2,000 empirical studies written since the 1970s on the link between

[4] Differences between the true and the perceived sustainability might occur for many 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, e.g., through lobbying and dis-information campaigns.

ESG and corporate financial performance and document that roughly 90% of the studies find a nonnegative relation between ESG and corporate performance. For example, Ferrell, Liang, and Renneboog (2016) document a positive relation between valuation and ESG measures. Other examples of such studies include Deng, Kang, and Low (2013), who examine ESG performance in the context of mergers and acquisitions and show that high sustainability results in better post-acquisition performance or Krueger (2015), who examines short-term financial valuation effects of positive and negative sustainability news showing that negative news about a firm's environmental and social impact lead to substantial declines in firms' equity market valuations. There are also papers showing that sustainability pays off particularly during periods of crises (see for example Lins, Servaes, and Tamayo (2017); Albuquerque et al. (2020)). While there is substantial evidence of a positive relation between sustainability and financial performance, the exact mechanisms through which sustainability translates into firm value remain ambiguous and elusive. Papers often fail to provide causal evidence of the respective channels. In particular, a simple reverse causation explanation, i.e., well-performing firms having the financial slack to invest into sustainability, appears to be an alternative explanation that is usually difficult to rule out (see, e.g., Hong, Kubik, and Scheinkman, 2012). Prima facie it is also puzzling how allocating financial resources to improving ESG policies—and thus incurring higher costs—can translate into higher firm value. From a corporate finance perspective, firms' investments in ESG policies can translate into higher firm value either by increasing cash flows or by lowering discount rates, if the benefits of the ESG investments exceed the costs of such investments. In line with the discount rate argument, Albuquerque, Koskinen, and Zhang (2019) provide evidence that firms with high ESG ratings tend to have lower costs of capital. More specifically Albuquerque, Koskinen, and Zhang (2019) develop a model that predicts that CSR decreases systematic risk and increases firm value and that these effects are stronger for firms with high product differentiation. While the link between a firm's cost of capital and ESG is increasingly documented in the literature (see also also Chava, 2014 or Dunn, Fitzgibbons, and Pomorski, 2017), prior research has been less able to credibly identify channels through which ESG policies affect cash flows. A notable exception is Tamayo and Servaes (2013) who uncover a consumer channel of ESG and show that good ESG policies appear to contribute to firm value for firms with high customer awareness. The idea is that firms with better ESG policies can sustain higher margins if sustainability aware customers are willing to pay higher prices. While more sustainable companies might attract customers with higher reservation prices, it cannot be ruled out that products from such companies also exhibit higher product 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. We contribute to this literature by providing evidence of a new channel, the *Sustainability wage gap*, through which sustainability affects firm value. Moreover, as explained earlier, the availability of very granular data as well as additional predictions on specific subpopulations, derived from heterogeneity of workers' preferences for jobs in sustainable sectors, allow us to rule out many other explanations. Hence, we believe that our paper makes a step forward to show more convincingly that investments into sustainability can cause increases in firm value.

Secondly, 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 2020). 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.

Last, we 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 in our setting meaning—as proxied by the environmentally 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 societally 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 nicely 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 very 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 describe 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). In the same spirit, we also find that retention rates of individuals with better non-cognitive skills are higher among firms that operate in more sustainable sectors.

Besides the several scientific contributions, our paper also has important policy implications for firms: we show that firms can attract talent at lower wages by investing into environmentally friendly, or more generally, pro-social policies, and thus "do well by doing good." Our findings are particularly relevant 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—which 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. Overall, our results also help to explain how ESG can potentially translate into financial profits by stressing the value of non-monetary aspects of a job for highly talented workers, which have increasingly important consequences for firms' human resources strategies.

The rest of the paper is organized as follows: In the next section we discuss the concepts of Sustainability and ESG and also and make use of a representative survey on work orientations to motivate and develop our main hypotheses, and also explain how we construct our main empirical measure for sustainability. Section 3 tests the baseline implications using detailed administrative employer-employee matched data from Sweden. Section 4 investigates labor market consequences of sustainability for the most talented workers and for more recent cohorts. Section 5 discusses alternative interpretations in detail. In Section 6, we make use of commercial ESG rating data to show consistent evidence at the firm-level. The last section concludes. We deliberately kept the data description part in the paper relatively short to increase 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 an internal appendix.

2 Sustainability, Preferences about Sustainability, and the "Sustainability Wage Gap"

2.1 CSR, Sustainability, 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, 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.[7] More recently, the concept of sustainability has gained more traction. Like CSR, sustainability also lacks a tightly circumscribed definition, but sustainability is generally also thought to be about the social and environmental impacts. Importantly, in addition to environmental and social aspects, sustainability also incorporates dimensions of firm

[7] 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."

governance as well as notions related to the time horizon and inter-generational equity. Sustainability is sometimes equated with the umbrella term ESG[8].

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 them. 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 an international 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. Finally, we use best-in class ESG scores from commercial data providers that capture the quality of a firm's ESG policies relative to industry peers.

2.2 Sustainability Preferences and Labor Market Outcomes: International Social Survey Programme (ISSP)

A central assumption underlying our analysis is that

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

(ii) these preferences affect their labor market choices.

More specifically, we hypothesize that individuals accept lower wages to work in jobs that are more useful to society, or, using our terminology, jobs that are more sustainable. In order to motivate our analysis and illustrate that workers do indeed have preferences for sustainability of their jobs consistent with our main hypothesis, we start by presenting some suggestive evidence using data from the International Social Survey Programme (ISSP).

The ISSP is a cross-national collaboration that runs annual surveys on topics important to the social sciences.[10] ISSP has executed four waves (1989, 1997, 2005, and 2015) of the Work

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[8] 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.

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

Orientations Survey, a specific survey that seeks to collect data on the survey participants' attitudes toward work and private life, their work organizations, and working conditions (see Dur and van Lent, 2019).[11] Sweden joined the ISSP in 1997 and we have survey responses for about 1,200 survey participants of a representative Swedish sample in each of the three waves of the survey. Besides basic demographic information (e.g., age, gender, and education), we focus on survey questions that capture respondents' (i) general attitudes about work, (ii) beliefs about their current job, and (iii) responses to questions about labor market outcomes. We choose these three categories of questions because they are useful to illustrate that workers exhibit sustainability preferences and that such preferences affect labor market outcomes.

First, we document that most workers exhibit strong non-monetary preferences related to their labor choices. The idea of focus on non-monetary work preferences is that these should be positively correlated with sustainability preferences: in the corporate context, for instance, sustainability issues are also sometimes referred to as non-financial issues. Using the ISSP survey, we construct two metrics of non-monetary preferences of workers. We focus on the importance workers attach to the societal usefulness of their jobs and the extent to which they think that jobs are simply a way of earning money. The ISSP survey explicitly asks about those aspects in the questions "*How important is a job that is useful to society*" and "*How much do you agree or disagree with the statement that a job is just a way of earning money – no more*".[12] The variables that measure the responses to these questions are denoted by *hlpsoc* respectively *wrkrearn*. Simple descriptive analysis reveals that the majority of people indeed care about non-financial 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.[13]

Next we turn to illustrating 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 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"* stack up against the stated belief that it is important

[11] See Section 2 of the Appendix for more information on ISSP and the data we extract from the survey.
[12] Responses to these questions range from 1=Strongly disagree / Not important to 5 = Strongly agree or Very important.
[13] In Section 2 of the Appendix we describe the ISSP data and relevant summary statistics of the survey responses in greater detail (see especially Table A4).

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

Next, we examine whether the documented differences in the extent to turn down a higher paying job are statistically significant across the different response groups (see Panel A of Appendix Table A5). 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.[14] 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).

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” and the Generation Z (i.e., cohorts born after 1980) have strong preferences for meaning or purpose of their jobs. Documenting such potential heterogeneities would be interesting for two reasons. First, those cohorts have entered the labor market / climbed up the corporate ladder and, hence,

[14] 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 A8 of the 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.

accommodating those preferences is increasingly important for firms to attract and retain the 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.

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 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 (see Appendix Table A5, Panel B for details).

