

Can Socially-Responsible Firms Survive Competition? An Analysis of Corporate Employee Matching Grants

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This Version: March 7, 2017

Abstract

Employee matching grant schemes are coordination mechanisms that reduce free-riding by socially-conscious employee-donors. Their prevalence demonstrates that socially-responsible firms can survive market competition. When socially-conscious employees are more productive or value working together, matching schemes can enhance employee welfare and raise more for charities without reducing investor profits. We document higher labor productivity at firms with matching schemes and that matching firms are more likely to be ranked as one of the “100 Best Companies to Work For.” The relation is robust to managerial entrenchment concerns and is not simply a reflection of productivity and preferences in the high-tech sector.

Keywords: Employee matching grants, corporate social responsibility

JEL codes: D03, D21, H41, L31

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I. Introduction

Does spending on corporate social responsibility (CSR) reduce shareholder profits? And if not, to what extent is the cost of CSR spending borne by employees who may then be tempted by more lucrative employment opportunities at rival firms? In short, can companies afford to be socially-responsible given that they must compete for capital and labor? This paper focuses on one particular form of spending on social programs, namely corporate giving via employee matching grant schemes, and a novel database in order to answer these questions.¹ We provide a theoretical and empirical analysis of the conditions under which employee matching grant schemes can survive capital and labor market competition while improving welfare for a corporation's employees and the communities that benefit from the matched donations. Our results are consistent with the conclusion of Ferrell et al. (2016), namely that corporate social responsibility in the private sector can enhance social welfare without undermining the foundations of capitalism.

Our investigation suggests that teams of socially-conscious employees produce either a pecuniary benefit of increased labor productivity or a collective warm glow and that companies can fund employee matching grants through a reduction in the wages that would otherwise be paid to their philanthropic employees. The company's shareholders need bear none of the cost of corporate giving. Why then is the company's board feted for its "generosity"? The answer is three-fold. First, corporate donations serve as a coordination mechanism that allows socially-conscious employees to achieve their preferred combination of private and public good consumption. The employees prefer that combination to what they would have achieved if they were paid more at regular firms and had to make their donations individually. Second, charities raise more money than in the equilibrium of decentralized giving by better-paid employees. And third, firm owners are no worse off. The company's board can be applauded for its "social responsibility" in implementing a Pareto optimal outcome for employees, charities, and shareholders.

¹ Under an employee matching grant scheme, an employer matches employee charitable contributions up to some dollar amount. For example, Microsoft Corporation's 2015 Citizenship Report states that Microsoft matches employee donations of up to \$15,000 per employee per year and in 2015 the program raised \$131.7 million and over 67 percent of Microsoft's US employees participated.

Our model is based on the theory of voluntary contributions to public goods. Voluntary contributions by employee-donors reflect the value employees place on the public good. We term employees who value public goods “socially-conscious”. Uncoordinated private donations by these employees cannot reach the optimal level of giving because employees consider only the value that they individually place on the public good, and not the value the good has to other socially-conscious employee-donors. Hence they underestimate the total benefit from their giving. We show that a corporation can play a role similar to a central planner by coordinating socially-conscious employees’ donations via a corporate matching grant scheme.

Provided the total effective pay package of wages and donations on behalf of the employees reflects labor productivity, a matching scheme imposes no costs on the shareholders of socially-responsible firms. The costs of the match are borne by the employees in the form of reduced take-home wages and the firm’s investors enjoy the same profits with or without a matching program. If all employees value the public good, they will prefer the lower take-home pay associated with an optimally designed matching scheme to a system of higher pay and uncoordinated giving. By reducing free-riding, coordination allows employees to achieve their preferred mix of consumption of private and public goods.

However, not all employees care about public goods and these employees will prefer higher take-home pay and no corporate matching. We term those employees “regular” employees. In a competitive marketplace, some firms will cater to “regular” employees and will not have corporate matching programs. The higher take-home pay offered by such “regular” firms will be tempting to even socially-conscious employees. By switching to a higher-paying job at a rival regular firm and free-riding on the contributions made by employees remaining at socially-responsible firms, defectors can contribute privately to the charity and achieve the same outcome as if they had not switched. Importantly, after switching they will find it optimal to give less than they effectively gave at their socially-responsible former employer and the equilibrium will unravel. No one, not even the most munificent of employee-donors, will remain with socially-responsible firms. How then can corporate matching schemes survive?

One condition that allows the survival of employer-funded corporate philanthropy is that socially-conscious employees are more productive when they work together at socially-responsible firms. This gives a socially-responsible firm some room to improve the total package offered to its employees to prevent defections to regular rival firms. Alternatively, the

interactions between socially-conscious employees may produce a direct, non-pecuniary benefit to them—a collective warm glow. For socially-conscious employees, the satisfaction of working with like-minded colleagues may overcome the fact they receive less take-home pay. Thus both regular firms and socially-responsible firms may be able to co-exist with different types of firms catering to different types of employees: Regular employees will enjoy higher take-home pay and work at regular companies, while socially-conscious employees will choose to work for socially-responsible firms.

While our main focus is employee matching grant schemes, Appendix III considers a frequently used alternative form of corporate philanthropic program, namely lump-sum donations. Employees are less likely to switch to regular firms if the socially-responsible firm offers a matching scheme than if it makes a lump-sum donation given the same total donation to the public good. If a socially-conscious employee is tempted to move from a firm with a matching scheme, the donation on which she can free-ride will be reduced by the loss of the corporate match if she defects, while the donation to the public good is unchanged if she leaves a firm with a lump-sum donation program. Since socially-conscious employees are less likely to switch from firms with matching schemes than from firms making lump-sum donations, socially-responsible firms with matching schemes are better able to survive competition from regular firms.

We test our model using a previously unexplored data base. The *HEP Development* data base contains data on match ratios and maximum dollar matches for US companies with matching grant schemes identified by the provider.² The data base lists over 1,800 organizations in the U.S. with matching grant schemes. Interestingly, this list includes fifty-five percent of S&P 500 firms. Descriptive properties of the matching schemes are set out in Table I. We empirically investigate the link between labor productivity and whether a firm has a matching grant scheme after controlling for industry competition, physical capital employed per employee, year and sector fixed effects, etc. We also combine the *HEP* data with data from *Fortune* magazine's annual list of the "100 Best Companies to Work For in America" in order to investigate whether employees at firms with matching grant schemes are more satisfied and hence that these firms are more likely to be included on this list after controlling for various determinants of employee satisfaction including an index of employee relation strengths and

² See www.hepdata.com.

concerns constructed from the *KLD Social Ratings* data. The empirical findings match our model's predictions. We find higher labor productivity at firms with matching schemes and that these firms are more likely to be ranked as one of the "100 Best Companies to Work For."

[Please insert Table I here]

We undertake an empirical analysis of the relation between labor productivity and matching grant schemes that controls for the book value of assets per employee, industry concentration, lagged *R&D*, firm leverage, Tobin's *Q*, managerial entrenchment, and sector and year effects. We estimate that labor productivity per employee at firms with matching schemes is approximately \$20,000 per annum higher than at otherwise equivalent firms without matching schemes. We also show that matching is not simply a proxy for high labor productivity environments. For example, there is a positive relation between matching schemes and productivity even after controlling for the quality of a firm's employee relations. And the significant position relation between matching schemes and labor productivity exists even when management is not entrenched and faces the threat of a takeover should the firm deviate from shareholder wealth maximization. It is less likely that the results for these firms can be explained as the result of reverse causality in which high labor productivity gives rise to financial slack that management then directs to corporate philanthropy. Further, a significant positive relation between matching schemes and labor productivity exists for both high-tech firms (as defined by Loughran and Ritter (2004)) and firms that are not high-tech, meaning that we are documenting more than just a combination of the productivity and preferences of high-tech employees. The differential labor productivity of matching and non-matching high-tech firms is significantly positive and we can conclude that matching schemes serve as a coordination mechanism for employee preferences and not just as a proxy for a high-tech firm effect. Finally, we show that the positive relation between matching schemes and labor productivity exists even after controlling for the firm's status as a generous giver to social programs in general.

Consistent with a collective warm glow associated with working at a firm with a matching scheme, firms with matching schemes are more likely to be included on the "100 Best" list than are firms without a matching scheme. We also find that conditional on being on the list in one year, a firm is more likely to remain on the list in the following year if it has a matching scheme. Furthermore, we show that labor productivity and employee satisfaction may be substitute

channels that allow socially-responsible firms to survive competition from regular firms. For firms that are on the list of “100 Best Companies to Work For”, labor productivity is not significantly different between firms with matching grants and those without. However, for firms not on the list, labor productivity is significantly higher at firms with matching grant schemes than at firms that do not have a matching scheme.

The paper is organized as follows. Section 2 reviews the literature on corporate philanthropy and highlights our contribution. Section 3 analyses matching schemes as coordination mechanisms and shows that when all employees are socially-conscious, employee matching grant schemes can achieve the first-best outcome and dominate a system of decentralized employee giving. However, if some employees are not socially-conscious, regular firms may be set up to cater for regular employees. Section 4 considers how matching firms can survive labor market competition. All else equal, regular firms can afford to offer higher wages that will induce socially-conscious employees to defect and corporate employee matching grant schemes will not survive. But, provided that socially-conscious employees working together either produce more valuable output or enjoy working with like-minded individuals, matching schemes with match ratios that are not too high can survive and implement a Pareto improvement. Section 5 undertakes an empirical analysis of the relation between labor productivity and matching grant schemes. Section 6 empirically investigates the possibility that socially-conscious employees are more satisfied when working in a team of like-minded individuals. Additional results of a Propensity Score Matching analysis of the relation between labor productivity and matching for the sets of firms that are and are not on the “100 Best” list are reported in the Online Supplement. Open questions for future research are discussed in Section 7. Section 8 concludes.

2. Contribution to the Literature

The literature on corporate philanthropy is voluminous and many rationales for corporate giving have been proposed and investigated. Heinkel et al. (2001), Barnea et al. (2005, 2013), Morgan and Tumlinson (2012) and Nilsson and Robinson (2012) model settings in which corporate spending on public goods reflects shareholder preferences. Heinkel et al. (2001) and Barnea et al. (2005, 2013) consider the effect on stock prices when investor portfolio choice is influenced by corporate donations. Morgan and Tumlinson (2012) examine whether firms produce the socially optimal quantity of the public good when socially-conscious shareholders are unwilling to sell to

profit-maximizing raiders.³ Nilsson and Robinson (2012) model corporate giving as a reflection of shareholder preferences when socially-responsible firms have an advantage relative to charities at transforming private goods into public goods. Chava (2014) and Cheng et al. (2014) model settings in which investor preferences are such that better corporate social and environmental performance improves access to capital markets.

Rather than being a reflection of investor preferences, an alternative view of corporate giving is that corporate philanthropy is a perk enjoyed by managers when corporate governance is weak and free cash flows are plentiful. Both Brown et al. (2006) and Cheng et al. (2016) empirically link corporate charitable giving with measures of potential agency problems: The former finds that firms with larger boards and lower debt ratios tend to give more, while the latter finds that increasing managerial ownership and monitoring decreases measures of firm “goodness”.⁴

Other work recognizes that corporate donations or spending on social and environmental projects are not necessarily different from ordinary business expenditures incurred to increase shareholder wealth. For example, corporate donations may simply be a marketing strategy to improve the public image of the corporation (Mescon and Tilson, 1987; Galaskiewicz, 1997). Similarly, Lev et al. (2010) document a positive relation between corporate charitable contributions and customer satisfaction. Navarro (1988) recognizes that donations to local environmental protection and local educational institutions may reduce future costs of production and thereby maximize shareholder wealth. Elfenbein et al. (2012) show that charitable contributions can be used as a signaling mechanism for quality assurance in a marketplace.

Our analysis posits a distinct rationale for corporate giving that is additional to and not in conflict with extant rationales. In our model there is no link between corporate giving and investor preferences concerning the public good. Nor is corporate giving a manifestation of an agency problem. Corporate giving is not used as part of a marketing strategy. Finally, corporate giving does not lead to environmental improvements and/or educational opportunities for the workforce that reduce future costs of production, and corporate giving is not a signal of product

³ Morgan and Tumlinson (2012) do not consider the incentive for socially-conscious shareholders to buy shares in higher-dividend-paying regular firms while free-riding on the public good provision of socially-responsible firms.

⁴ Masulis and Reza (2015) conclude that shareholders are not naïve about charitable giving to either CEO or director-affiliated organizations and that such donations reduce firm value.

quality. Rather, our analysis focuses on employee utility and reflects the literature on human capital as a key asset in firm production (Zingales, 2000; Akerlof, 2007). Previous research has suggested that labor productivity may be related to social interactions between employees. Sociologists have coined the phrase “social capital” to describe “features of social life-networks, norms, and trust that enable participants to act together more effectively to pursue shared objectives” (Putnam, 1993).⁵ “Social capital” may underlie the results of Filbeck and Preece (2003), Goenner (2008), Edmans (2011, 2012), and Ahmed et al. (2010). These researchers examine *Fortune* magazine’s annual list of the “100 Best Companies to Work For in America” and conclude that there is a positive relation between improved employee satisfaction and stock market returns.

A number of papers argue that firms with charitable programs can attract employees who are passionate about particular social or environmental concerns and are linked through this common interest. Sabatini (2008) examines a set of small-to-medium sized Italian enterprises and concludes that bonding social capital through employees’ membership and participation in voluntary organizations improves labor productivity. We posit that corporate employee matching grant schemes can also act as bonding social capital. Hamilton et al. (2003) find that more productive workers tend to join teams first, even despite a loss in earnings, and conclude that this is evidence that some workers derive non-pecuniary benefits from teamwork. Brekke and Nyborg (2008) show that employers may be able to use the firm’s corporate social responsibility profile as a screening device to attract more productive workers. These last two papers are consistent with the possibility that corporate giving allows firms to attract and/or identify inherently more productive workers. Or it may be that the bonding social capital of a team makes its members more productive. In our model of corporate giving the actual mechanism is unimportant. What matters is that in equilibrium there is a positive correlation between those who choose to work in socially-responsible firms and either their utility or productivity. The direction of causation between team membership and either utility or productivity is irrelevant.

Ours is the first systematic analysis of employee matching grant schemes. Firms in our model operate in competitive capital and labor markets. Given these twin constraints, our model shows that the maximization of employee utility and the maximization of shareholder wealth are not in conflict and corporate philanthropy associated with employee matching grant schemes

⁵ There are a number of surveys on this topic: Dasgupta and Serageldin (1999), Sobel (2002) and Sabatini (2006).

does not come at the expense of shareholders.⁶ The cost of corporate philanthropy is borne by the employees as one of the firm’s “natural stakeholders” whose utility is increased by corporate giving. We show that companies can afford to be socially-responsible despite competing for capital and labor, and that matching schemes can increase employee utility and the amount raised for charity without reducing investor profits.

3. Matching as a Coordination Mechanism

We consider the ability of a socially-responsible firm using employee matching grants to coordinate donations by socially-conscious employees. Firms may institute a matching policy such that for each dollar contributed by the employees, the firm will match it with h dollars.⁷ The recipient of a corporate donation is assumed to be a nonprofit organization which produces G units of a public good. Coordination can also take the form of direct lump-sum corporate donations. Appendix III compares lump-sum corporate donations and employee matching grant schemes.

We adopt the public good model of Warr (1982, 1983) and Bergstrom et al. (1986).⁸ The utility U^i of socially-conscious employee i , $i = 1, \dots, N$, is a function of her private consumption x_i and the total amount of the public good G . $U^i = U^i(x_i, G)$ is continuous and strictly quasi-concave. For simplicity, we assume socially-conscious employees share a common utility function and we omit the superscript i . The first and second-order derivatives satisfy

$$U_1 > 0, U_2 > 0, U_{11} < 0, U_{22} < 0, \text{ and } U_{12} \geq 0. \quad (1)$$

Individuals have diminishing marginal utility with respect to both the public and private good and increased consumption of the public good does not reduce the marginal utility of the private good. We initially assume that a socially-responsible firm has N homogeneous employees all of whom are socially-conscious and later consider what happens when not all employees are

⁶ The fundamentals of the corporate governance literature debate on shareholder value versus a stakeholder society can be found in Friedman (1970), Freeman (2001), Tirole (2001, 2006), and Benabou and Tirole (2010).

⁷ Previous studies on matching behaviour and private donations include Guttman (1978, 1985, 1986), Danziger and Schnytzer (1997), Karlan and List (2007), Meier (2007), Rondeau and List (2008), Huck and Rasul (2011), Karlan et al. (2011), and Gong and Grundy (2014). These studies do not consider corporate matching grant schemes.

⁸ For a detailed account of the development of the public goods model and its application in philanthropy, see the survey by Andreoni (2006).

socially-conscious. In order to guarantee interior solutions, an employee's utility function is assumed to satisfy the Inada conditions $\lim_{x \rightarrow 0} U_1(x, G) = +\infty$, and $\lim_{x \rightarrow \infty} U_1(x, G) = 0$.

Socially-responsible firms compete with regular firms which do not have the matching scheme. Throughout this section, labor productivity is assumed to be the same at both firm types. If a socially-responsible firm has a matching scheme and the corporate match is g_i per employee, then in order to be able to compete in the product and capital markets wage rates must satisfy the following condition

$$W_S + g_i = W_R, \quad (2)$$

where W_S and W_R are the wage rates paid by socially-responsible and regular firms respectively. The level of employee i 's private donation is denoted by g_i and the corporate match of Equation 2 is given by $g_i = h g_i$.

Equation (2) plays a crucial role in our analysis. We abstract away from detailed modelling of the capital and labor market competitions and assume simply that because firms operate in a competitive environment, they are unable to either reduce or increase the total pay package to employees (salary plus any social spending/charitable giving on the employees' behalf) for a given level of labor productivity. That total compensation package reflects the employees' marginal productivity. Given labor productivity, if a firm were to reduce the employees' total package, the employees would move to rival firms. If instead a firm were to increase the total package, the reduction in profits to shareholders would lead to the successful takeover of the profligate employer. Therefore, Equation (2) sets out the condition under which firms must operate when capital and labor markets are competitive and matching grant programs are uncorrelated with labor productivity. In Section 4, we consider the situation when in equilibrium labor productivity is correlated with whether a corporation has a matching scheme.

Before considering employee matching grant schemes we first consider uncoordinated employee giving in the absence of corporate donations. The employee allocates her wage W_i between private consumption x_i and a donation g_i with $x_i + g_i = W_i$. Continuing the assumption that all giving is private gifts from employees then all firms are regular firms and the wage rate $W_i = W_R$. Each employee contributes g_i which solves

$$\max_{g_i} U(W_R - g_i, g_i + (N-1)\bar{g}) \quad (3)$$

where \bar{g} is the equilibrium donation from each of the other employees. In a Nash equilibrium, every employee contributes \bar{g} which satisfies

$$U_1(W_R - \bar{g}, N\bar{g}) = U_2(W_R - \bar{g}, N\bar{g}), \quad (4)$$

and the total amount raised by the charity is $\bar{G} = N\bar{g}$.

To simplify the discussion, we use a single asterisk to denote variables (such as donations, wages, etc.) under a matching scheme. Thus g^* denotes each employee's direct contribution to the public good given a matching scheme. A socially-responsible firm reduces wages by hg^* per employee relative to a regular firm in order to fund the match. A firm's total labor plus donation cost per employee is then unaffected by the matching scheme, thereby keeping shareholder profits unchanged. Given a matching scheme and a Nash equilibrium with a total donation including the match of G^* , each employee's utility takes the form $U(W_S^* - g^*, G^*)$ and the wage rate is $W_S^* = W_R - hg^*$. We now solve for the first-best optimal match ratio.

Assuming all other employees choose to donate g^* , employee i 's maximization problem becomes:

$$\max_{g_i} U(W_S^* - g_i, (1+h)g_i + (N-1)(1+h)g^*)$$

The Inada condition $\lim_{x \rightarrow 0} U_1(x, G) = +\infty$ guarantees an interior solution and the first order condition of a Nash equilibrium is

$$-U_1(W_S^* - g^*, (1+h)Ng^*) + (1+h)U_2(W_S^* - g^*, (1+h)Ng^*) = 0. \quad (5)$$

Condition (5) expresses the employee's optimal contribution to the public good as an implicit function of the match ratio h . It can be shown that the solution is unique.⁹

The total donation including the match exceeds the total donation under decentralized giving. To see this intuitively, suppose instead that in equilibrium the total donation including any match were the same under both decentralized giving and matching. Private consumption

⁹ The proof of this statement can be found in the proof of Lemma S1 of the Online Supplement.

would then also be the same under both schemes. At an optimum for decentralized giving, the utility loss from reducing private consumption by one dollar exactly offsets the utility gain from an additional dollar of expenditure on the public good. Consider a matching scheme with a total donation (including the match) equal to the optimum for decentralized giving. Given the match, an employee who then decreases her private consumption by one dollar will gain the utility from $(1+h)$ dollars of additional expenditure on the public good. The utility gain from the increased consumption of the public good will therefore more than offset the utility loss from the decreased consumption of the private good. The employee will be better off reducing her private consumption and increasing her donation. The resultant increase in giving means that the equilibrium donation under a matching scheme will be higher than the equilibrium total donation under decentralized giving.

More formally, rewrite the first order condition in (5) as

$$U_1\left(W_R - (1+h)g^*(h), (1+h)Ng^*(h)\right) = (1+h)U_2\left(W_R - (1+h)g^*(h), (1+h)Ng^*(h)\right). \quad (6)$$

Combined with the assumption that increased consumption of the public good does not reduce the marginal utility of the private good (i.e., that $U_{12} \geq 0$), it follows from a comparison of (4) and (6) that total donations given under a matching scheme exceed those with decentralized giving.

Proposition 1. *For any positive match ratio h , the total contribution to the public good under a matching scheme is greater than under a decentralized scheme.*

Proofs of Lemmas and Propositions are contained in Appendix I. An immediate implication of Proposition 1 is that the charity is strictly better off under a matching scheme than with decentralized giving. Are employees also better off with a matching scheme? To answer this question, we need to find the match ratio h that maximizes employee utility and then compare the utility of the employees with and without such a matching scheme. Lemma 1 establishes that the total of the employees' donations and the match is increasing in the match ratio. Note that this is so even if employee donations themselves decline as the match ratio increases.

Lemma 1. $(1+h)g^*(h)$ is increasing in h .

Now assume that a socially-responsible firm, acting as a social planner on behalf of the employees, chooses the match ratio h so as to maximize employee utility; i.e., as the argmax of the problem

$$\max_h U(W_R - (1+h)g^*(h), (1+h)Ng^*(h)), \quad (7)$$

with first-order condition

$$\frac{dU}{dh} = \left(g^*(h) + (1+h) \frac{dg^*(h)}{dh} \right) (-U_1 + NU_2) = 0.$$

From Lemma 1 we have

$$\frac{\partial(1+h)g^*(h)}{\partial h} = \left(g^*(h) + (1+h) \frac{dg^*(h)}{dh} \right) > 0,$$

and hence the first-order condition simplifies to $-U_1 + NU_2 = 0$; i.e.,

$$U_1(W_R - (1+h)g^*, (1+h)Ng^*) = NU_2(W_R - (1+h)g^*, (1+h)Ng^*). \quad (8)$$

It is straight-forward to verify that the second-order condition is satisfied:

$$\frac{d(-U_1 + NU_2)}{dh} = \left(g^*(h) + (1+h) \frac{dg^*(h)}{dh} \right) (U_{11} - (N+1)U_{12} + NU_{22}) < 0. \quad (9)$$

For any given match ratio h , the optimality condition for the employee-donor is given by (6). Equation (8) gives the optimality condition when a socially-responsible firm acts as a social planner to coordinate employee donations by choosing h . Proposition 2 follows from a comparison of (6) and (8).

Proposition 2. *Assume that all employees are socially conscious and that all firms are socially responsible and have matching grant schemes. Then the match ratio that maximizes employee utility, h^0 , is equal to $N - 1$.*

At the optimal match ratio the first order condition of equation (8) can be rewritten as

$$U_1(W_R - Ng^*(h^0), N^2g^*(h^0)) = NU_2(W_R - Ng^*(h^0), N^2g^*(h^0)). \quad (10)$$

An immediate corollary of Proposition 2 and Lemma 1 is that employee utility is an increasing function of the match ratio h for h in the interval $[0, N - 1]$. Setting $h = 0$ corresponds to the case of no matching and since the utility maximizing match ratio exceeds 0, employees can be strictly

better off when firms offer matching grants. Proposition 3 summarizes our observations on decentralized giving and matching schemes.

Proposition 3. *When all employees are socially-conscious and all firms are socially-responsible, employees are strictly better off working at socially-responsible firms that offer a matching scheme with the optimal match ratio than in an equilibrium with decentralized giving.*

A match ratio of $N - 1$ is much higher than the match ratios observed in practice as reported in Table I. In the following section, we show that the relatively modest match ratios observed in practice may be the equilibrium outcome when there exist competing regular firms. These firms will offer higher take-home pay than socially-responsible firms.

4. Surviving Labor Market Competition: Labor Productivity and Employee Warm Glow

We first consider the situation in which the productivity of employees is unaffected by whether they work in a socially-responsible firm or a regular firm and employees do not value working with like-minded coworkers who support the same causes they do. There is then no benefit from socially-conscious employees working together. All firms will offer the same total pay package (the total of take-home pay plus any per employee corporate matching donation) determined in a competitive labor market. Will a socially-conscious employee earning W_S at a socially-responsible firm have an incentive to switch to a higher-paying position offering W_R at a regular firm? Proposition 4 highlights the difficulty of retaining employees in the face of competition from firms without employee matching programs.¹⁰

Proposition 4. *Suppose that, consistent with the productivity of employees being unrelated to whether they work at socially-responsible or regular firms, all firms offer the same total pay package (the total of take-home pay plus any per employee corporate matching donation) and that socially-conscious employees gain no benefit from working with like-minded individuals. If*

¹⁰ Employees who are not socially-conscious will naturally prefer the higher take-home pay offered by regular firms. Regular firms would have an incentive to enter, offer a wage marginally less than W_R and earn a higher profit than a competing socially-responsible firm. Even if all employees are socially-conscious, Proposition 4 establishes that a regular firm could enter, offer a wage marginally less than W_R , attract socially-conscious employees away from socially-responsible firms, and earn a higher profit than competing firms.

a firm offers an employee matching scheme with a fixed match ratio, employees will defect to regular firms without such a matching program.

The intuition underlying Proposition 4 is straightforward. The higher take-home pay offered by regular firms would not only be welcomed by any regular employees, it will also be attractive to socially-conscious employees. By switching to a higher-paying job at a regular firm and free-riding on the contributions made by employees remaining at socially-responsible firms, defectors can contribute privately to the charity if they wish and achieve the same outcome they would have had if they did not switch. In fact, they will find it optimal to give less than they effectively gave at their socially-responsible former employer. No one, not even the most munificent of employee-donors, will remain with socially-responsible firms.

Proposition 4 refers to a fixed match ratio. If there is to be an equilibrium with a matching grant scheme when socially-conscious employees gain no benefit from working with like-minded individuals and all firms offer the same total pay package, then the match ratio cannot be a constant. A scheme where the match ratio declined if an employee defected would reduce the incentive to leave and free-ride on the matched donations of the remaining employees. One simple solution that will prevent defection is $h = h(N)$ with

$$h(N) = \begin{cases} N - 1; & \text{if no one defects} \\ 0 & ; \quad \text{if one or more defect.} \end{cases}$$

Defection by even one employee would lead to the loss of the entire match. Because of the complexity of implementing a non-fixed match ratio scheme and because in practice matching schemes have constant match ratios, our analysis focuses on matching schemes with constant match ratios.