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 anecdotic evidence that generational changes in preferences for sustainable jobs are more pronounced for highly skilled workers. Hence, in our empirical analysis, we will be able to focus on those subpopulations, using skill-measures that i) are very granular and ii) allow for a comparison over time.[15] Note also that

[15] 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),

our main evidence 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 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 (see Figure A2 and Table A8 in the appendix)[16]. 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.

2.3 The "Sustainability Wage Gap" (Hypotheses)

In the previous section we illustrate that values and preferences are related to labor market decisions. More specifically, we provided evidence that non-monetary aspects of a job are important and that individuals with more pronounced societal preferences are more likely to turn down other jobs that may even pay more. Consistent with the ISSP survey evidence we formulate our first hypothesis, on the "*Sustainability wage gap*":

Hypothesis 1: Workers in firms that operate in more sustainable industries and firms that have better ESG policies (as opposed to industry peers) are paid less.

The previous section also displayed considerable heterogeneity in sustainability preferences. For instance, more educated individuals have stronger preferences for the overall societal good. In addition, there is evidence that societal preferences have become more important over time. Our second set of hypotheses states that:

Hypothesis 2a: The sustainability wage gap is larger for more talented workers.

Hypothesis 2b: The sustainability wage gap is increasing over time.

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 4.1. when we conduct the corresponding tests.

[16] See Section 2.2 of the Appendix for all results (figures and tables) replicated for the ISSP data from U.S. respondents.

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 by making use of 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.

2.4 Measuring the "Sustainability" of Firms

In our tests, we will use two measures of the sustainability of a job. While we are agnostic about the precise definitions of sustainability, we do think that an increasingly important component of sustainability concerns the impact of firms on the environment. 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 to be environmentally sustainable. Secondly, we also rely on ESG ratings from commercial data providers. These ratings aim to assess the extent to which the processes and policies of a firm address social and environmental concerns relative to industry peers. While there are several limitations and concerns of those firm-level ratings, such as their opaqueness, their limited data availability, or the potential inconsistencies across rating agencies, we believe that it is still interesting to use them in a complementary analysis to investigate more directly potentially optimal firms policy responses.

2.4.1 Measuring the Environmental Sustainability of Economic Activities: Krueger, Metzger, and Wu (KMW) survey

One intuitive way of measuring the sustainability of a company is to think about the environmental impact of the sector in which the 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". They find that the majority of respondents believe that the sustainability of a firm's business practices relates primarily to the 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. To do so, we recruit second year Bachelor students in Economics and Management at the University of Geneva enrolled in a Corporate Finance lecture. 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=sustainable, 5=unsustainable). We focus on 95 economic sectors that cover 98% of employment in our matched worker-firm sample.

Each participant is asked to classify 35 randomly drawn economic sectors in terms of sustainability, which leads to about 42 survey responses for each sector. In Appendix Table A9, we provide an overview of the demographic characteristics of the KMW survey respondents: 54 percent of the respondents are women and the median birth year is 1998. The median time taken to complete the survey is about 7 minutes. In Panel A (B) of Appendix Table A11, we provide an overview of the ten most sustainable (unsustainable) industries according to the 124 survey participants. 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 and education being classified as most sustainable.

Classifying sectors in terms of environmental sustainability might be obvious for some economic activities, but difficult for others. Therefore, we allow survey participants do choose the response "Do not know" (DNK). In Appendix Figure A3 we plot 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 industry average sustainability, we group all sectors into five quintiles from sustainable (first quintile) to unsustainable (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 A3 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., more DNK responses), while there is less uncertainty about the most sustainable and unsustainable sectors in the tails. In our empirical analysis, we will hence also make use of specifications that focus on the most informative parts of the distribution of the sustainability measure.

2.4.2 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 is now a wide variety of 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 the primary economic activity (e.g., selling coal, drilling oil, selling tobacco and alcohol), firms can choose to implement exceptional social and environmental policies to mitigate the negative impact of their products and activities, which is what we capture using such ESG ratings. Despite the recognition that ESG scores and methodologies can disagree across data providers (see Berg, Koelbel, and Rigobon, 2020; Gibson, Krueger, and Schmidt, 2020), such measures have been used heavily in prior research (see, for example, Hong and Kostovetsky, 2012; Lins, Servaes, and Tamayo, 2017; Liang and Renneboog, 2017). To address the issue of disagreement[17] in ESG scores, we investigate ESG scores from two prominent data providers for which we have data for a meaningful number of Swedish firms, namely MSCI and Refinitiv.[18] Note that besides the limitations of such measures in terms of disagreement and methodologies, another limitation of such measures is that they are generally only available for publicly listed companies. This is a big advantage for our sector-level measure, which is available for 98 percent of our employment data.

3 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. We complement these data with (i) sustainability measures resulting from a survey that we specifically design to measure the environmental sustainability of economic activities and (ii) with third party commercial data on the sustainability performance of firms.

Our main measure on the (environmental) sustainability of sectors comes from a survey described in the previous section.[19] 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 in the survey that, on average, they would be willing to accept a wage cut of about 17.2% (15% as the median) in order to work for a more environmentally sustainable firm.[20] 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 those intentions also translate into real choices in the labor market.

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[17] Using of S&P500 firms between 2013 and 2018 and ESG scores from six different ESG data providers, Gibson, Krueger, and Schmidt (2020) find that the average correlation for the total ESG score is about 0.48.
[18] In Appendix Section 5, we provide further details and background on the ESG ratings we use in the paper.
[19] The sustainability industry classification based on the KMW survey is described in greater detail in Section 2.4 of the paper and in Section 3 of the Appendix.
[20] See Table A10 in the Appendix.

We therefore examine administrative employer-employee matched data from Sweden. Our main data source for 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. The employer-employee matched data is described in further detail in Section 4 of the Appendix.

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 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 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. 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. Table 1 provides descriptive statistics of the wage data. All variables are defined and described in Appendix Table A15.

We start our analysis by running standard Mincerian wage regressions augmented by an indicator for 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.[21] Column (1) in Panel A of Table

[21] We describe alternative specifications in the next paragraphs and find robust results.

2 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%).[22] Interestingly, the magnitude of the effect is quite similar to the wage concession of 17.2% that we find in our KMW survey.

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 skills measures, the coefficient estimates on the sustainability dummy increase to 20% (19% for women).[23]

In Columns (3) to (5) we make use of different granularities of occupation-year fixed effects, controlling for occupation-specific, time-varying heterogeneity.[24] In the specification with the highest level of granularity, i.e., specification (5), we find that the wage difference between workers of the same education, same experience, 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[25], 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. In Section 5.2, we will also address the concern that workers might be "stuck" in

[22] We cluster standard errors at the firm-level to adjust for serial correlation at the firm-level. In Appendix Table A1, we take alternative structures for the error terms into consideration. Our results remain robust to various ways of clustering.

[23] While we cannot directly measure 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 2.2. for more details.

[24] 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 to 113 unique ones, and occ8 corresponds to eight unique occupational groups.

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

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 2, 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 it 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 preferences (e.g., "midlife crisis"). In Section 5.2., we will also look 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.

Next, we analyze the validity of our environmental sustainability measure as well its robustness by analyzing different functional forms. In Table 3, Column (1), we use the continuous version of the measure. The point estimate is -0.067 and significant at the 1%-level. The estimate is very large in absolute terms, suggesting that a worker moving from the lowest rated sector to the highest rated sector earns about 27% less. However, it is likely that there are non-linearities in the effect and, for instance, moving by one unit in the middle of the 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. Our 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 is -0.137, suggesting a jump of almost 9 percentage points between those sectors and the sectors in the second most sustainable category. This analysis is very similar to the graphical evidence in Figure 1 where we show a binned scatter plot on the association between wages and our sustainability measure. These patterns are consistent with results from an auxiliary analysis where we show that people find it relatively easy 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 much more difficult.[26]

In Column (4) of Table 3, we define a worker-weighted dummy for high sustainability sectors. More specifically, *Sust. (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 results, 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.