Since socially-responsible firms cannot survive competition from regular firms when socially-conscious employees gain no productivity or collective warm glow benefit from working together, we turn to alternate settings in which employee-funded corporate philanthropy can survive. One such setting is when socially-conscious employees are more productive if they work together at socially-responsible firms. This gives a socially-responsible firm some room to improve the total package offered to its employees to prevent defections to regular rival firms. An alternate condition is that the interaction between socially-conscious employees produces a direct, non-pecuniary benefit from working together. For socially-conscious employees, the

warm glow of working with like-minded colleagues can overcome the temptation to switch to a regular firm. Thus we establish conditions under which both regular firms and socially-responsible firms can co-exist despite competition in the capital and labor markets. The different types of firms cater to different types of employees. Regular employees will enjoy higher take-home pay and work at regular companies, while socially-conscious employees will choose to work for socially-responsible firms.

4.1 Surviving Labor Market Competition: Matching Grants and Labor Productivity

When socially-conscious employees have a higher marginal product of labor than regular employees, a socially-responsible firm that can attract socially-conscious employees will have some flexibility to improve the total package offered. Proposition 5 establishes that this flexibility is always sufficient to prevent defections to regular rival firms.

Proposition 5. *When socially-conscious employees in socially-responsible firms are more productive than regular employees, there exists a separating equilibrium in which teams of socially-conscious employees choose to work together in socially-responsible firms that offer lower take-home pay and a matching grant scheme while regular employees choose to work for regular firms. This equilibrium exists even when socially-conscious employees do not enjoy a collective warm glow when working with like-minded individuals in a socially-responsible firm.*

The proof in Appendix I and the numerical example in Appendix II reflect the following intuition. Let S denote a socially-responsible firm and R denote a regular firm. The two firms are identical in every aspect except that the socially-responsible firm S offers a matching scheme while the regular firm R does not and the labor productivity in firm S is higher than that in firm R . A source of funds for the matching grant offered by firm S is the higher labor productivity of its socially-conscious employees. As shown in Lemma A2 of Appendix I, there exists a match ratio \bar{h} such that firm S 's matching donation is exactly equal to the additional output at firm S relative to firm R .

For a match ratio of h the diminution in the wage paid by firm S necessary to just cover the cost of the match is $hg^*(h)$. From Lemma 1 it follows that this diminution is increasing in the match ratio. Lemma A2 states that at a match ratio of \bar{h} the additional productivity achieved

when socially-conscious employees work together just offsets the diminution in the wage and take-home pay at firm S will equal that at firm R . At match ratios greater than \bar{h} , the diminution will be greater than the additional productivity and hence take-home pay at firm S will be less than that at firm R . Thus regular employees will remain at firm R since they will not be tempted to take a cut in pay.

Now consider socially-conscious employees. At a match ratio of \bar{h} , socially-conscious employees at firm S maximize their utility by giving $g^*(\bar{h})$. If they were to defect they could free-ride on the matched gifts of those who stayed and determine their new optimal level of giving at g^A . But this altered level of giving would not be matched, thus they would enjoy strictly less utility than if they had never defected but had stayed with firm S and given g^A . And that level of utility would itself be strictly less than they would have achieved if they had never defected and had continued to make the optimal donation of $g^*(\bar{h})$. Thus they will be strictly worse off if they defect. This is true for a match ratio of \bar{h} . By continuity it is also true at slightly higher match ratios. Therefore, for match ratios slightly greater than \bar{h} regular employees will prefer to be employed at regular firms and socially-conscious employees will prefer to be employed at socially-responsible firms.

While the proof of Proposition 5 establishes that a separating equilibrium exists for match ratios slightly greater than \bar{h} , the higher take-home pay offered by regular firms may prove too tempting for socially-conscious employees to resist if the match ratio is too high. As established in Proposition 2, when all firms are socially-responsible and all employees are socially-conscious, the match ratio that maximizes employee utility is $h^* = N - 1$. This far exceeds the match ratios observed in practice and set out in Table I. A natural explanation for why we do not see such high match ratios is that very high match ratios imply such low wages at socially-responsible firms that competition from regular firms offering higher wages and no match would tempt even the most magnanimous of socially-conscious employees¹¹.

In summary, this subsection has shown that if the labor productivity of socially-conscious employees working at a socially-responsible firms is higher than that of regular employees at regular firms, there exists separating equilibria in which (i) socially-responsible firms offer

¹¹ The proof of this statement is contained in Item 2 of the Online Supplement.

matching schemes; (ii) their socially-conscious employees receive higher utility than they would in the absence of such schemes; and (iii) take-home pay at socially-responsible firms can be only slightly lower than at regular firms. In order to empirically investigate the precondition of higher productivity at socially-responsible firms, Section 5 undertakes an empirical investigation of the relation between matching schemes and labor productivity.¹²

4.2 Surviving Labor Market Competition: Matching Grants and a Collective Warm Glow

As observed by Andreoni (1989), many donors enjoy a warm glow from the act of giving. Their utility functions are increasing in their consumption of the private good, in the amount of the public good and in the size of their individual donation. Our employee donors can enjoy a different form of warm glow, namely a “collective warm glow” that comes from working with those who support the causes that they value. When this is the case, matching schemes act not only as a coordination mechanism to mitigate free-riding in the provision of public goods, but also as a bonding mechanism for team members since a move to a regular firm will mean the loss of collective warm glow.

Proposition 6. *When socially-conscious employees in socially-responsible firms enjoy a collective warm glow from working with like-minded individuals, there exists a separating equilibrium in which teams of socially-conscious employees choose to work together in socially-responsible firms that offer lower take-home pay and a matching grant scheme while regular employees choose to work for regular firms even when labor productivity is the same at socially-responsible and regular firms.*

Bauman and Skitka (2012) argue that the non-pecuniary benefit of team membership can make socially-conscious employees at socially-responsible firms reluctant to move to regular firms despite the temptation of a higher salary. An empirical investigation of the relation between corporate giving and a measure of employee satisfaction is contained in Section 6.

¹² Appendix II uses a utility function of the Cobb-Douglas form defined over private and public good consumption to numerically illustrate the relation between the match ratio that maximizes employee utility within the set of match ratios consistent with a separating equilibrium and each of (a) the enhanced labor productivity of a socially-conscious team, (b) the size of a socially-conscious team, and (c) and the employees’ relative preference over private and public consumption.

5. Empirical Findings on Matching Schemes and Labor Productivity

5.1 Data and Summary Statistics

Information on matching schemes is determined from an examination of a database that to our knowledge has not previously been empirically investigated in financial economics, the *HEP Development* database. The *HEP* database provides information on whether a firm has an employee matching grant scheme, the size of the match ratio, and the dollar limit of the match per participating employee and we collected data on May 18, 2010 and April 10, 2015. The *HEP database* does not indicate when the matching programs started. We only consider firms which have the same matching grant status in both May, 2010 and April, 2015. That is, either the firm had matching grants on both dates, or the firm did not appear on the *HEP* data set on both dates.

For firms in the *ExecuComp* database with an unchanged matching grant status between May 2010 and April 2015, we obtain financial information for the years 2010 through 2013 from *Compustat*.¹³ To be included in our sample, firms must have a set of relevant financial information available; in particular, the number of employees (*Compustat* code EMP), book value of assets (*Compustat* code AT), and operating income after depreciation (*Compustat* code OIADP). The number of employees has to be at least 200. We delete observations for a given firm in a given year if the firm's book value of equity is negative that year. After the screening procedure, there are 5,184 valid firm-year observations, roughly one third of which are from firms with matching grants.

We calculate labor productivity for the set of firms included in the Standard and Poor's *ExecuComp* database, namely the S&P 1500 firms plus some firms removed from the index that are still trading. Labor productivity is measured at the firm-year level as per employee pre-tax operating income after depreciation in excess of the firm's cost of capital.¹⁴ A firm's cost of capital is the dollar cost calculated as the product of the book value of the firm's property, plant

¹³ Because our empirical analysis also requires information from the *KLD* database and because at the time we collected our data the *KLD* database only contained information prior to 2014, we only examine 2010 through 2013; i.e., the years prior to 2014.

¹⁴ We thank an anonymous referee for suggesting this definition of labor productivity.

and equipment times the sum of the risk-free rate and a 3% risk premium.^{15,16} Asset values and operating income are deflated to 2009 dollars using the GDP deflators reported on the Federal Reserve Bank of St. Louis website.

We use *R&D* as one of a number of controls and measure this variable as the investment in research and development scaled by sales. Missing values of *R&D* set to zero. In order to investigate the relation between matching grant schemes and employee satisfaction we obtain information on the firms included in *Fortune Magazine's* "100 Best Companies to Work For in America" from the magazine's website. In addition, we define a variable *emp_relation* which summarizes firms' employee relation metrics in the *KLD* data base. *KLD Ratings Data* provides a scoreboard of corporate social performance across time and we measure the strength of *emp_relation* for a given firm and year as the number of employee relations strengths minus the number of employee relations concerns for that firm and year. In its employee relations strengths section, *KLD* gives a one or zero rating in each the following categories: union relations; employee profit sharing; employee involvement through stock ownership or stock options, or participation in management decision-making; retirement benefits strength; health and safety strength; and) other strengths not covered by the preceding list. Similarly, in its employee relations concerns section, *KLD* gives a one or zero rating in each of union relations; health and safety concerns; workforce reductions; retirement benefits concern; and other concerns.

Summary statistics on matching grants, labor productivity, *emp_relation* and various firm characteristics are reported in Table II for the complete set of firms and for the subsets of firms with and without matching schemes. Firms offering matching schemes appear to have higher labor productivity with a median (mean) value of \$50,120 per year (\$87,440 per year); while firms without such programs have median (mean) labor productivity of \$25,640 per year (\$48,960 per year). The two-sample *t*-statistic for a test of the difference in the labor productivity between the two subgroups is 6.7521 (*p*-value of 0.0000). Firms with matching grant schemes have on average a higher *emp_relation* score of 0.80 while firms without matching schemes have an average score of 0.23. The two-sample *t*-statistic for a test of the difference in these two

¹⁵ The risk-free rate is measured as the average over the calendar year in which the financial year-end falls of the monthly risk-free rates reported on Ken French's website.

¹⁶ Note that 3% is the assumed risk premium on firm assets and not the risk premium on firm equity. None of our results are materially affected if the risk premium is instead set to 4% or 5%.

averages is 12.0375 (p -value of 0.0000). Firms offering matching grants are typically larger in terms of both the median book value of their assets (\$8.47 billion versus \$1.58 billion) and the median number of employees (12,780 versus 4,000). The two-sample t -statistic for a test of the difference in the book value of assets between the two subgroups is 9.0379 (p -value of 0.0000), while that of the number of employees is 8.4776 (p -value of 0.0000). Moreover, the median book value of assets per employee is higher at firms with matching schemes (\$606,000) than at firms with matching schemes (\$334,000). The two-sample t -statistic for the difference in the book value of assets per employee is 6.005 (p -value of 0.0000). Firms with matching schemes have better accounting performance. Their average return on assets (ROA) is 14%, as compared with 13% for firms without matching grants. The two-sample t -statistic for the difference in the return on assets is 2.106 (p -value of 0.0353). Firms with matching schemes have an average value of Tobin's Q of 1.30. Non-matching firms have a higher average Tobin's Q of 1.37. The two-sample t -statistic associated with the difference in these two averages is 2.5304 (p -value of 0.0114).

[Please insert Table II here]

5.2 Matching Grant Schemes and Labor Productivity

In order to explore the relation between matching schemes labor productivity we begin by investigating variants of the following relation using data from 2010 through 2013:

$$(Y/L)_{i,t} = \alpha + b_1 M_i + b_2 (BVA/L)_{i,t} + b_3 HHI_{i,t} + b_4 R\&D_{i,t-1} + b_5 BL\&e_{i,t} + b_6 Q_{i,t} + e_{i,t}, \quad (11)$$

where $(Y/L)_{i,t}$ is labor productivity for firm i for the financial year ending in calendar year t ; M_i is a dummy that takes the value one if firm i has an employee matching grant scheme; $(BVA/L)_{i,t}$ is the capital-labor ratio measured as the book value of assets per employee based on financial year-end asset values and the firm's number of employees; $HHI_{i,t}$ is a Herfindahl-Hirschman index value for firm i in year t ; $R\&D_{i,t-1}$ is the one-year lagged investment in research

and development by firm i scaled by sales; $BLev_{i,t}$ is book leverage at the end of the financial year; and $Q_{i,t}$ is Tobin's Q at the end of the financial year.¹⁷

When corporate donations act either as bonding social capital that increases labor productivity or as a screening device to attract more productive workers, the marginal product of socially-conscious employees will exceed the marginal product of regular employees. The left-hand-side of relation (11) can be thought of as the average product of labor less the wage rate. In a separating equilibrium the wage rate at a socially-responsible firm with a matching scheme cannot be higher than the wage rate at regular firms since if it were, regular employees would be attracted by the higher wages and would switch to socially-responsible firms and socially-responsible firms could not survive. Provided the higher marginal product at socially-responsible firms translates into higher average product, this higher average product combined with the lower wage rate at socially-responsible firms will mean that the left-hand-side variable of relation (11) will be higher at socially-responsible firms with matching schemes than at regular firms. Thus if socially-responsible firms survive market competition because of their greater labor productivity, the coefficient b_1 will be positive.

Five control variables are included in regression relation (11). The book value of assets per employee is included because output per employee is likely to be increasing in capital per employee. The Herfindahl-Hirschman (HHI) index is included as a control to reflect the Giroud and Mueller (2011) conclusion that firm performance is in part determined by the competitiveness of the firm's product markets. We construct annual values of HHI for each of the 38 Fama-French industry classifications based on Ken French's website.¹⁸ The index is calculated yearly on the basis of sales data. Lagged $R\&D$ expenditures relative to sales is included as a control since labor productivity may depend not only on a firm's capital and labor inputs in a given year, but also on how much of the capital reflects recent investment in $R\&D$. Book leverage is included since the disciplinary role of debt may influence labor productivity. Tobin's Q is also included as a control.