4 Sustainability and Labor Market Outcomes of the Most Talented Workers

As discussed in Section 2.2, there exists substantial heterogeneity in the 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 sustainability preferences are increasing over time. This evidence leads to additional predictions which we can test in our data. Those tests are interesting 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 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 can 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 those alternative channels 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 those preferences might become increasingly important for firms to attract and retain the most talented workers.

[26] The fraction of "Do not know" answers in the survey is high for industries in the middle of the distribution and low in the left and right tails (see Appendix Figure A3).

4.1 The "Sustainability Wage Gap" for Highly Educated Workers and its Evolution over Time

We test these additional predictions in Table 4. In the ISSP survey we can measure educational attainments (e.g., university degree) which we interpret as a proxy for talent. In our empirical analysis we will make use of the corresponding information as well. 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 sharply increased 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 for talent, measures that are comparable over time, i.e., with distributions in the population that are the same across cohorts. Another advantage is that, while having a degree university or not is a crude measure of talent, they are sufficiently detailed to allow us to analyze the upper percentiles of the talent distribution.

We, hence, focus on the male subsample given that our skills measures are of higher quality for men. Panel A shows differential effects for groups with different levels of education or skills. In Columns (1), we test whether there are differences 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 include firm fixed effects in our specification, absorbing time-invariant firm-heterogeneity. We find that the interaction term between sustainability 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% workers according to the skills distribution. Please note that we estimate a positive and sizeable coefficient for the main effects of skills (and on top of education). The interaction term between those high-skilled measures and sustainability is negative (-1.5% and -1.6%, respectively), which is consistent with Hypothesis 2a.

In Columns (4) to (6) we investigate whether the previously documented wage gaps for highly educated and talented workers is indeed increasing over time as stipulated in Hypothesis

2b. In order to test this hypothesis, we include a triple interaction term between education/talent, sustainability, and time, which we measure using a linear trend. The results are consistent between the different measures of education and talent. We document significant estimates on those 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 high non-cognitive skills workers are also economically significant as well as they suggest that the wage gap is increasing by about 1-2% every decade. Secondly, 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 those cognitive and non-cognitive skills measure as educational attainment measures are becoming less informative over time due to a severe expansion of schooling over time (see Böhm, Metzger, and Strömberg (2020)).

Taken together the results of Table 4 are supportive of the hypotheses that more talented workers with higher preferences toward sustainability are willing to accept lower wages and that these effects are growing over time, which increase our confidence in a causal interpretation of our findings.

4.2 Retention

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 2.2. 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 data to test whether workers with high preferences for sustainability are less likely to change firms in sustainable sectors. 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 5, Panel A shows the results using the same setup as in our previous tests using *Stay in firm* as the dependent variable. The interaction terms between education/talent and sustainability of the sector is 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. An interpretation of those coefficients is not straight forward 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 results analyze turnovers 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 to no firm in the next year. We define a voluntary turnover if a worker changes firms and is neither fired nor above 60. In Panel B, we then focus on voluntary turnovers. We find, similar to our previous findings, 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. The interaction term between high cognitive skills and the dummy for high sustainable sectors is positive but smaller and non-significant, between -0.4% and -0.6%.

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

5 Alternative Explanations

One of the contributions of our paper is to provide direct evidence on a (new) channel through which sustainability/ESG affects firm value. 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.

5.1 Other ESG-related Explanations: Customer awareness, Discount rates, and Reverse causation

As discussed in the literature review, there is increasing evidence for a positive correlation between investments into ESG and firm performance. Scholars have offered different (non-exclusive) explanations for a potential effect of ESG investments on firm performance: increased cash flows, lower discount rate, or a generally larger "corporate pie" to be shared by all stakeholders. Moreover, reverse causation, i.e., well performing firms being more likely to invest into ESG, appears also consistent with most previously presented evidence. In the following, we discuss those alternative explanations and their implications for wages and wage heterogeneity in more detail. Table A2 in Section 1 of the Appendix tabulates those alternative explanations and provides references to related papers.

(1) Investing into ESG might increase free cash flows of a firm, for instance, by sustaining higher margins if socially aware customers 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. Those set of explanations 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 differential effects for high-skilled workers, for instance.

(2) Investing into ESG might decrease costs of capital of a firm for two reasons. First, investors might be willing to forego some returns when providing capital to more sustainable firms. For instance, there are governmental programs that support the transition into cleaner production processes by providing cheap loans or loan subsidies. This type 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 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 Sections 5.2 and 5.3). Moreover, this alternative explanation also needs to explain the heterogeneity of the documented sustainability gap.

(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, not lower wages.

Overall, we conclude that those alternative interpretations are more difficult to reconcile with the full set of presented results. On the contrary, our results are fully consistent with the set of hypotheses derived from preferences toward sustainability and their heterogeneities. However, some concerns related to worker and especially job and sector heterogeneity might remain, which we address in the next section.

5.2 Worker, Job, and Industry Heterogeneity

First, 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 those 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 cognitive and non-cognitive talent measures from military enlistment tests, variables that have been found to be very informative in explaining labor market outcomes (see Böhm, Metzger, and Strömberg (2020) and Lindqvist and Vestman (2011), for instance). Moreover, the survey evidence presented in Section 2.2. (and in Appendix Tables A5 and A8, Panel A) does also suggest that workers with higher 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.

Finally, in some of our subsequent tests, we will analyze job switchers, controlling for workers fixed effects, even after more exogenous separations related to bankruptcies or massive layoffs. The Sustainability Wage Gap remains significant.

Moreover, there is the concern that heterogeneity on 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 those 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 on worker or sector-level, which we can include in our regressions. We will test those potential "compensating differentials" in more detail in the next section.

We start with further robustness tests by looking at several subsamples in Table 6. In Column (1), we consider only observations from the most recent years (2016-2018), given that our 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. Focusing on those recent years does not change the results and the estimates are almost 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 stays 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 sustainable sectors and less valuable in others, outside options might be smaller, negatively affecting the wage progression of workers in those industries or occupations. In order 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 certain 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). The specification in Column (3) shows the results for this subsample. The estimate of high sustainable industries is -0.114, 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). 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, we consider scenarios in which the separation between workers and firms is "more" exogenous, addressing the concern that some time-varying omitted factors may bias our estimates (such as finding "meaning of life during midlife crises"). To be concrete, we focus on workers who had to change jobs because of their firms going bankrupt in the previous year (see Column (5)) or if their firms experienced a massive layoff of more than 75% of their workforce (see Column (6)). The results remain basically unchanged in both specifications (-0.119 and -0.103, respectively).

5.3 Compensating Differentials

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, iii) work flexibility, and iv) family outcomes (such as being married or having children) and include those averages and their squared values as additional controls. We first include those variables (and their squares) separately by groups in Columns (1) to (4) of Table 7 and then pool them all together in the column (5). The coefficients of high sustainability are not changing much across specifications and lie between -10% and -13%. It is worth noting that some of those controls, such as being married or getting children, might be endogenous to the wages which may bias the estimates. Second, the results on part-time work are consistent with our analysis in the previous section when we focused on fulltime workers only.

We also explicitly test the alternative hypothesis that firms in sustainable sectors provide better learning and training opportunities allowing 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 4, 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. non-sustainable sectors are basically parallel suggesting that the sustainability wage gap remains constant throughout the career of a worker.

Those tests on compensating differentials also help us 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 et al. 2020). The predictions of being a BC on wages are ambiguous. First, a company might be voted a BC by their workers because of them paying higher wages; however, BCs may also treat their workers better, 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. This is be relevant for testing our hypotheses, if companies that are more environmentally sustainable also treated their workers better, in non-pecuniary dimensions.[27][28] 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

[27]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.
[28] 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 its sustainability.

“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 this gap.

6 Doing Well by Doing Good? Firm-level Evidence.

In the previous sections 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 often rely on self-reported data by firms. Third, there is increasing evidence of low correlations between the ESG ratings from different rating providers (see Berg, Koelbel, and Rigobon (2020) and Gibson, Krueger, and Schmidt (2020)). Finally, historic data on firm-level ESG ratings are available for publicly listed firms only and are often available only for a relatively small number of years, severely restricting the sample in both the time-series and the cross-section.