¹⁷ In the analyses that follow, no results change in sign or significance if variables that involve end-of-year values are replaced by averages of beginning- and end-of-year values.

¹⁸ http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

Relation (11) is estimated after trimming the top and bottom 0.5% of inflation-adjusted labor productivity observations.¹⁹ The results of estimating variants of relation (11) with and without the five control variables are reported in columns (1) and (2) of Table III. The *t*-statistics are computed using standard errors robust to heteroscedasticity and clustering of residuals at the firm level (Petersen, 2009). For both regressions (1) and (2) of Table III, labor productivity is significantly higher at firms with matching schemes, with the estimated increment to labor productivity associated with a matching scheme being \$37,380 in the absence of controls, and \$25,280 when all five controls are included.

To control for other differences in productivity between sectors beyond industry concentration, the regressions are also estimated with sector dummies created by classifying firms into ten sectors based on their Global Industry Classification Standard (GICS) code. The results with sector effects are shown in columns (4) and (5). Again, firms with matching grants have significantly higher labor productivity. To control for common variation in profitability across time the regressions are re-estimated with both sector and year dummies in columns (7) and (8). In all six variants of regression (11) (i.e., with and without controls, with sector effects but without year effects, and with both sector and year effects), the estimated labor productivity at firms with matching schemes is significantly higher than at regular firms at the 1% level. When sector and year effects and all five controls are included, labor productivity at firms with matching schemes is estimated to be \$21,800 higher than at otherwise equivalent firms without matching schemes.

[Please insert Table III here]

5.3 Matching Schemes as a Proxy for High Labor Productivity Environments

Proposition 5 has established that when socially-conscious employees gain no utility from inclusion in a socially-conscious team, socially-responsible firms can still survive competition from regular firms provided their employees are more productive than regular employees. Proposition 5 does not claim that implementing a matching scheme *causes* employees to become more productive. Rather, greater labor productivity is a necessary condition for the survival of a firm offering a matching scheme when socially-conscious employees are not willing to accept

¹⁹ The sign and significance of the estimates are unchanged if the regressions reported in Table III use the non-trimmed sample.

lower wages in return for the opportunity to work with like-minded individuals. The relevant question is then whether matching schemes and labor productivity are positively correlated. The subtle question of causation, namely whether socially-conscious employees are inherently more productive or matching schemes attract socially-conscious who then become more productive once they work together in a team is interesting, but not germane to the question of the sign of the correlation. It is though important to investigate whether matching schemes are simply a proxy for an environment of high labor productivity such that labor productivity would be the same for firms with and without matching schemes holding the environment fixed. We consider four ways in which matching schemes may be nothing more than proxies for high labor productivity environments: a) firms with good employee relations/high employee satisfaction; b) high productivity firms that also have poor governance; c) firms with high-tech operations; and d) firms noted for their philanthropy.

5.3.a. Employee relations, matching schemes and labor productivity

Lazear and Shaw (2007) and Bloom and Van Reenen (2011) argue that team structures and compensation practices can be designed to both attract workers with particular skill sets and improve their productivity. It is possible that matching schemes are symptomatic of environments with good employee relations that attract more productive workers. To investigate the incremental relation between matching schemes and labor productivity after controlling for the *emp_relation* measure, we investigate the following regression relation:

$$(Y/L)_{i,t} = \alpha + b_1 M_i + b_2 (BVA/L)_{i,t} + b_3 HHI_{i,t} + b_4 R\&D_{i,t-1} + b_5 BLev_{i,t} + b_6 Q_{i,t} + b_7 (emp_relation)_{i,t} + e_{i,t}. \quad (12)$$

The results of variants of regression (12) (i.e., with and without sector and year effects) are reported in columns 3, 6 and 9 of Table III. The quality of employee relations itself has incremental explanatory power—in all three regressions the coefficient b_7 on the *emp_relation* measure is significantly positive and greater employee satisfaction is associated with greater productivity. Importantly for our analysis, the coefficient on the matching dummy is in every case effectively unchanged by the inclusion of the measure of the quality of employee relations, which is consistent with matching schemes being a coordination mechanism for employee preferences rather than simply a proxy for good employee relations.

5.3.b. Managerial entrenchment, matching schemes and labor productivity

If corporate philanthropy reflects managerial preferences and is an outcome of poor governance (Brown et al. 2006; Cheng et al. 2016) and poor governance in non-competitive industries is associated with low labor productivity (Giroud and Mueller, 2011), then we may observe a negative relation between matching schemes and productivity. We therefore re-examine the relation between matching grants and labor productivity after controlling for a measure of corporate governance. The measure of corporate governance we adopt is the Entrenchment Index (E-index) of Bebchuk et al. (2009). The E-index is based on six corporate provisions: staggered boards, limits to shareholder bylaw amendments, supermajority requirements for mergers, supermajority requirements for charter amendments, poison pills, and golden parachutes. The first four provisions can prevent a shareholder majority from exercising control, while the last two are protections for incumbent top managers that do not require shareholder approval. Bebchuk et al. (2009) argue that these six provisions are associated with economically significant reductions in firm valuation.

We collect data from Institutional Shareholder Services (ISS) to compute the E-Index for the firms in our sample. The mean value of the E-index is 3.168. For firms with matching schemes, the mean is 3.301 and the mean for firms without matching schemes is 3.096. The value of a two-sided t -test of the difference in means is 6.1942 (p-value = 0.0000); i.e., firms with matching schemes are significantly more likely to have entrenched managers.

Table IV reports the results of the following pooled regression that includes the E-index as a control variable:

$$(Y/L)_{i,t} = \alpha + b_1 M_i + b_2 (BVA/L)_{i,t} + b_3 HHI_{i,t} + b_4 R\&D_{i,t-1} + b_5 BL\text{ev}_{i,t} + b_6 Q_{i,t} + b_7 (emp_relations)_{i,t} + b_8 E\text{-index}_{i,t} + e_{i,t}. \quad (13)$$

Consistent with Giroud and Mueller (2011), column (1) reports a negative relation between labor productivity and entrenchment after controlling for whether a firm has a matching grant scheme. Our interest is in the relation between labor productivity and matching schemes after controlling for managerial entrenchment. Column (1) reports that this relation is significantly positive. Columns (2) and (3) report the results for the samples of firm-year observations with E-index values greater than 3 (more entrenched managers) and less than or equal to 3 (less entrenched

managers), respectively. The relation between matching schemes and productivity is significant for both subsets of observations, and the relation is stronger when managers are less entrenched.

[Please insert Table IV here]

The positive relation between labor productivity and matching schemes might potentially be a reflection of the type of reverse causality posited in Hong et al. (2012). Hong et al. argue that “firms do good only when they do well in the sense of having financial slack”. The analogous argument in our setting would be that only firms with high labor productivity could afford to implement matching schemes; i.e., that causality runs from high labor productivity coupled with entrenched management to the adoption of matching schemes. In the model of Hong et al. (2012) the firm’s objective function is increasing in both profits and expenditures on the public good. In contrast, in our model capital markets discipline firms that deviate from profit maximization and it is the employees, not the managers or shareholders, who value the public good.

Column (2) of Table IV focuses on entrenched managers and the results are potentially consistent with reverse causality provided firms with entrenched managers and high labor productivity prior to 2010 chose to deviate from shareholder wealth maximization by implementing matching grant schemes and that high labor productivity continued during our 2010 and 2013 sample period. We can though rule out reverse causality for the set of firms that are subject to the market discipline of a takeover in the event they are tempted to give away their shareholders’ profits. The results for the sample of firms with E-index values less than or equal to one (i.e., for firms whose managers are not entrenched) are reported in column (4) of Table IV. The significant positive relation between matching and labor productivity in the absence of entrenchment is more consistent with the thesis of the paper than with an explanation rooted in reverse causality.

5.3.c. High-tech firms, matching schemes and labor productivity

Perhaps high-tech firms have high labor productivity and socially-conscious employees with tech-firm skills demand that their employers offer matching grants. This possibility can be thought of as a variant of Proposition 5. Since our sector dummies do not fully characterize the high-tech nature of a firm’s operations, we construct a high-tech industry dummy based on the SIC code classification in Appendix D of Loughran and Ritter (2004). Regression results that include this high-tech dummy as an additional control variable are reported in Table V.

Columns (1) to (3) of Table V report the results of a pooled regression estimation of relation (12) for high-tech firms; Columns (4) to (6) report the analogous results for non-high-tech firms. The results are consistent with a weaker relation between matching grants and labor productivity for high-tech firms relative to non-high-tech firms, but the differential labor productivity of matching firms and non-matching firms is significantly positive (at 5% level) for both groups and we can conclude that a matching scheme can serve as a coordination mechanism for employee preferences and is not just a proxy for a high-tech firm effect.

[Please insert Table V here]

5.3.d. General corporate philanthropy, matching schemes and labor productivity

Another possible interpretation of the results of Table III is that the matching dummy is simply a proxy for corporate giving undertaken as an ordinary business expense (Mescon and Tilson, 1987; Galaskiewicz, 1997; Lev et al., 2010; and Elfenbein et al., 2012) and that increased profitability gives rise to the appearance of increased labor productivity. We therefore seek to disentangle the potentially quite distinct roles of matching schemes and corporate philanthropy.

Prior to 2011, *KLD* classified firms as generous-givers (data item “com_str_a”) if the firm had consistently given over 1.5% of its trailing three-year net earnings before taxes to charity or “in *KLD*’s opinion is notably generous in its giving.” *KLD* dropped its generous-giver classification after 2010 and so we only have this data item for our 2010 observations. The likelihood of being classified as a “generous giver” is in fact higher for firms with matching schemes than for firms without matching schemes: 18.5% versus 5.5%. The $\chi^2(1)$ statistic of 23.46 is significant at the 1% level and rejects a null of independence between matching and generous giving.

To investigate whether matching is simply a proxy for corporate philanthropy we estimate the following relation in the year 2010:

$$(Y/L)_i = \alpha + b_1 M_i + b_2 (BVA/L)_i + b_3 HHI_i + b_4 R\&D_{i,-1} + b_5 BLev_i + b_6 Q_i + b_7 GG_i + e_i, \quad (14)$$

where GG_i is a dummy equals to one if firm i is classified as a generous-giver in 2010. Given its generous-giver status, if firms with matching schemes have higher labor productivity then we expect a positive coefficient on the M dummy. If after controlling for whether a firm has a matching scheme, generous giving is associated with higher profitability, then we expect a

positive coefficient on the *GG* dummy. The results of regression (14) are reported in Table VI both with and without sector effects, and when firms with missing values in *KLD* for the generous-giver measure are either not included or included with the missing values set to zero. In all four variants, the coefficient on the matching dummy is significant at the 1% level while the coefficient on the generous-giver dummy is insignificantly different from zero. The significantly positive coefficient on the matching dummy coupled with the insignificant coefficient on the generous-giver dummy is consistent with matching schemes serving as a coordination mechanism for employee preferences rather than simply as a proxy for corporate philanthropy per se.²⁰

[Please insert Table VI here]

6. Empirical Findings on Matching Schemes and a Collective Warm Glow

We turn now to an empirical investigation of a collective warm glow as an explanation of how socially-responsible firms survive competition from regular firms. When socially-conscious employees enjoy a direct utility benefit from team membership at socially-responsible firms, they lose that benefit if they are tempted to defect to a higher-paying regular firm.

We use the list of *Fortune Magazine*'s "100 Best Companies to Work For in America" to test whether there is a positive relation between employee matching grant schemes and employee satisfaction. Since 1998, *Fortune Magazine* has published an annual list of the 100 firms judged to be the best places to work for based on their employer-employee relations. The list is determined by the *Great Place to Work Institute* and the decision to include a firm on the list is based on employee surveys. Thus inclusion on the list can be treated as a direct measure of employee satisfaction.²¹ Previous studies (for example, Ahmed et al., 2010; Edmans, 2011;

²⁰ It might be argued that the positive coefficient on the matching dummy is actually a reflection of, say, an advertising role for matching schemes in terms of increased demand for a firm's products if consumers especially value products made by firms which via a matching scheme support a particular cause. Such an argument requires that customers know which particular firms have matching schemes.

²¹ The survey includes two parts. Two-third of a company's score is based on 57 questions. One of those questions is whether the company has an employee matching grant scheme. However, in e-mail communication with the authors, one of the institute's founders, Milton Moskowitz stated that "This is NOT a major criterion in selection of the list. It is just one of many attributes checked off. A company would not be severely handicapped by not having this

Edmans, 2012) report a link between corporate financial performance and inclusion on the list. Since only firms with more than 1,000 employees are eligible to be considered for the list, we restrict our sample accordingly in this part of our empirical analysis.

6.1 The Relation between Matching and the Likelihood of Appearing on the “100 Best” List

Using data for the 2010 to 2013 period, we investigate the hypothesis that firms with matching schemes will be more likely to appear in *Fortune*’s “100 Best Companies to Work For in America”. This would be consistent with employees enjoy a non-pecuniary benefit from working in firms with matching schemes. Panel A of Table VII reports that 5.15% of the firms in our sample of firms with matching schemes also appear on the “100 Best” list. Only 1.34% of firms without matching grants appear on the list. The associated $\chi^2(1)$ statistic is 57.59, with a p -value of 0.00. Panel B of Table VII reports that a firm that is currently not on the list but does have a matching scheme seems to find it slightly easier to break into the ranking in the subsequent year. The chance of inclusion in the following year is 0.17%. In contrast, a firm that is not on the list and does not have a matching scheme has a 0.14% chance of being included in the subsequent year. This small difference is not statistically significant. However, Panel C of Table VII indicates that a firm on the list that has a matching scheme has a 93.85% chance of continuing to be on the list in the following year. In contrast, there is only an 80% chance of remaining on the list in the following year if a firm does not have a matching scheme. This difference is statistically significant at the 5% level. The associated $\chi^2(1)$ statistic is 4.18 and the p -value is 0.041.

[Please insert Table VII here]

A Probit analysis is employed to further investigate the relation between matching schemes and inclusion on the “100 Best” list. The dependent variable is a dummy which takes the value one if the firm appears on the list and zero otherwise. The independent variables are a dummy for whether a firm has a matching scheme plus, as control variables, *HHI*, profitability (defined as a firm’s revenues minus the costs of goods sold divided by the book value of assets), lagged *R&D*,

program. The methodology of the list rests largely on the opinions of employees who take our survey. Their answers to 57 questions account for two-thirds of the final score. The remaining one-third comes from our evaluation of the programs and benefits offered by applicants, and matching grants do not have any strong weight by themselves.” For a more detailed description of how the list is compiled, see www.greatplacetowork.com.

book value of assets per employee, a high-tech firm dummy, the E-Index, and the *emp_relation* variable constructed from the *KLD* data. Since we are investigating a repeated sampling of whether firms appear on the “100 Best” list in each year between 2010 and 2013, the standard errors are adjusted for clustering at the firm level.

Columns (1) and (4) of Table VIII report that firms with matching schemes are more likely to appear on the “100 Best” list and the relation is significant at the 1% level.²² Importantly, firms offering matching schemes are more likely to be included on the “100 Best” list even after controlling for our KLD-based *emp_relation* metric; i.e., there appears to be a unique, beneficial impact of a matching scheme on employees’ satisfaction. Both the *emp_relation* index and the matching dummy are significant determinants of whether a firm is included on the “100 Best” list (as seen in columns (2) and (5)).

The relation between inclusion on the “100 Best” list and each of the matching dummy and the *emp_relation* variables remains significant when the full set of controls is considered. The book value of assets per employee is positively associated with the probability of being included on the “100 Best” list. Firms with higher profitability have a higher chance of appearing on the “100 Best” list, but this effect becomes insignificant once we control for sector fixed effects. The estimated relation between inclusion on the list and the matching dummy is little changed when sector effects are included, as seen in columns (3) and (6) of Table VIII. In summary, the results of Table VIII highlight the role that matching schemes have in improving employee job satisfaction.

[Please insert Table VIII here]

6.2 Inclusion on the “100 Best” List as a Proxy for Collective Warm Glow

Consistent with a collective warm glow associated with working at a firm with a matching scheme, firms with matching schemes are more likely to be included on the “100 Best” list than are firms without matching schemes. Still a collective warm glow and inclusion on the list are at heart different concepts. Employees will be less tempted by the higher take-home pay at regular firms if that means moving from a matching firm on the “100 Best” list to a regular (non-matching) firm that is not on the list, because of the loss of employee satisfaction. But an employee considering

²² Due to the time delay between the survey and the release of the resultant list, we match the “100 Best Companies to Work For in America” list in a given year with financial data from the preceding year.

defecting from a matching firm on the list to a non-matching firm that is also on the list faces no such loss. For a matching firm on the list to survive competition from a non-matching firm that is also included on the list can require either (i) that defection involves the loss of a collective warm glow that is quite distinct from the employee satisfaction proxied by inclusion on the list or (ii) that the employees of matching firms on the list are more productive than the employees of non-matching firms that are also on the list.

We now empirically investigate the interplay of matching, inclusion on the “100 Best” list, and labor productivity. Columns (1), (2) and (3) of Table IX report that both matching schemes and our *emp_relation* variable are significantly positively related to labor productivity, and that being on the “100 Best” list has an incremental, but insignificant, positive relation with productivity. This insignificant relation is an incremental relation – recall from Table VIII that the *emp_relation* variable is a significant predictor of membership of the “100 Best” list. Results for the set of firms that are not on the “100 Best” list are reported in Columns (7), (8) and (9). Since the firms not on the list make up the bulk of the full sample, the results in columns (7), (8) and (9) mirror those in (1), (2) and (3) and matching schemes are again seen to be significantly positively related to labor productivity.

The results for the much smaller sample of firms that are included on the “100 Best” list are reported in columns (4), (5) and (6). For firms that are on the list, the matching dummy is insignificantly related to labor productivity, and in one specification is negative. In that specification, the estimated coefficient on the *emp_relation* variable is also insignificant. Because of the small sample size, we also undertake the regression analysis without sector and year fixed effects. The relation between matching and labor productivity remains insignificant in this scaled-back specification.²³

²³ We examine the possibility that the relation between labor productivity and matching schemes and is a reflection of a nonlinear relation between labor productivity and the set of control variables combined with an unmodelled non-zero correlation between actual productivity in excess of linearly-predicted productivity and the adoption of a matching scheme. The results of a Propensity Score Matching investigation of this possibility are reported in Item 4 of the Online Supplement. We estimate that employees at those firms that are not on the “100 Best” list but do have matching schemes each produce \$27,776 more in annual output than do employees at firms not on the “100 Best” list that do not have matching schemes. Also consistent with the results of Table IX, we find that for the set of firms that are on the “100 Best” list, there is no significant difference in the PSM-based estimate of the labor productivity differential between firms that do and do not have matching schemes.

[Please insert Table IX here.]

If employees of matching firms on the list are not more productive than employees of non-matching firms that are also on the list, then socially-conscious employees will be tempted to switch to non-matching firms unless defection involves the loss of a collective warm glow quite distinct from working at a “100 Best” firm. Thus one interpretation of columns (4), (5) and (6) is that the empirical analysis supports the view that matching schemes act as a bonding mechanism for team members since a move to a regular firm will mean the loss of collective warm glow from working with like-minded colleagues. An alternate interpretation is simply that employees’ skill sets do not allow them to easily move from one “100 Best” employer to another.

It is important to recognize that the empirical absence of a significantly higher level of labor productivity at matching firms relative to non-matching firms when both firm types are on the list may simply reflect the small size of the sample of “100 Best” firms. Consider as a null hypothesis that the difference in the labor productivity of matching and non-matching firms is the same for firms on the “100 Best” list as it is for firms not on the “100 Best” list. Recall that for firms that are not on the “100 Best” list, matching firms have significantly higher labor productivity than non-matching firms. For the specifications of labor productivity given in columns (4) and (7), in columns (5) and (8), and in columns (6) and (9) of Table IX, the χ^2 statistics associated with this null are 0.09 (with a p -value of 0.7688), 0.08 (with a p -value of 0.7747), and 0.43 (with a p -value of 0.5104) respectively and we are unable to reject this null at conventional confidence levels. Thus we cannot reject a null that socially-conscious employees do not defect from “100 Best” firms with matching schemes to “100 Best” firms without matching schemes because their total pay package would be lower if they did.

6.3 Labor Productivity, Inclusion on the “100 Best” List, and Matching Schemes

While tangential to our paper’s question of how matching firms survive competition, it is interesting to investigate the relation between labor productivity and inclusion on the “100 Best” list. We follow the Propensity Score Matching (PSM) technique employed in Malmendier and Tate (2009) and classify observations as either in the “treatment” or “control” groups. The treatment (control) group consists of the set of firms that are on (not on) the “100 Best” list. Probit analysis is used to estimate a firm’s likelihood of being in the treatment group. Each firm

in the treatment group is paired with either one “nearest neighbor” or three “nearest neighbors” in the control group based on the book value of assets per employee, *HHI*, book leverage, Tobin’s *Q*, a high-tech dummy, the E-index, and the *emp_relations* variable. We undertake separate PSM analyses of the set of firms that do not have matching schemes and the set of firms that have matching schemes. Our interest lies in the differential labor productivity of firms that are on the “100 Best” list versus firms that are not on the list.

Panel A of Table X reports significantly higher labor productivity at firms that do not have matching schemes and are on the “100 Best” list than at firms that likewise lack matching schemes but are not on the list. Since the variables used to pair firms in the PSM include the *emp_relation* variable, inclusion on the “100 Best” list is seen to have a significant incremental relation to labor productivity at firms without matching schemes even after controlling for the quality of employee relations. Thus when employees rate their firm as one of the best to work for, they are significantly more productive even if the firm does not have a matching scheme. In contrast, Panel B of Table X reports the absence of a significant difference in labor productivity between firms that have matching schemes and are on the “100 Best” list and firms that have matching schemes and are not on the list. This result is consistent with high labor productivity at matching firms irrespective of whether or not the matching firm is on the “100 Best” list and/or with labor productivity at matching firms being determined in part by a collective warm glow that attracts socially-conscious employees to socially-responsible firms.

[Please insert Table X here.]

7. Open Questions

Our study seeks to partially reconcile conflict between stakeholders vs. shareholders given CSR by specifying conditions under which employee matching grant schemes can survive competition while improving employee welfare and increasing donations raised. Many interesting questions remain. In our model’s separating equilibrium, socially-responsible firms attract socially-conscious employees and regular-firms attract regular employees. But the factors that determine whether a particular firm chooses to be socially-responsible remain unexplored. Similarly, whether socially-conscious employees are more likely to have particular skills and hence a

higher proportion of firms in industries demanding those skills choose to be socially-responsible is an interesting question.

We have emphasized that whether socially-conscious employees working together are inherently more productive even absent a matching scheme or whether the adoption of a matching scheme increases the productivity of socially-conscious employees is not relevant in regards to the question of how firms offering matching schemes survive competition from regular firms. Still the distinction is an interesting one. The *HEP* database does not contain information on when a firm first started to offer employee matching grants. By surveying the firms identified in *HEP* and learning when these firms first adopted matching grant schemes, it may be possible to determine whether high labor productivity came about after the adoption of a matching grant scheme or pre-existed its adoption. If the improvement comes after adopting a matching grant scheme, an investigation of employee turnover data could help distinguish between attracting more productive socially-conscious employees vs. motivating an existing socially-conscious workforce.

An important prediction we have not been able to investigate is that it is the socially-conscious employees who bear the direct cost of the match through a reduction in their take-home pay relative to their marginal product. Due to the lack of wage data in the *Compustat* database, we are unable to directly examine whether employees at socially-responsible firms in our sample are paid less than those working for regular firms. However, Nyborg and Zhang (2013) estimate that in Norway firms with a strong reputation for CSR pay their employees less than is paid by firms without a reputation for CSR. While this offers some corroborative evidence supporting the claims in Propositions 5 and 6, Nyborg and Zhang (2013) do not focus on employee matching grant schemes.

8. Conclusion

We have addressed an important element of the relation between corporate philanthropy and human capital, namely the viability of employee matching grant schemes. When socially-conscious employees value both their private consumption and the provision of the public good, corporate matching grant scheme can act as a coordination mechanism to mitigate the free-rider problem among employee donors and matching schemes are superior to decentralized giving by employees. Matching schemes are challenged by employees' incentive to switch to regular firms

offering higher take-home pay. However, a separating equilibrium in which socially-conscious employees work for socially-responsible firms that offer employee matching programs and regular employees work for regular firms can exist if socially-conscious employees working together are either more productive or enjoy a collective warm glow from working with like-minded individuals.²⁴

We show numerically that when employees have Cobb-Douglas utility defined over their private consumption and the public good, the match ratios that can survive competition from regular firms are close to the one-for-one matches typically observed. In the absence of competition from regular firms the optimal match ratio would be much higher than one – in fact; the optimal match ratio would be approximately equal to the number of employees. But the implications for employees' take-home pay would then be so dire that even the most munificent of socially-conscious employees would be tempted to defect to a regular firm. The one-for-one matches we typically observe suggest that competition in the labor market does play an important role in the design of matching grant schemes.

Our empirical investigation supports our prediction that teams of socially-conscious employees produce either a pecuniary benefit of increased labor productivity or a collective warm glow and we find evidence for both the productivity and warm glow channels. Our analysis controls for a large set of variables related to labor productivity: the book value of assets per employee; industry concentration; lagged *R&D* expenditures; firm leverage; Tobin's *Q*; year effects; and sector effects. We estimate that labor productivity per employee at firms with matching schemes is approximately \$20,000 per annum higher than at otherwise equivalent firms without matching schemes.

We also show that matching is not simply a proxy for a high labor productivity environment. For example, there is a positive relation between matching schemes and productivity even after controlling for the quality of a firm's employee relations. And the significant position relation between matching schemes and labor productivity exists even when management is not entrenched and would face the threat of a takeover should the firm deviate from shareholder wealth maximization. This makes it less likely that the positive relation between matching and labor productivity that we document can be explained as the result of high labor productivity

²⁴ As shown in Item 3 of the Online Supplement, the tax deductibility of corporate and individual donations does not change our paper's theoretical results.

leading to financial slack that entrenched managers then direct to corporate philanthropy. The positive relation exists for both high-tech firms and firms that are not high-tech, meaning that we are documenting more than just a combination of the productivity and preferences of high-tech employees. Finally, the positive relation between matching schemes and labor productivity exists even after controlling for the firm's status as a generous giver.

Consistent with a collective warm glow associated with working at a firm with a matching scheme, firms with matching schemes are more likely to be included on Forbes' list of the "100 Best" companies to work for than are firms without such schemes. We also find that, conditional on being on the list in one year, a firm is more likely to remain on the list in the following year if it has a matching scheme.

When employees are socially-conscious, companies can fund employee matching grants through a reduction in the wages that would otherwise be paid. Given the increased productivity and/or warm glow associated with employment at a socially-responsible firm with a matching scheme, socially-conscious employees will not be lured away by the higher take-home pay offered by regular firms. Wages can adjust such that shareholders bear none of the cost of a corporate matching grant scheme. Why then should a company's board be feted for its apparent "generosity"? The answer is threefold. First, matching schemes coordinate employee giving and by reducing the free-rider problem allow employees to achieve their preferred combination of private and public good consumption. Second, charities raise more money than in a world of decentralized giving. And finally, the firm's owners are no worse off. A company's board should be rightfully applauded for its "social responsibility" in implementing a Pareto improving outcome for employees, charities and shareholders.