While there are many reasons why we do not want to use existing firm-level ESG measures in our main analysis, we still believe that it is interesting and potentially informative to analyze those ratings as well. We run some basic tests using ESG ratings from MSCI and Refinitiv (former Thomson Reuters Asset4), two data providers that have been commonly used in finance research (see Pedersen, Fitzgibbons and Pomorski (2020) or Ferrell, Liang, and Renneboog (2016)). These tests are interesting as they assess firms’ sustainability policies relative to their peers (“Best in class”). Note that ESG ratings seek to assess the sustainability of the ESG policies and practices of firms and not of the sustainability of the products and services a firm sells. In other words, firms can be part of an unsustainable sector (e.g., oil) but still obtain good ESG ratings. While it is likely to be difficult for firms to change their main economic activity or to improve the sustainability of a whole sector in order to attract and retain talent, they 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 be “doing well by doing good”.

In our main firm-level tests we focus on the environmental pillar of ESG ratings as they are most closely related to our sector-level measures in the previous sections and they might be easier to interpret by potential workers. Indeed, it seems more plausible that one can objectively quantify a firm's environmental performance since aspects such as water and energy use or greenhouse gas emissions can be measured. In contrast, scoring 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 rating (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 be related to compensating differentials such as work flexibility.

As pointed out before, ESG ratings are relative to industry and geographical peer groups.[29] 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. 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 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 Appendix Tables A13 and A14). For that reason, we decide to use a 2-digit industry classification in the later tests in which we also investigate the relation between the S and the G pillar of the ESG ratings and wages.

In Panel A of Table 8 we show summary statistics for the ESG ratings for Refinitiv and MSCI. We report statistics on the composite ESG scores and the individual components.

[29] For 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. Performance is measured relative to industry (ES) and country (G) peer groups.

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 policies.[30]

Panel B of Table 8 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)).[31] 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 of Table 8. 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), 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 social 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. 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 (e.g., Cunat, Gine, and Guadalupe (2012)), maybe because of omitted variables or reverse causation (e.g., Hermalin

[30] Section 5 in the Appendix provides more details and descriptive statistics on the ESG rating data.
[31] 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, they 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 scores are relative to industry peer.

and Weisbach (1998) and Adams, Hermalin, and Weisbach (2010)). In any case, the positive association between the G 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. A one standard deviation increase in the composite score is associated with 0.29% (0.88%) lower wages for MSCI (Refinitiv) firms.

Overall, the firm evidence on environmental policies is very much consistent with our findings at the sector level. Moreover, an important implication of the firm evidence is that firms can attract talent at lower wages by investing into environmentally friendly (and maybe into pro-social policies), and thus “do well by doing good.”

7 Conclusion

In this paper we propose and test a novel channel through which a firm’s sustainability or ESG characteristics affect its financial performance: the “Sustainability wage gap” channel. 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 (10-20%) and attract and retain higher skilled workers. Supported by evidence from three waves of a large and representative survey (International Social Survey Programme (ISSP)), we argue that workers are willing to give up part of their financial compensation because of nonpecuniary benefits related to their preferences to work in more sustainable sectors. Those preferences are more pronounced for highly skilled workers.

While a plethora of prior studies documents a positive correlation between a firm’s sustainability characteristics and its financial performance, few studies manage to credibly identify the actual mechanism through which sustainability translates into higher firm performance. We argue that most other explanations such as a customer awareness channel 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 results have also important consequences for firms’ human resources strategies. Accommodating the preferences for sustainability of workers might be a decisive factor for firms to attract and retain the most talented workers and remain competitive in the future.

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9 Figures

Figure 1: Wages and Sustainability

This figure shows a binned scatterplot of the relation between wages and sustainability. We focus on men (for which we have skill data) in the last three years for which we have data (2015-2017). We control for occupation, education, potential experience, and cognitive and non-cognitive skills. Data come from Statistics Sweden (SCB) and the KMW survey.

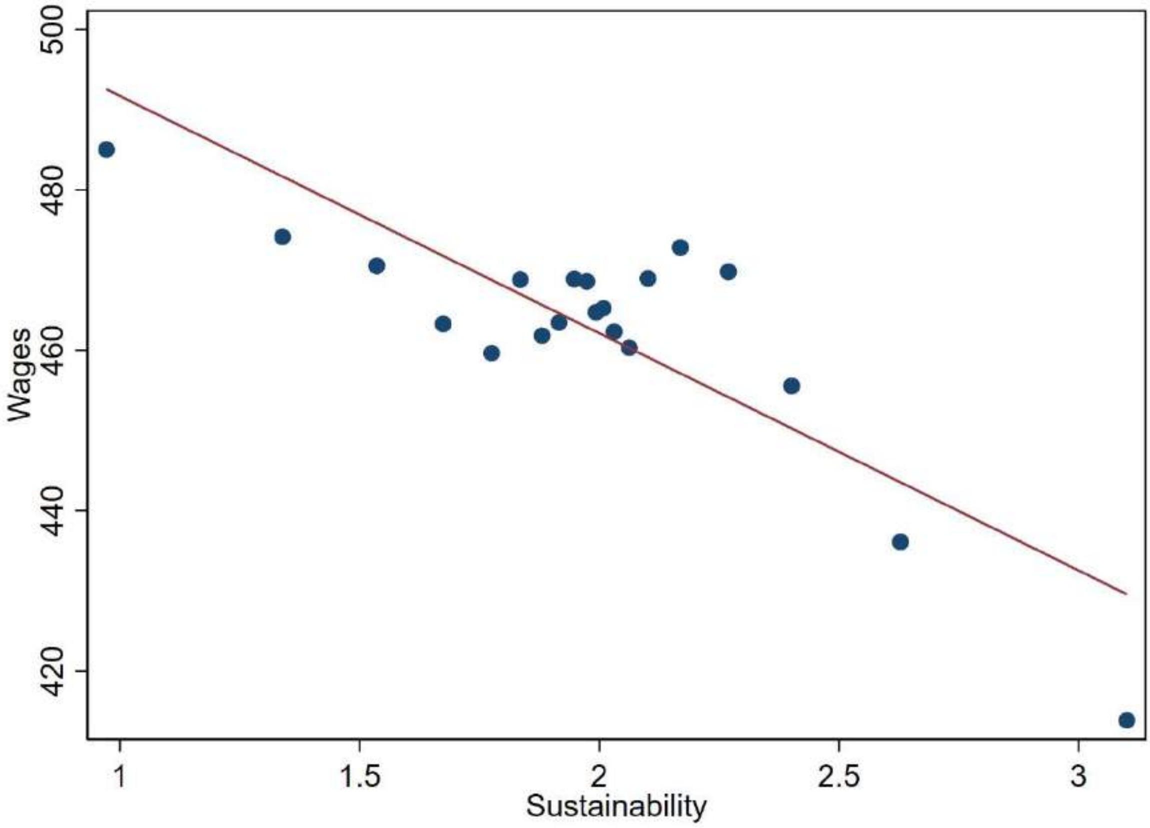


Figure 2: Relation between sustainability preference and labor choices

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.