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Appendix I. Proofs of Lemmas and Propositions

Proof of Proposition 1: Suppose Proposition 1 were false and that for some h and associated $g^*(h)$, the level of decentralized giving \bar{g} was greater than or equal to $(1+h)g^*(h)$. Since $U_1 > 0$, $U_{11} < 0$, and $U_{12} \geq 0$, $\bar{g} \geq (1+h)g^*(h)$ implies that the left-hand-side of (4) is at least as large as the left-hand-side of (6). This implies that the right-hand-side of (4) must be at least as large as the right-hand-side of (6) and since $h > 0$,

$$U_2(W_R - \bar{g}, N\bar{g}) \geq (1+h)U_2(W_R - (1+h)g^*, (1+h)Ng^*) > U_2(W_R - (1+h)g^*, (1+h)Ng^*).$$

Now consider the set of inequalities $\bar{g} \geq (1+h)g^*$, $U_2 > 0$, $U_{22} < 0$, and $U_{12} \geq 0$. Together they imply

$$U_2(W_R - \bar{g}, N\bar{g}) < U_2(W_R - (1+h)g^*, (1+h)Ng^*)$$

and we have a contradiction. **QED**

Proof of Lemma 1: For a given match ratio h , each employee takes as given that each other employee will donate g^* and solves

$$\max_g U\left((W_R - g^*h) - g, (N-1)(1+h)g^* + (1+h)g\right).$$

Given the result that there is a unique optimal employee donation $g^*(h)$ for each match ratio h (see Item 3 of the Online Supplement for the proof), the first order condition can be written as

$$U_1(W_R - (1+h)g^*(h), N(1+h)g^*(h)) = (1+h)U_2(W_R - (1+h)g^*(h), N(1+h)g^*(h)).$$

For notational ease, we define $\tilde{g}(h) \equiv (1+h)g^*(h)$. Consider two match ratios, h^A and h^B , with $h^A > h^B$. Suppose in fact that

$$(1+h^A)g^*(h^A) \leq (1+h^B)g^*(h^B). \tag{A1}$$

The first order conditions corresponding to match ratios of h^A and h^B are

$$U_1(W_R - \tilde{g}(h^A), N\tilde{g}(h^A)) = (1+h^A)U_2(W_R - \tilde{g}(h^A), N\tilde{g}(h^A)) \tag{A2}$$

and

$$U_1(W_R - \bar{g}(h^B), N \bar{g}(h^B)) = (1 + h^B) U_2(W_R - \bar{g}(h^B), N \bar{g}(h^B)). \quad (\text{A3})$$

The assumptions that $U_1 > 0$, $U_2 > 0$, $U_{11} < 0$, $U_{22} < 0$, $U_{12} \geq 0$ and the supposition that $(1 + h^A)g(h^A) \leq (1 + h^B)g(h^B)$ when $h^A > h^B$, have the following contradictory implication: The left-hand-side of equality (A2) is smaller than the left-hand-side of equality (A3), yet the right-hand-side of equality (A2) is greater than the right-hand-side of equality (A3). Thus $(1 + h)g^*(h)$ is strictly increasing in h . **QED**

Proof of Proposition 4: For ease of exposition we introduce some additional notation: S and R , and \hat{g} and g' . Let S denote a socially-responsible firm and R denote a regular firm. Let \hat{g} denote the non-matched donation that a socially-conscious employee who does defect could choose to give post defection. \hat{g} may be zero. Let g' denote the donation made by those employees that remain with firm S after the defection. Note that $g' = g'(\hat{g}, h)$ is a function of both \hat{g} and h . It is straightforward to show that $g'_1(\hat{g}, h) \equiv \frac{\partial g'(\hat{g}, h)}{\partial \hat{g}} < 0$.

We first show that if socially-conscious employees gain no benefit from working with like-minded individuals, then defection will always occur unless h is specified as a function of the number of employees remaining at firm S . Assume that h is fixed. A potential defector will choose her optimal post-defection donation as the argmax of

$$\max_g U(W_R - g, (N - 1)g'(g, h)(1 + h) + g).$$

One feasible strategy for the defector is to donate an amount equal to $g^*(h)(1 + h)$; i.e., to give both what she would have given at her previous employment and make up for the lack of a match. She can use the increase in her wages as a result of the defection to cover exactly what would have been the match at her old firm. In this event $g'(g^*(h)(1 + h), h) = g^*(h)$ and the defector achieves the same level of utility that she achieved before defecting.

But this will not be the optimal donation for a defector to choose. The partial derivative of the defector's maximization problem evaluated at $\hat{g} = g^*(h)(1+h)$ is

$$\begin{aligned}
& -U_1(W_R - g^*(h)(1+h), Ng^*(h)(1+h)) \\
& + U_2(W_R - g^*(h)(1+h), Ng^*(h)(1+h)) \left[1 + (N-1)(1+h)g'_1(g^*(h), h) \right] \\
& < -U_1(W_R - g^*(h)(1+h), Ng^*(h)(1+h)) + U_2(W_R - g^*(h)(1+h), Ng^*(h)(1+h)) \\
& < -U_1(W_R - g^*(h)(1+h), Ng^*(h)(1+h)) + (1+h)U_2(W_R - g^*(h)(1+h), Ng^*(h)(1+h)) \\
& = 0.
\end{aligned}$$

She could achieve a higher level of utility by giving a lesser amount instead. Thus if all firms were socially-responsible there would be an incentive for a new firm of type R to enter and offer a wage marginally less than W_R . By doing so, it could attract socially-conscious employees away from type S firms and earn a higher profit than competing firms. **QED**

Proposition 5: The proof of Proposition 5 set out below relies on Lemmas A1 and A2.

Lemma A1: $\lim_{h \rightarrow \infty} (1+h)g^*(h) = (1+\Delta)W_R$

Proof of Lemma A1: Lemma 1 has established that $(1+h)g^*(h)$ is strictly increasing in h . Given the assumed Inada condition $\lim_{x \rightarrow 0} U_1(x, G) = +\infty$ it cannot be that $(1+h)g^*(h)$ reaches $(1+\Delta)W_R$ at a finite value of h . The employee would be consuming zero of the private good and her entire marginal product would be donated to the charity. Now suppose $\lim_{h \rightarrow \infty} (1+h)g^*(h) = B < (1+\Delta)W_R$. The first-order condition determining the employee's optimal donation given a match ratio of h and a productivity increment of Δ requires that

$$\frac{U_1(W_R(1+\Delta) - (1+h)g^*(h), N(1+h)g^*(h))}{U_2(W_R(1+\Delta) - (1+h)g^*(h), N(1+h)g^*(h))} = (1+h). \quad (\text{A4})$$

Take the limit of both sides of (A4) as h approaches infinity. The limit of the left-hand side is a

finite number, $\frac{U_1(W_R(1+\Delta)-B, NB)}{U_2(W_R(1+\Delta)-B, NB)}$, while the limit of the right-hand side is infinite and we

have a contradiction. **QED**

Lemma A1 states that as the match ratio approaches infinity, the private good consumption of socially-conscious employees will approach zero. This is a direct result of the assumed properties of the utility function of employee-donors as given in relation (1), namely that the marginal utility of the public good for those employees is strictly positive and that an increase in the public good does not decrease the marginal utility of private consumption. By cutting back private consumption and increasing their donation to the public good the employee-donor enjoys a utility gain from the increase in the public good equal to $(1+h)$ times marginal utility gain of an unmatched increase in the public good and suffers a utility loss equal to the marginal utility of private consumption. Since the utility gain becomes infinite as the match ratio approaches infinity, the marginal gain from cutting back private consumption will exceed the marginal loss and private consumption will be reduced toward zero. As private good consumption approaches zero the Inada condition implies that the utility loss will then also approach infinity and the marginal gain and loss will balance.

Lemma A2: There exists a match ratio \bar{h} such that $\bar{h}g^*(\bar{h}) = \Delta W_R$.

Proof of Lemma A2: We first prove that $hg^*(h)$ is an increasing function of h . We prove this statement by contradiction. Suppose that $hg^*(h)$ were non-increasing in h over some range. Then $g^*(h)$ would have to be decreasing in h over that same range and this would imply that $g^*(h) + hg^*(h) = (1+h)g^*(h)$ was decreasing in h over that range. But Lemma 1 rules out this possibility. Thus, $hg^*(h)$ must be everywhere increasing in h . Since $hg^*(h)$ is increasing in h while $\lim_{h \rightarrow 0} hg^*(h) = 0$ and $\lim_{h \rightarrow \infty} hg^*(h) = (1+\Delta)W_R$ (implied by Lemma A1), continuity ensures there exists a match ratio \bar{h} such that $\bar{h}g^*(\bar{h}) = \Delta W_R$. **QED**

Lemma A2 states that there exists a critical match ratio at which the firm's matching donation per employee is exactly equal to the additional productivity of socially-conscious employees working in a team relative to the productivity of regular employees. We are now ready to establish the existence of a separating equilibrium when socially-conscious employees in socially-responsible firms are more productive than regular employees,

Proof of Proposition 5: Assume that socially-conscious employees gain no utility from inclusion in a socially-conscious team. First, consider the condition for socially-conscious employees to stay with firm S . If a potential defector conjectures that all other socially-conscious employees will stay with firm S and that they will continue to give $g^*(h)$, then she will not defect provided

$$U(W_R(1+\Delta) - (1+h)g^*(h), N(1+h)g^*(h)) > \max_g U(W_R - \hat{g}, (N-1)(1+h)g^*(h) + \hat{g}). \quad (\text{A5})$$

From Lemma A2, there exists an h which satisfies $hg^*(h) = \Delta W_R$. Let \bar{h} denote this particular match ratio. Given this match ratio, we have

$$\begin{aligned} & U(W_R(1+\Delta) - (1+h)g^*(h), N(1+h)g^*(h)) \Big|_{h=\bar{h}} \\ & \equiv \max_g U(W_R - \hat{g} + \Delta W_R - hg^*(h), (N-1)(1+h)g^*(h) + \hat{g}(1+h)) \Big|_{h=\bar{h}} \\ & = \max_g U(W_R - \hat{g}, (N-1)(1+\bar{h})g^*(\bar{h}) + \hat{g}(1+\bar{h})) \\ & > \max_g U(W_R - \hat{g}, (N-1)(1+\bar{h})g^*(\bar{h}) + \hat{g}) \end{aligned}$$

and inequality (A5) is satisfied. Given a match ratio of \bar{h} a type S employee will enjoy a higher level of public good consumption if she stays with the firm that provides a match. Thus given a match ratio of \bar{h} a socially-conscious employee strictly prefers not to defect. By continuity, there exists some $h > \bar{h}$ in the neighborhood of \bar{h} such that type S employees will not defect from socially-conscious firms.

Second, to ensure that regular employees working for type R firms do not switch to type S firms, it must be that $\Delta W_R < hg^*(h)$, i.e., that the nominal pay at firm S is lower than that at firm R . Now Lemma 1 implies that $hg^*(h)$ is increasing in h and hence Lemma A2 implies that

$hg^*(h)|_{h>\bar{h}} > \Delta W_R$. Thus for $h > \bar{h}$ in the neighborhood of \bar{h} , type R employees will not defect from regular firms. **QED**

Proof of Proposition 6: Without loss of generality we model the effect of warm glow on the utility of socially-conscious employees as

$$U(x, G) + I \times \Gamma,$$

where I is a zero-one indicator that takes the value one if and only if the employee is socially-conscious and works in a socially-responsible firm, and Γ is the utility increment from working with other socially-conscious individuals. Assuming all other employees will remain with firm S , an employee currently working for firm S with a matching grant scheme will defect if and only if

$$\text{Max}_{g_i} U(W_R - g_i, (N-1)(1+h)g^*(h) + g_i) > U(W_R - (1+h)g^*(h), N(1+h)g^*(h)) + \Gamma. \quad (\text{A6})$$

It follows immediately from (A6) that provided Γ is large enough, socially-conscious employees will not defect to regular firms.

Appendix II. Numerical Illustration of Relation between Optimal Match Ratio and Model Parameters given a Separating Equilibrium

Assume that employee-donors have Cobb-Douglas utility: $U(x, G) = x^\alpha G^\beta$. It can be shown that the Nash equilibrium donation is $g^*(h) = \frac{\beta(1+\Delta)W_R}{\alpha N + \beta(1+h)}$. Guided by the insight obtained from Lemma A2 and Proposition 5, we can determine the match ratio for which a separating equilibrium is certain to exist. The critical value of the match ratio \bar{h} at which $\bar{h}g^*(\bar{h}) = \Delta W_R$ (and hence wages at a type S firm are identical to those at a type R firm) is $\bar{h} = \frac{(\alpha N + \beta)\Delta}{\beta}$.

For $\alpha = \beta = 0.5$, $N = 100$, $\Delta = 2\%$ and $W_R = \$10,000$, the critical value of $\bar{h} = 2.020$. A separating equilibrium exists for match ratios slightly higher than 2.020. For instance, it is easy to verify that, when $h = 2.030$, the take-home pay at firm S is $w_s = \$9,999.03$, which is lower than w_r and thus there is no incentive for regular workers to move from firm R to firm S . When $h = 2.030$ the utility of a socially-conscious employee who remains at firm S is 17,232.88, which is higher than the maximum level of the utility she will conjecture that she can achieve by moving to firm R , which is 17,232.85. This maximum level is associated with a conjecture that all the other employees will stay at firm S and that those who stay will continue to make the same donation as they made before the defection. Given such a conjecture, the parameter values are such that a switcher would then optimally cease all donations post the switch.

For a slightly higher value of h of 2.031, socially-conscious employees will find switching to type R firms attractive. Since $U(W_R - (1+h)g^*(h), (1+h)Ng^*(h))$ is increasing in h for all $h < N - 1$, the separating equilibrium with the highest level of employee utility is achieved at a match ratio at 2.030.

Further calculations show the comparative static relations between the optimal match ratio consistent with a separating equilibrium and each of (i) the per employee productivity gain of Δ , (ii) the number of employees in firm S , and (iii) the employees' preference parameter α . The higher the per employee productivity gain of Δ at socially-responsible firms, the higher the optimal match ratio that can be offered. This is demonstrated in Panel A of Table AI. It is

intuitive since the incentive to switch to a higher-paying regular firm is reduced if greater productivity at firm S allows a higher match without a reduction in the wage.

[Please insert Table AI here]

The relation between the optimal match ratio and the number of socially-conscious employees is positive, as illustrated in Panel B of Table AI. With the ability to free-ride on the generosity of a greater number of employee donors, each employee will reduce her gift. In turn the firm's match per employee is reduced and the wage offered by firm S rises. The incentive to defect is then reduced and a separating equilibrium can be maintained at a higher match ratio. Finally, the higher the preference parameter associated with the private good, the higher the optimal match ratio. This can be seen from panel C of Table AI. The higher the value of α , the smaller the amount that the employees will donate for any given match ratio and the firm's match per employee will be reduced. At an unchanged match ratio the wage offered by firm S will rise. The incentive to defect will be reduced and again a separating equilibrium can be maintained at a higher match ratio. Somewhat ironically, the end result is that when the utility function of socially-conscious employees places *less* weight on the public good, socially-responsible firms can offer higher matches.

Appendix III: Corporate Lump-Sum Donations

An often-used alternative to matching schemes is corporate lump-sum donations. The extant literature often views corporate lump-giving as a reflection of the preferences of top managers (Brown et al., 2006; Cheng et al., 2016; Reza and Masulis, 2015) rather than the preferences of employees. In this view corporate giving is an agency cost. Throughout Appendix III, we assume that giving is not a manifestation of an agency problem and compare and contrast employee matching grant schemes and corporate lump-sum giving when corporate giving benefits employees without harming shareholders.

When employees do not give privately but instead firms determine the optimal lump-sum contribution to the charity to give on behalf of the employees, \bar{G}_l , the firm acts as a social planner. The wage rate at a socially-responsible firms satisfies $W_S = W_R(1 + \Delta) - g_l$ where Δ is the fractional increment to labor productivity when socially-conscious employees work together relative to the productivity of regular employees. The lump-sum contribution can be expressed as $\bar{G}_l = N\bar{g}_l$, where \bar{g}_l is the optimal per employee lump-sum corporate donation and \bar{g}_l solves

$$\max_{g_l} U(W_R(1 + \Delta) - g_l, Ng_l) + \Gamma.$$

At an optimum

$$U_1(W_R(1 + \Delta) - \bar{g}_l, N\bar{g}_l) = NU_2(W_R(1 + \Delta) - \bar{g}_l, N\bar{g}_l). \quad (A7)$$

Comparing the optimality condition (A7) given a lump-sum corporate donation with the optimality condition (4) given decentralized employee giving, we see that coordination at the firm level reduces free-riding.²⁵ Total giving is greater with coordination than with decentralized giving even if $\Delta = 0$, and will be greater still when $\Delta > 0$. This type of result is well-known in the public-goods literature – see Samuelson (1954) and Chapter 2 of Laffont (1989). Since \bar{g}_l is the first-best per employee donation, employees will have no desire to make additional private contributions. Proposition A1 summarizes the discussion thus far.

²⁵ This result is distinct from the Modigliani-Miller style irrelevance proposition in relation to corporate charitable donations derived by Zivin and Small (2005). Zivin and Small model employee donations as a private good, not as a public good and hence their model does not address the issue of free-riding by donors.

Proposition A1: *The total amount donated to the public good if socially-conscious employees give privately is less than that the corporate lump-sum donation that maximizes employee utility.*

We next establish the equivalence between optimal lump-sum corporate donation schemes and optimal employee matching grant schemes when all employees are socially conscious and all firms are socially responsible. Under a matching scheme with the optimal match ratio we have

$$U_1\left(W_R(1+\Delta)-Ng^*(h^o), N^2g^*(h^o)\right) = NU_2\left(W_R(1+\Delta)-Ng^*(h^o), N^2g^*(h^o)\right). \quad (\text{A8})$$

An optimal lump-sum scheme satisfies

$$U_1\left(W_R(1+\Delta)-\bar{g}, N\bar{g}\right) = NU_2\left(W_R(1+\Delta)-\bar{g}, N\bar{g}\right). \quad (\text{A9})$$

Comparing (A8) and (A9) we have that

$$\begin{aligned} \bar{g}_l &= Ng^*(h^o) \\ &= (1+(N-1))g^*(h^o) = (1+h^o)g^*(h^o). \end{aligned}$$

Thus the optimal per employee lump-sum donation is equal to the total under a matching scheme of the optimal per employee donation plus the per employee match. Hence corporate lump-sum donations and employee matching grants can potentially achieve the same first-best solution. Proposition A2 summarizes our observations on decentralized giving, lump-sum donations, and matching schemes.

Proposition A2: *When all employees are socially-conscious and all firms are socially-responsible, employees are strictly better off working at socially-responsible firms that offer either a matching scheme with the optimal match ratio or equivalently a lump-sum scheme with the optimal lump-sum donation than in equilibrium world of decentralized giving.*

The assumption that all firms are socially-responsible means that there are no regular firms who might tempt socially-conscious employees to join them by offering a higher take-home pay package. At an optimum an employee's consumption of private and public goods remains the same under both forms of corporate donation strategy. The two schemes do differ though in the employee's take-home wage. Under the optimal corporate lump-sum donation approach, each employee's take-home wage is $W_s = W_R(1+\Delta) - \bar{g}_l$, which is equal to $W_R(1+\Delta) - Ng^*(h^o)$. Under

an optimal matching scheme each employee's take-home pay is higher still and equal to $W_S^* = W_R - h^o g^*(h^o) = W_R - (N-1)g^*(h^o)$; i.e., higher by the amount $g^*(h^o)$.

The difference in take-home pay between lump-sum schemes and matching schemes becomes crucial when socially-responsible firms face competition from regular firms. Firms that are socially-responsible are better able to survive competition from regular firms when corporate giving takes the form of a matching scheme rather than of lump-sum giving.

Proposition A3: *Assume that socially-conscious employees are either more productive or enjoy a collective warm glow when working with like-minded individuals in a socially-responsible firm. Comparing a lump-sum donation scheme to a matching scheme that raises the same amount for the charity, the productivity gain or collective warm glow necessary to preclude switching is smaller when the firm has a matching scheme than when it makes a lump-sum donation.*

The intuition underlying Proposition A3 is straightforward. If a socially-conscious employee is tempted to switch from a firm with a matching scheme to a regular firm, then the donation to the public good on which she can free-ride will be reduced by the loss of the corporate match should she defect. In contrast, if she leaves a firm with a lump-sum scheme, the corporate donation to the public good is unchanged. Socially-conscious employees are therefore less likely to switch from a firm with a matching scheme and hence socially-responsible firms with matching schemes are better able to survive competition from regular firms.²⁶

²⁶ Although the possibility of a mixed scheme exists, Proposition A3 implies that for the purpose of maintaining the separating equilibrium the two-part scheme will be less effective than if the entire corporate donation was packaged as an employee matching scheme. When each type of donation serves a different purpose, both types can naturally co-exist. For example, lump-sum donations may play an advertising role or benefit top executives' pet projects, while employee matching schemes may be aligned with employee preferences.

Table I Summary of U.S. Employee Matching Grant Schemes

Panel A: Distribution of the maximum amount matched

The number of organizations reported in the data source <http://hepdata.com> on May 18, 2010 as willing to match to a specific level when organizations are counted at the parent company level

Maximum Amount Matched	Number of Firms	%
50,000-200,000	8	0.44%
25,000-49,999	26	1.43%
10,000-24,999	174	9.54%
5,000-9,999	232	12.73%
1,000-4,999	653	35.82%
100-999	468	25.67%
20-99	14	0.77%
Unspecified	248	13.60%
Total	1823	100.00%

Panel B: The distribution of the match ratio

The maximum for each parent company organization reported in the data source <http://hepdata.com> in May, 2010 of that organization’s regular and qualified match ratios:

Match Ratio	$h = 9$	$h = 5$	$h = 4$	$h = 3$	$h = 2$	$h = 1$	$h < 1$
Number of Firms	1	1	1	22	106	1607	85
%	0.05%	0.05%	0.05%	1.21%	5.81%	88.15%	4.66%

An organization with a matching scheme may specify different match ratios for donations made to different causes. For example, Murphy Oil Corporation has a matching policy which specifies that donations for Education & Hospitals will be matched as 2:1; other donations are matched 1:1. In this case, the regular match ratio is 1 and the qualified match ratio is 2. We report that such a company has a match ratio $h = 2$ in Panel B.

Table II Summary Statistics: Matching Grants vs. Non-matching Grants

The sample consists of firms included in the ExecuComp database in 2009. Matching grant information is obtained from www.hepdata.com. Only firms with unchanged matching grant status in 2015 relative to 2010 are included. Financial information comes from *Compustat* and covers the years 2010 through 2013. Dollar values are deflated to 2009 dollars using the GDP deflator on the website of the Federal Reserve Bank in St. Louis. Firm-year observations with incomplete financial information on Labor Productivity, Book Asset Value (BVA), or Number of Employees, with negative book value of equity, or with less than 200 employees in a given year are dropped from the sample. Missing values of *R&D* are assumed to have zero value. Variable definitions are contained in Section 5.1. # is the number of the firm-year observations. Panel A includes all firms. Panel B reports summary statistics for the subsample of firms with matching grants. Panel C reports summary statistics for firms without matching grants.

	Panel A: All Firms						Panel B: Firms with Matching Grants						Panel C: Firms without Matching Grants					
	#	Mean	S.D.	25%	Median	75%	#	Mean	S.D.	25%	Median	75%	#	Mean	S.D.	25%	Median	75%
Labor Productivity: <i>Y/L</i> (thousands)	5,184	61.82	155.04	11.70	32.21	75.58	1,732	87.44	226.49	22.43	50.12	101.98	3,452	48.96	99.38	8.70	25.64	60.66
<i>BVA</i> (billions)	5,184	18.83	110.00	830.60	2.712	8.995	1,732	44.55	180.00	2.779	8.467	27.453	3,452	5.923	19.210	587	1.575	4.624
No. of Employees: <i>L</i> (thousands)	5,184	22.83	77.52	2.01	5.70	16.70	1,732	39.55	120.04	4.60	12.78	32.94	3,452	14.43	39.85	1.50	4.00	10.81
<i>BVA/L</i> (thousands)	5,184	1,424	3,373	193	397	1,078	1,732	1,872	4,218	286	606	1,905	3,452	1,199	2,830	157	334	785
<i>HHI</i>	5,184	0.05	0.05	0.02	0.04	0.05	1,732	0.04	0.05	0.02	0.03	0.05	3,452	0.05	0.06	0.02	0.04	0.05
Tobin's <i>Q</i>	4,750	1.35	1.03	0.72	1.07	1.68	1,566	1.30	0.89	0.72	1.07	1.70	3,184	1.37	1.10	0.71	1.07	1.67
ROA	5,175	0.13	0.10	0.08	0.13	0.18	1,730	0.14	0.08	0.09	0.13	0.18	3,445	0.13	0.11	0.07	0.12	0.18
Book Leverage: <i>BLev</i>	5,155	0.20	0.17	0.05	0.18	0.31	1,718	0.24	0.15	0.13	0.23	0.33	3,452	0.18	0.18	0.02	0.15	0.30
<i>R&D</i> scaled by sales (thousands)	5,184	0.03	0.09	0.00	0.00	0.03	1,732	0.03	0.06	0.00	0.00	0.03	3,452	0.03	0.10	0.00	0.00	0.02
<i>emp_relation</i>	4,563	0.43	1.33	0.00	0.00	1.00	1,625	0.80	1.75	0.00	0.00	2.00	3,058	0.23	0.99	0.00	0.00	0.00
Matching Dummy	5,184	0.33	0.47	0.00	0.00	1.00												

Table III: Labor Productivity and Matching Grant Schemes – Pooled Regressions

The sample consists of 2010 through 2013 observations on *ExecuComp* firms. The dependent variable Y/L is labor productivity. The independent variable of interest is a matching dummy, M , equal to one when the firm has a matching scheme and zero otherwise. The control variables are book value of assets per employee, a Herfindahl-Hirschman index HHI , lagged $R\&D$ expenditure, book leverage and Q . $Emp_relation$ is a measure of the quality of employee relations based on KLD measures. Sector dummies are based on the GICS industry classification of a firm. Dollar values of assets and profits are deflated to 2009 dollars. The t -statistics (in parentheses) are computed using standard errors robust to heteroskedasticity and clustering at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels respectively.

$$(Y/L)_{i,t} = \alpha + b_1 M_i + b_2 (BVA/L)_{i,t} + b_3 HHI_{i,t} + b_4 R\&D_{i,t-1} + b_5 BLev_{i,t} + b_6 Q_{i,t} + b_7 (emp_relation)_{i,t} + e_{i,t}.$$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Matching Dummy	37.38 (6.81)***	25.28 (5.818)***	25.06 (5.457)***	33.07 (6.651)***	23.15 (5.577)***	22.23 (5.171)***	33.04 (6.644)***	23.22 (5.587)***	21.80 (5.076)***
<i>BVA</i> per Employee		0.0247 (11.83)***	0.0243 (10.58)***		0.0241 (9.022)***	0.0234 (7.813)***		0.0241 (9.014)***	0.0234 (7.809)***
<i>HHI</i>		16.77 (0.481)	25.08 (0.692)		18.59 (0.544)	25.60 (0.725)		17.71 (0.519)	23.92 (0.676)
<i>R&D</i> (lagged)		28.24 (1.134)	33.87 (1.275)		18.73 (0.685)	27.28 (0.907)		18.35 (0.666)	25.84 (0.858)
Leverage		19.77 (1.915)*	15.35 (1.360)		10.22 (1.009)	5.870 (0.530)		11.08 (1.091)	7.188 (0.648)
Tobin's Q		20.55 (9.290)***	19.33 (8.531)***		20.12 (9.532)***	18.85 (8.846)***		20.47 (9.554)***	19.24 (8.897)***
<i>emp_relation</i>			2.752 (2.717)***			3.235 (3.201)***			4.327 (3.785)***
Sector Effects	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Year Effect	No	No	No	No	No	No	Yes	Yes	Yes
Observations	5,132	4,710	4,286	5,132	4,710	4,286	5,132	4,710	4,286
Adjusted R-squared	0.036	0.412	0.399	0.188	0.434	0.425	0.188	0.435	0.427