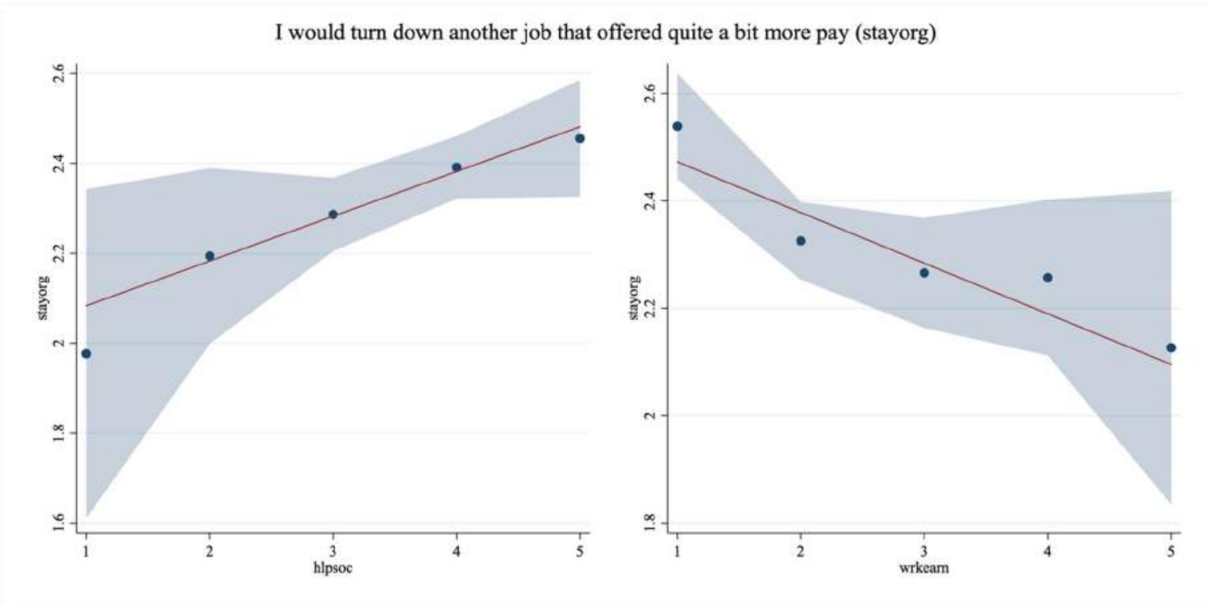


Figure 3: Heterogeneity of preferences

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.

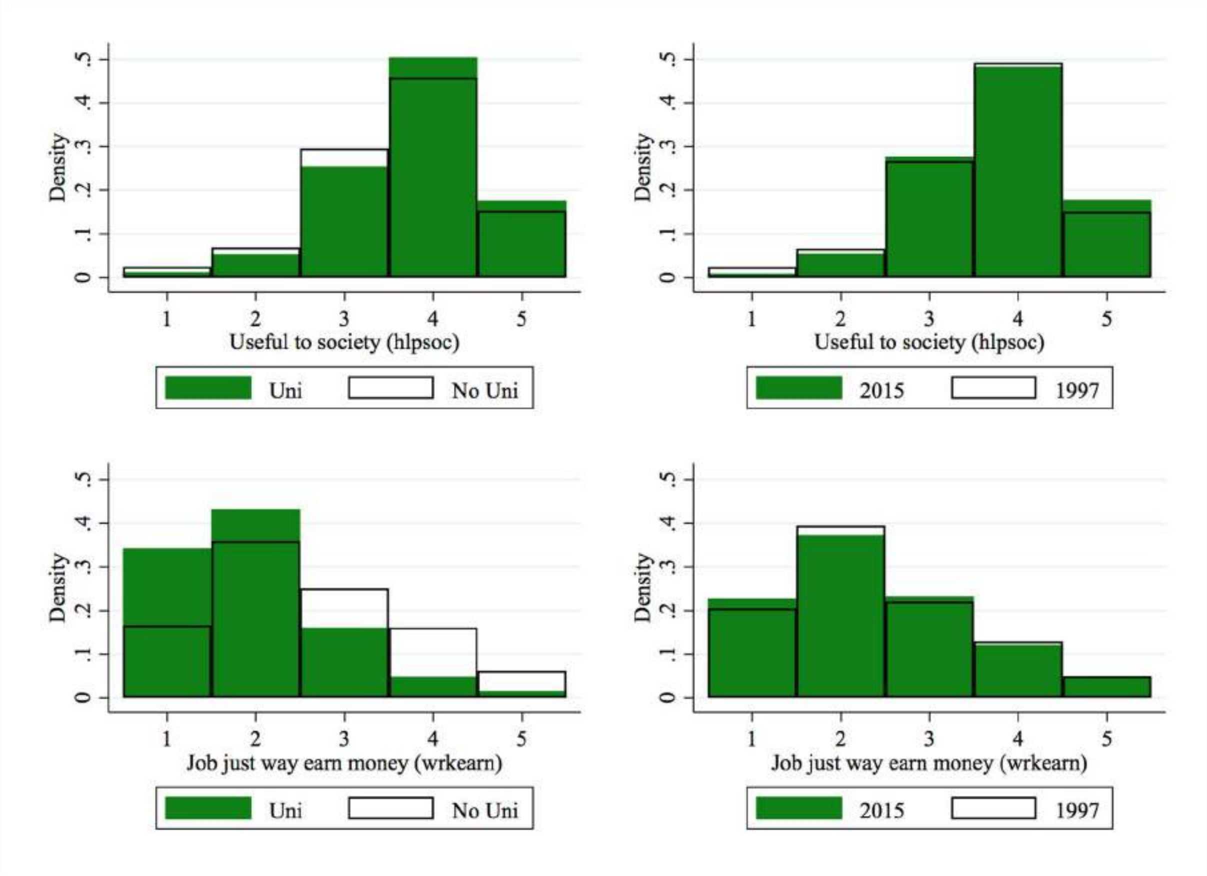
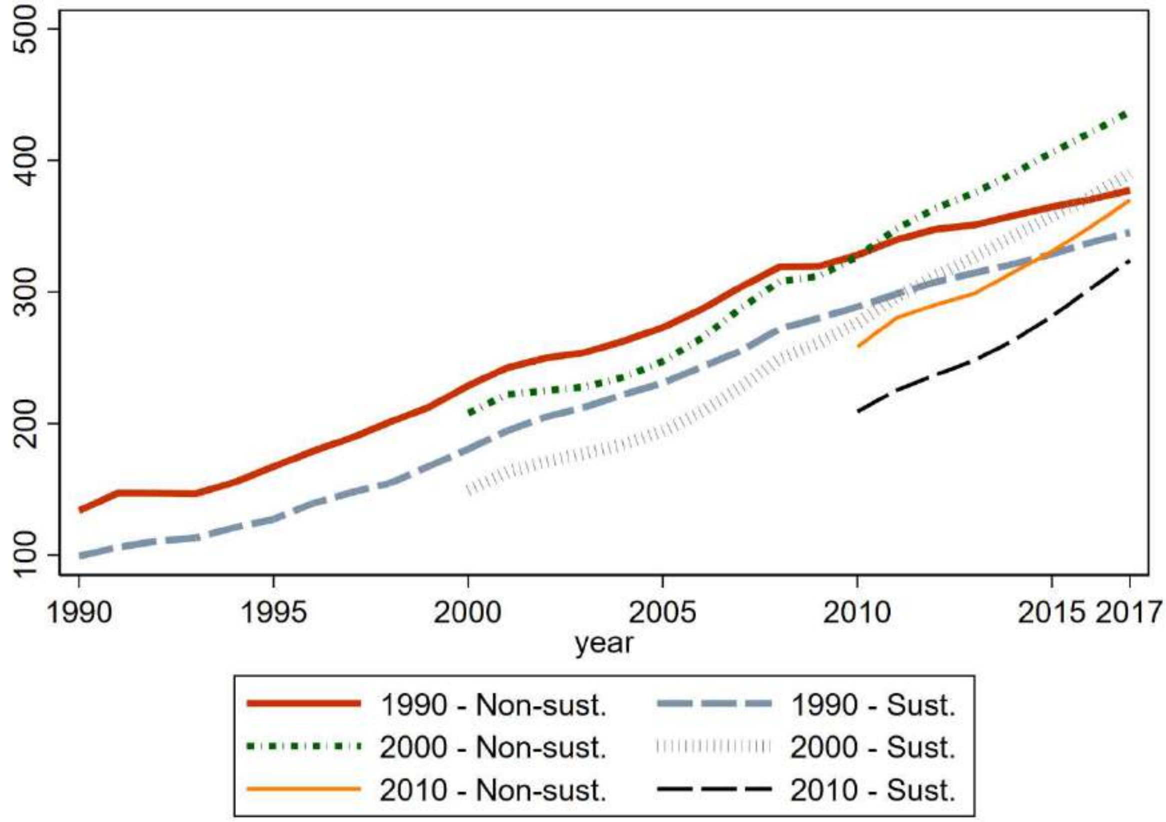


Figure 4: Wage Profiles

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 KMW survey.



10 Tables

Table 1: 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 A15.

	Obs in m.	**mean**	**sd**	**p10**	**p25**	**p50**	**p75**	**p90**
Panel A: Labor-related variables								
Ln(Wages)	112	7.33	0.90	5.93	6.97	7.57	7.89	8.20
defdeklon	112	2075.51	1817.42	376.28	1063.89	1929.06	2681.67	3623.93
DekLon	117	231.03	215.01	40.40	111.20	203.80	304.60	420.90
DispInk	117	2074.92	6649.11	841.00	1219.00	1722.00	2467.00	3375.00
LoneInk	117	2267.63	1954.45	388.00	1097.00	2019.00	3014.00	4133.00
full_deklon	25.4	320.14	203.08	174.10	223.50	284.60	365.80	491.90
full_dispink	25.4	2428.25	4421.67	1369.00	1689.00	2163.00	2779.00	3597.00
full_loneink	25.4	3160.14	1882.24	1736.00	2226.00	2832.00	3622.00	4822.00
Stay in job	100	79.7%	40.2%	0.0%	100.0%	100.0%	100.0%	100.0%
Volunt. turnover	100	9.5%	29.3%	0.0%	0.0%	0.0%	0.0%	0.0%
Panel B: Demographic and education variables								
Female	117	48.8%	50.0%	0.0%	0.0%	0.0%	100.0%	100.0%
Alder	117	40.88	13.54	23.00	30.00	41.00	52.00	59.00
Schooling	116	11.84	2.70	9.00	10.50	12.00	13.50	16.00
Pot. Experience	117	21.93	13.51	4.00	10.00	21.50	33.00	40.50
Cog. Skills	35.6	5.13	1.92	3	4	5	6	8
Non-cog. Skills	33.7	5.09	1.72	3	4	5	6	7
Pred. cog. Skills	56.7	4.47	2.85	1	2	4	7	8
Panel C: Sustainability measures from KMW survey								
Sustain. (high)	111	43.5%	49.6%	0.0%	0.0%	0.0%	100.0%	100.0%
Sustain. (cont.)	111	2.25	0.81	1.28	1.64	2.04	3.02	3.45
Sustain. (high - empl.)	111	19.8%	39.9%	0.0%	0.0%	0.0%	0.0%	100.0%

Table 2: The "Sustainability Wage Gap" – Baseline Results

The table shows results from estimating standard Mincerian wage regressions. The dependent variable is log of wage which is regressed on the dummy variable for sustainability, 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 males (females). We control for year of schooling and potential experience. In Column (2) through (6) we add skill controls. In addition, the specifications across the columns include different fixed effects in the estimation. In columns (3) to (6), we also include occupation-year fixed effect at different levels for granularities. All variables are described and explained in Appendix Table A15. Standard errors are clustered at the firm-level. ***, **, * indicates significance at 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.	Cog./Non-cog.
Year f.e.	Yes	Yes	No	No	No	No
Occ. - year 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		Graderank	Graderank	Graderank	Graderank	Graderank
Year f.e.	Yes	Yes	No	No	No	No
Occ. - year 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 3: 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 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). Standard errors are clustered at the firm-level. ***, **, * indicates significance at 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)
Sustainability	-0.067***				-0.054***			
	(0.003)				(0.004)			
Sust. quintile = 1		-0.033***				-0.084***		
		(0.009)				(0.014)		
Sust. quintile = 2		-0.039***				-0.058***		
		(0.008)				(0.014)		
Sust. quintile = 3		-0.049***				-0.087***		
		(0.010)				(0.015)		
Sust. quintile = 4		-0.137***				-0.150***		
		(0.009)				(0.014)		
Sust. tercile = 1			-0.046***				-0.038***	
			(0.006)				(0.010)	
Sust. tercile = 2			-0.088***				-0.093***	
			(0.007)				(0.010)	
Sust. (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.	Graderank	Graderank	Graderank	Graderank
Occ. - year 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 4: 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 variables are defined and explained in Appendix Table A15. All specifications are estimated only for the male subsample. Standard errors are clustered at the firm-level. ***, **, * indicates significance at 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
Occ. - year 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 5: Retention

This table investigates the effect of workers with higher preferences for sustainability and the likelihood of staying with the same firm. The outcome variable used 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. Standard errors are clustered at the firm-level. All variables are defined in Appendix Table A15. ***, **, * indicates significance at 1, 5 and 10% level, respectively.

Panel A: 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
Occ. - year 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 B: 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
Occ. - year 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 6: Robustness Tests (Subsamples)

The table shows robustness tests on different subsamples. Column (1) displays the results considering only the most recent years (from 2016 to 2018). 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 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%. Standard errors are clustered at firm-level. ***, **, * indicates significance at 1, 5 and 10% level, respectively.

	Ln(Wages)					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Sust. (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. (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	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.
Occ. - year f.e.	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4
R-squared	0.334	0.539	0.425	0.417	0.282	0.441

Table 7: Compensating Differentials

The table reports the regression results taking different compensating wage differentials into account. Compared to the baseline regression from Table 2, industry averages (and their squares) related to firing risk, health risk, work flexibility and family outcomes are included as additional controls. Standard errors are clustered at firm-level and ***, **, * indicates significance at 1, 5 and 10% level, respectively.

	Ln(Wages)				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Sust. (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.
Occ. - year f.e.	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4
R-squared	0.426	0.426	0.418	0.425	0.347

Table 8: Firm-level ESG Ratings (MSCI / Refinitiv)

This table shows summary statistics and regression results using the firm-level sustainability ratings from MSCI and Refinitiv. Panel A displays summary statistics of the sustainability rating data for each data provider. The sample period for the data is between 2002 and 2018. Panel B shows Mincerian regressions in which we relate the wage to the environmental ratings from Refinitiv (columns (1) to (3)) and MSCI (columns (4)-5). Moving across specification, we vary the level of granularity of the industry classification from 1- to 3-digits. In Panel C we report results of Mincerian wage regressions using the social, governance, and the composite ESG ratings from both Refinitiv and MSCI as the main explanatory variable. Standard errors are clustered at the firm-level. ***, **, * indicates significance at 1, 5 and 10% level, respectively.

Panel A: Summary Statistics

	count	**mean**	**sd**	**p5**	**p25**	**p50**	**p75**	**p95**
a4ir_sc (Refinitiv)	617	0.632	0.294	0.09	0.39	0.75	0.89	0.94
envscore_sc (Refinitiv)	617	0.662	0.301	0.14	0.38	0.80	0.93	0.95
socscore_sc (Refinitiv)	617	0.626	0.289	0.11	0.37	0.71	0.90	0.95
cgvscore_sc (Refinitiv)	617	0.497	0.227	0.09	0.33	0.53	0.68	0.83
iva_company_rating (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_score (MSCI)	747	5.43	1.73	2.30	4.47	5.40	6.60	8.24
governance_pillar_score (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)
yearsofschool	0.035***	0.034***	0.038***	0.037***
	(0.000)	(0.000)	(0.000)	(0.000)
potexp	0.047***	0.047***	0.048***	0.048***
	(0.000)	(0.000)	(0.000)	(0.000)
potexp # potexp	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Obs	1426168	1426110	1128860	1128826
R-squared	0.453	0.456	0.469	0.473
Sustainability	Environmental pillar (MSCI)		Environmental pillar (Refinitiv)	
Sample	Males	Males	Males	Males
Year##Occ. FE	Yes	Yes	Yes	Yes
Year##Industry FE	ind2	ind3	ind2	ind3
Skills FE	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)
yearsofschool	0.035***	0.038***	0.035***	0.038***	0.035***	0.038***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
potexp	0.047***	0.048***	0.047***	0.048***	0.047***	0.048***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
potexp # potexp	-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. score (MSCI)	Comp. score (Refinitiv)
Sample	Males	Males	Males	Males	Males	Males
Year##Occ. FE	Yes	Yes	Yes	Yes	Yes	Yes
Year##Industry FE	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

The Sustainability Wage Gap

Appendix

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1 Robustness Tests and Summary of Alternative Explanations

In this section we report robustness tests of our main results (Table A1) and a summary of the implications that alternative explanations would have for wages and shareholder value (Table A2).

In Table A1 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.

Table A2 summarizes channels which have been suggested in the literature through which ESG investments might affect firm performance. Each row discusses one alternative channel. Column (2) provides references to related literature. 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 A1: 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 tables. 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.
Year f.e.	No	No	No	No	No	No
Occ. - year f.e.	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4
Person f.e.	No	No	No	Yes		
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	Graderank	Graderank	Graderank	Graderank	Graderank	Graderank
Year f.e.	No	No	No	No	No	No
Occ. - year f.e.	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4	Ssyk4
Person f.e.	No	No	No	Yes	Yes	Yes
R-squared	0.354	0.354	0.346	0.346	0.346	0.346

Table A2: Potential ESG Channels and Expected Labor Market Outcomes

The table summarizes channels of how ESG 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 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 subsidies		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., Albuquerque, 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 A3, we provide summary statistics on some demographic characteristics of the Swedish ISSP participants.

Table A3: 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 A1 below.

Figure A1: 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.

Tables A4 shows summary responses for the main questions (see Figure A1). We provide summary statistics for the raw data, but we also coded dummy variables for the two highest (lowest) categories of agreement. Later, we use some of these dummies to split the sample (e.g., in Table A5). Panel A of Table A4 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). 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 the next table we will test whether there are systematic differences in those labor outcomes of individuals with high / low non-financial preferences.

Table A4: 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
Hlpsoc45 (dummy)	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
Wrkearn12 (dummy)	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
Rhlpsoc45 (dummy)	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

Panel A of Table A5 presents a univariate analysis of labor market outcomes with respect to non-financial preferences. Columns (1) and (3) show summary statistics for individuals with high non-financial preferences, while columns (2) and (4) show corresponding statistics for those with low 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. Overall, we perform twelve different tests. In 9 out of those 12 tests, the point estimate is consistent with the hypothesis that workers with higher non-financial preferences are willing to work at lower wages / spend more effort.[1] Results are strongest for wage-related outcomes (rows 1 and 2). When we analyze variables that aim to capture effort (work harder) results are weaker. We find significant differences for "work harder" using one measure of non-financial preferences (columns (3) and (4)) and for "spend more time on job" using our alternative measure of non-financial preferences (columns (1) and (2)). Taking all tests together, our analysis suggests that workers with high preferences for non-financial aspects of their job are willing to work at lower wages and put in more effort.

As a next step, we analyze whether there is heterogeneity of those "sustainability preferences". Specifically, we look at high vs. low educated individuals and at changes over time. Those splits have been motivated by various more anecdotic articles in the general press on "the war for talent" and on preferences of younger generations (e.g., the millennials). Panel B of Table A5 shows the corresponding univariate tests (corresponding histograms for the full distribution) are presented in Figure 2 in the paper. Columns (1) and (2) analyze differences between university graduates and non-graduates and for younger (Column (3)) vs. older cohorts (Column (4)). The signs of all point estimates are consistent, but we find statistically more significant effects when we split by education; this might be partly driven by the sample size in the tests that compare cohorts. Overall, however, the analyses show 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.

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

Table A5: 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 *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 through 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	**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 (1)	No uni (2)	Uni - No uni (1)-(2)		2015 (3)	1997 (4)	2015 - 1997 (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 A2 and Tables A6 to A8). Table A6 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 A7), but there is similar heterogeneity of those preferences in the population; ii) Consistent with the Swedish evidence, those preferences for sustainability have real labor consequences (see Table A8, Panel A); iii) Consistent with the Swedish evidence, those 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 A6: 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 A7: 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 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 A8: 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

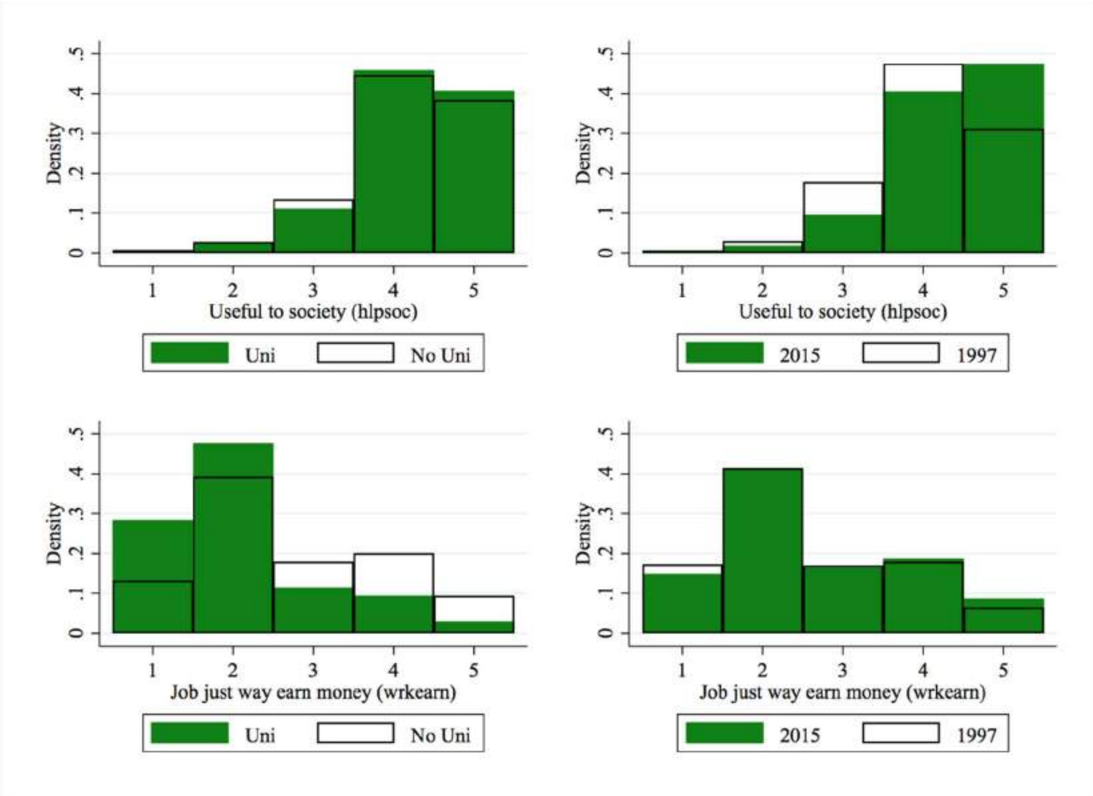
	hlpsoc45 **(1)**	**hlpsoc123** **(2)**	**High-low** **(1)-(2)**		**wrkearn12** **(3)**	**wrkearn345** **(4)**	**High-low** **(3)-(4)**	
Turn down job higher pay (stayorg)	2.7	2.46	0.24***	3.70	2.79	2.48	0.31***	6.33
Turn down job have higher pay (4,5) (stayorg45)	0.29	0.21	0.08***	3.29	0.3	0.23	0.07***	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 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 A2: 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 Krueger-Metzger-Wu (KMW) 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 environmental sustainability.

In the first part, we ask 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 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 1=sustainable to 5=unsustainable. Respondents can also choose a "do not know option". The survey was executed at the University of Geneva among a group of second year bachelor students. The 95 economic sectors that make up 98% of employment in our administrative wage data.

Table A9 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.

Table A10 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 A11 Panel A (Panel B) 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. 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 A2 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.

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.

Table A9: Summary Statistics

This table presents summary statistics for the participants in the KMW survey. The participants are bachelor students in Economics and Management at University of Geneva.

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

Table A10: Survey responses: Labor choices and wages

The table summarize selected responses to the questions related to labor choices and wages. The scale of responses goes from 1 (not important at all) to 5 (very important).

	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 percentage)?	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 percentage)? **(conditional responding yes to Q3)**	17.20	15	76

Table A11: 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. Source: BSc students (University of Geneva), 2019

Panel A: Sustainability of industries (Top 10)

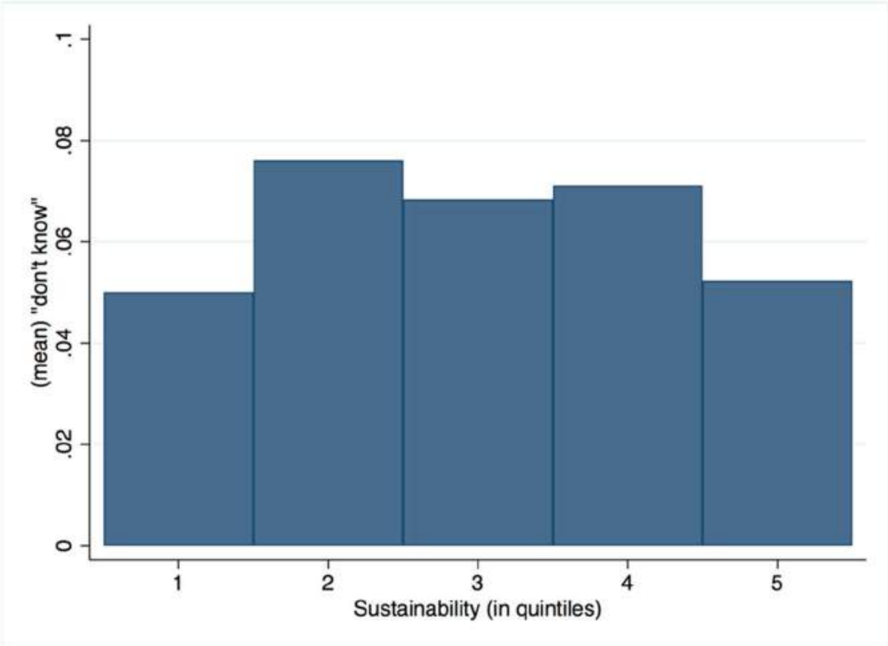
		mean	median	% of "do not know"	t-test (H0: mean =3)	p-value	Significance level
1	Education	3.45	5	0.00	2.40	0.0213	*
2	Physical well-being activities	3.44	5	0.00	14.21	0.0000	***
3	Recycling of metal waste and scrap and non-metal waste and scrap	3.33	5	4.26	10.49	0.0000	***
4	Recreational, cultural and sporting activities	3.17	4	0.00	7.67	0.0000	***
5	Research and development	3.02	4	2.17	10.47	0.0000	***
6	Social work activities	3.02	4	2.13	8.64	0.0000	***
7	Human health activities	2.91	4	2.27	5.08	0.0000	***
8	Collection, purification and distribution of water	2.85	4	2.08	5.29	0.0000	***
9	Legal, accounting and management consultancy	2.84	4	1.96	5.08	0.0000	***
10	Veterinary activities	2.72	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	0.52	1	2.33	9.40	0.0000	***
2	Extraction of crude petroleum and natural gas	0.54	1	4.65	9.12	0.0000	***
3	Mining of uranium	0.64	1	6.00	8.40	0.0000	***
4	Mining of coal	0.65	1	10.42	8.87	0.0000	***
5	Manufacture of tobacco products	0.68	1	0.00	9.75	0.0000	***
6	Retail sale of automotive fuel	0.68	1	9.52	7.78	0.0000	***
7	Manufacture of chemicals and chemical products	0.74	2	6.52	10.05	0.0000	***
8	Manufacture of aircraft and spacecraft	0.75	2	1.85	9.66	0.0000	***
9	Air transport	0.78	1	1.96	6.68	0.0000	***
10	Manufacture of textiles	0.79	2	0.00	8.44	0.0000	***

Figure A3: Sustainability vs. "Do not know"

The bar chart shows the relationship between sustainability of industries and the percentage of "don't know". We split the 95 industries into sustainability quintiles and plot the average percentage of "don't know" answers for each of the quintiles.



4 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 A12: 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 A15.

	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
d_next_same_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 KMW-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%

5 ESG Data (Firm-level)

5.1 Refinitiv (former Asset4)

We obtain firm-level sustainability scores from Thomson Reuters (former Asset4). Thomson Reuters[2] 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 Thomson (i.e., variables *a4ir*_sc, *envscore_sc, socscore_sc* and *cgvscore_sc*).[3] These pillar scores capture the overall social, governance and environmental quality of a company's policies. For instance, Thomson'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 those 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 A13 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 A13 reveals that about 85% are in industries with more than one firm and, hence, will

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

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.

Table A13: 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

5.2 MSCI

The 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 A14 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 A14 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 A14: 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

6 Variable Descriptions

Table A15: Variable Description

This tables presents the definition and sources of the main variables that we used in our study.

International Social Survey Programme (ISSP):

Name of variable	Definition	Source
hlpsoc	The importance level of a job that is useful to society. The scale is from 1 (not important) to 5 (very important).	ISSP
hlpsoc45	Dummy variable takes 1 if the importance level of hlpsoc is 4 or 5.	ISSP
wrkearn	The agreement level of 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
wrkearn12	Dummy variable takes 1 if the agreement level of wrkearn is 1 or 2.	ISSP
rhlpsoc	The agreement level of the statement "My job is useful to society". The scale is from 1 (Strongly disagree) to 5 (Strongly agree).	ISSP
stayorg	The agreement level of 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
stayorg45	Dummy variable takes 1 if the agreement level of stayorg is 4 or 5.	ISSP
helporg	The agreement level of 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
helporg45	Dummy variable takes 1 if the agreement level of helporg is 4 or 5.	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	Disposible income	LISA (SCB)
LoneInk	Gross salary	LISA (SCB)
full_deklon	Wage of full-time workers	LISA (SCB)
full_loneink	Gross salary of full-time workers	LISA (SCB)
d_next_same_job	Dummy variable takes 1 if the worker stays in the same firm for the next year	LISA (SCB)
d_next_fired_ind	Firing rate in the industry level	LISA (SCB)
sjukp_bdag_ind	Average gross sickness days in the industry level	LISA (SCB)
d_rehab_ind	Rate of having sickness/occupational injury/rehabilitation days in the industry level	LISA (SCB)
d_married_ind	Marriage rate in the industry level	LISA (SCB)
d_divorce_ind	Divorce rate in the industry level	LISA (SCB)
d_children_ind	Rate of workers having children at home in the industry level	LISA (SCB)
d_parttime_ind	Parttime worker rate in the industry level	LISA (SCB)
ssyk*	Different level of ssyk occupation classification	LISA (SCB)
occ8	occuptaion classification including 8 catagories	LISA (SCB)
ind*	Different digit level of SNI industry classiciation	LISA (SCB)
Panel B: Demographic and education variables		
Female	Dummy variable 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)
Graderank	rank of high school grades	LISA (SCB)
Cog. Skills	Cognitive ability score, ranging from 1 to 9	Military enlistment test(SCB)
Cog. Skills = *	Dummy variable equals to 1 if cognitive ability score equals to the number*	Military enlistment test(SCB)
Non-cog. Skills	Non-cognitive ability score, ranging from 1 to 9	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: Sustainability measures from KMW-survey		
Sustain. (high)	Dummy variable takes 1 if the sector is a high sustainability sector	KMW survey
Sustain. (high- empl.)	Dummy variable takes 1 if worker works in a sector that belongs to the top 20% of all workers	KMW survey
Sustainability (Sustain.)	Sector-level sustainability measure (continuous)	KMW survey
Panel B: CSR firm level measures		
a4ir_sc	Sustainability scores of firms from Refinitiv database	Refinitiv
envscore_sc	Environmental subscores from Refinitiv database	Refinitiv
socscore_sc	Social subscores from Refinitiv database	Refinitiv
cgvscore_sc	Governance subscores from Refinitiv database	Refinitiv
iva_company_rating	Sustainability scores of firms from MSCI database	MSCI
environmental_pillar	Environmental subscores from MSCI database	MSCI
social_pillar_score	Social subscores from MSCI database	MSCI
governance_pillar_score	Governance subscores from MSCI database	MSCI

7 Krueger-Metzger-Wu (KMW) 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 (1)
- ○ Somewhat sustainable (2)
- ○ Neutral (Neither sustainable nor unsustainable) (3)
- ○ Somewhat unsustainable (4)
- ○ Unsustainable (5)
- ○ Do not know (6)