Table IV: Entrenchment, Labor Productivity and Matching Grant Schemes

The sample consists of 2010 through 2013 observations on *ExecuComp* firms. The dependent variable Y/L is labor productivity. The independent variable of interest is a matching dummy, M , equal to one when the firm has a matching scheme and zero otherwise. The control variables are book value of assets per employee, a Herfindahl-Hirschman index HHI , lagged $R\&D$ expenditure, book leverage, Q , the $emp_relation$ measure of the quality of employee relations based on KLD measures and the E-Index of Bebchuk, Cohen and Ferrell (2009). Sector dummies are based on the GICS industry classification of a firm. Dollar values of assets and profits are deflated to 2009 dollars. Columns (2) and (3) report the results for the firm-year samples with E-index values greater than 3 and less than or equal to 3, respectively. Column (4) reports the results for the firm-year samples with E-index values less than or equal to 1. The t -statistics (in parentheses) are computed using standard errors robust to heteroskedasticity and clustering at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels respectively.

$$(Y/L)_{i,t} = \alpha + b_1 M_i + b_2 (BVA/L)_{i,t} + b_3 HHI_{i,t} + b_4 R\&D_{i,t-1} + b_5 BLev_{i,t} + b_6 Q_{i,t} + b_7 (emp_relation)_{i,t} + b_8 E-index_{i,t} + e_{i,t}.$$

	(1)	(2)	(3)	(4)
Matching Dummy M	22.39 (4.849)***	17.10 (2.598)***	24.88 (4.226)***	24.68 (2.066)**
BVA per employee	0.0241 (7.726)***	0.0216 (5.787)***	0.0268 (7.949)***	0.0227 (2.694)***
HHI	35.04 (0.865)	29.98 (0.402)	38.81 (0.801)	-8.598 (-0.167)
$R\&D$ (lagged)	48.67 (1.183)	28.81 (0.902)	111.0 (1.362)	347.7 (1.735)*
Leverage	2.800 (0.240)	4.264 (0.230)	6.943 (0.487)	20.36 (0.465)
Tobin's Q	18.06 (8.269)***	15.32 (5.197)***	19.75 (6.786)***	20.38 (3.569)***
$emp_relation$	3.647 (3.035)***	3.207 (1.233)	3.357 (2.801)***	3.851 (0.872)
E-index	-3.974 (-2.323)**	5.864 (1.128)	-5.117 (-1.796)*	-13.52 (-1.524)
Sector & Year Effects	Yes	Yes	Yes	Yes
Observations	3,888	1,502	2,386	218
Adjusted R-squared	0.434	0.405	0.467	0.650

**Table V: Labor Productivity and Matching Grant Schemes:
High-tech firms vs. Non-high-tech firms**

The sample consists of 2010 through 2013 observations on *ExecuComp* firms. The dependent variable Y/L is labor productivity. The independent variable of interest is a matching dummy, M , equal to one when the firm has a matching scheme and zero otherwise. The control variables are book value of assets per employee, a Herfindahl-Hirschman index HHI , lagged $R\&D$ expenditure, book leverage and Q and the $emp_relation$ measure of the quality of employee relations based on KLD measures. The high-tech classification is based on Loughran and Ritter (2004). Sector dummies are based on the GICS industry classification of a firm. Dollar values of assets and profits are deflated to 2009 dollars. Columns (1) to (3) are regressions for high-tech firms; Columns (4) to (6) are regressions for non-high-tech firms. The t -statistics (in parentheses) are computed using standard errors robust to heteroskedasticity and clustering at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels respectively.

$$(Y/L)_{i,t} = \alpha + b_1 M_i + b_2 (BVA/L)_{i,t} + b_3 HHI_{i,t} + b_4 R\&D_{i,t-1} + b_5 BLev_{i,t} + b_6 Q_{i,t} + b_7 (emp_relation)_{i,t} + e_{i,t}$$

	High-tech firms			Non-high-tech firms		
	(1)	(2)	(3)	(4)	(5)	(6)
Matching Dummy	30.07 (3.668)***	13.10 (2.466)**	9.111 (2.040)**	34.46 (5.939)***	23.24 (4.874)***	22.45 (4.527)***
<i>BVA</i> per employee		0.112 (9.762)***	0.118 (11.27)***		0.0237 (9.016)***	0.0230 (7.805)***
<i>HHI</i>		467.8 (2.147)**	489.6 (2.149)**		14.25 (0.414)	19.84 (0.555)
<i>R&D</i> (lagged)		-118.2 (-5.048)***	-124.3 (-5.178)***		54.34 (1.071)	57.17 (1.071)
Leverage		-19.60 (-1.081)	-14.13 (-0.833)		9.516 (0.841)	3.959 (0.321)
Tobin's Q		17.19 (5.591)***	16.80 (5.512)***		21.89 (9.063)***	20.63 (8.371)***
<i>emp_relation</i>			3.187 (2.282)**			3.895 (2.932)***
Sector and Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	845	768	676	4,287	3,942	3,610
Adjusted R-squared	0.068	0.552	0.594	0.194	0.447	0.437

Table VI: Labor Productivity, Generous Giving and Matching Grants

The sample consists of 2010 through 2013 observations on *ExecuComp* firms. The dependent variable Y/L is labor productivity. The independent variable of interest is a matching dummy, M , equal to one when the firm has a matching scheme and zero otherwise. The control variables include book value of assets per employee, a Herfindahl-Hirschman index (HHI), lagged $R\&D$ expenditure, book leverage and Tobin's Q . A further control is a dummy indicating whether a company is classified by KLD as a "generous giver", GG . Sector dummies are based on the GICS industry classification of a firm. Dollar values of assets and profits are deflated to 2009 dollars. The t -statistics (in parentheses) are computed using standard errors robust to heteroskedasticity and clustering at the firm level. *** denotes significance at the 1% level, ** denotes significance at the 5% level, and * denotes significance at the 10% level. Since KLD does not include the generous-giver classification after 2010, the cross-sectional regression is performed on year 2010 data only.

$$(Y/L)_i = \alpha + b_1 M_i + b_2 (BVA/L)_i + b_3 HHI_i + b_4 R\&D_{i-1} + b_5 BLev_i + b_6 Q_i + b_7 GG_i + e_i .$$

Note: Firms with missing values in KLD for the generous-giver measure are not included in Columns (1) and (3). Columns (2) and (4) contain the results when missing values of the GG dummy are coded as zero.

	(1)	(2)	(3)	(4)
Matching Dummy M	28.05 (3.816)***	24.25 (4.984)***	22.85 (3.243)***	22.07 (4.611)***
BVA per employee	0.0226 (7.044)***	0.0232 (10.41)***	0.0215 (5.678)***	0.0227 (8.187)***
HHI	62.50 (0.693)	18.45 (0.459)	54.80 (0.645)	11.85 (0.307)
$R\&D$ (lagged)	145.6 (2.075)**	82.65 (2.282)**	132.5 (1.431)	71.34 (1.520)
Leverage	-11.71 (-0.505)	18.18 (1.434)	-14.02 (-0.614)	8.35 (0.674)
Tobin's Q	18.18 (4.496)***	20.52 (8.203)***	18.86 (4.878)***	19.90 (8.342)***
Generous-giver dummy	13.99 (1.053)	22.05 (1.705)*	12.98 (1.028)	20.22 (1.641)
Sector Effects	No	No	Yes	Yes
Observations	530	1,244	530	1,244
Adjusted R-squared	0.382	0.415	0.400	0.434

Table VII: Matching Schemes and the “100 Best Companies to Work for”

Panel A: Frequency of appearance of *ExecuComp* firms with more than 1,000 employees on *Fortune Magazine*’s “100 Best Companies to Work for in America” lists between 2010 and 2013 inclusive. Firms are categorized by whether they have a matching grants scheme. There are 4,556 firm-year observations.

	Matching Scheme	No Matching Scheme	Total
On the “100 Best” List	85 (5.15%)	39 (1.34%)	124
Not on the “100 Best” List	1,566 (94.85%)	2,866 (98.66%)	4,432
Total	1,651	2,905	4,556

Pearson $\chi^2(1) = 57.5925$; p -value = 0.000

Panel B: Frequency of additions to the *ExecuComp* firms with more than 1,000 employees on *Fortune Magazine*’s “100 Best Companies to Work for in America” lists between 2010 and 2013 inclusive given not on the list in the preceding year. Firms are categorized by whether they have a matching grants scheme. There are 3,253 firm-year observations.

	Matching Grants	No Matching Grants	Total
Added to “100 Best” List	2 (0.17%)	3 (0.14%)	5
Not added or already on	1,159 (99.83%)	2,089 (99.86%)	3,248
Total	1,161	2,092	3,253

Pearson $\chi^2(1) = 0.0405$; p -value = 0.840

Panel C: Frequency of continued appearance of *ExecuComp* firms with more than 1,000 employees on *Fortune Magazine*’s “100 Best Companies to Work for in America” lists between 2010 and 2013 inclusive given on the list in the preceding year. Firms are categorized by whether they have a matching grants scheme. There are 95 firm-year observations.

	Matching Grants	No Matching Grants	Total
Remaining on “100 Best” List	61 (93.85%)	24 (80%)	85
Dropped from “100 Best” List	4 (6.15%)	6 (20%)	10
Total	65	30	95

Pearson $\chi^2(1) = 4.1783$; p -value = 0.041

Table VIII: Probit Analysis of Inclusion on the “100 Best” List and Matching Schemes

The sample consists of 2010 through 2013 observations on *ExecuComp* firms with more than 1,000 employees. The dependent variable takes the value one if the firm appears on the “100 Best Companies to Work for” list and zero otherwise. The independent variable of interest is a matching dummy, *M*, equal to one when the firm has a matching scheme and zero otherwise. The controls are the book value of assets per employee; *HHI*, lagged *R&D*; profitability; a dummy for high-tech firms based on Loughran and Ritter (2004); the E-index of Bebhuk, Cohen and Ferrell (2009); and the *emp_relation* measure of the quality of employee relations based on *KLD* measures. Sector dummies are based on the GICS industry classification of a firm. Dollar values of assets and profits are deflated to 2009 dollars. The z-statistics (in parentheses) are computed using standard errors robust to heteroskedasticity and clustering at the firm level. *** denotes significance at the 1% level, ** denotes significance at the 5% level, and * denotes significance at the 10% level.

	(1)	(2)	(3)	(4)	(5)	(6)
Matching Dummy <i>M</i>	0.591 (3.97)***	0.389 (2.38)**	0.396 (2.24)**	0.693 (4.16)***	0.471 (2.52)**	0.439 (2.20)**
<i>BVA</i> per employee			8.69×10 ⁻⁵ (3.93)***			8.08×10 ⁻⁵ (2.89)***
<i>HHI</i>			-0.942 (-0.84)			-1.68 (-1.47)
<i>R&D</i> (lagged)			0.550 (1.64)			0.627 (1.82)*
Profitability			0.838 (2.89)***			0.370 (0.96)
High-tech dummy			0.266 (1.44)			0.125 (0.42)
E-index			-0.06 (-0.84)			-0.047 (-0.61)
<i>emp_relation</i>		0.211 (7.38)***	0.187 (6.17)***		0.214 (6.43)***	0.198 (5.60)***
Sector Effects	No	No	No	Yes	Yes	Yes
Observations	4,520	4,159	3,798	3,207	2,921	2,651
Pseudo R ²	0.049	0.119	0.170	0.094	0.146	0.174

Table IX: Labor Productivity, Matching Grants, and “100 Best Companies to Work for”

The sample consists of 2010 through 2013 observations deflated to 2009 dollars for firms in *ExecuComp* with more than 1,000 employees. The dependent variable Y/L is labor productivity. The independent variable of interest is a matching dummy, M , equal to one when the firm has a matching scheme and zero otherwise. The control variables are those of Table IV plus a high-tech dummy and a “100 Best” dummy. The t -statistics (in parentheses) are robust to heteroskedasticity and clustering at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels respectively.

	All firms			“100 Best” firms			Non-“100 Best” firms		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Matching Dummy	20.81	21.28	22.02	8.862	9.402	-11.27	21.81	22.32	23.09
M	(4.800)***	(4.816)***	(4.633)***	(0.183)	(0.188)	(-0.193)	(5.083)***	(5.094)***	(4.917)***
BVA per employee	0.0225	0.0224	0.0232	0.0354	0.0355	0.0377	0.0221	0.0221	0.0228
	(7.161)***	(7.179)***	(7.137)***	(4.897)***	(4.875)***	(5.507)***	(6.932)***	(6.951)***	(6.897)***
HHI	37.87	37.57	50.04	856.9	868.6	944.0	33.07	32.83	45.05
	(1.059)	(1.049)	(1.218)	(0.819)	(0.794)	(0.850)	(0.929)	(0.920)	(1.102)
$R\&D$ (lagged)	34.18	42.50	50.28	-238.8	-270.6	-70.21	30.66	38.66	45.93
	(1.007)	(1.097)	(1.142)	(-0.676)	(-0.487)	(-0.119)	(0.944)	(1.047)	(1.096)
Leverage	17.85	17.48	10.02	17.24	16.36	112.0	18.65	18.28	10.39
	(1.633)	(1.595)	(0.855)	(0.126)	(0.117)	(0.699)	(1.723)*	(1.683)*	(0.894)
Tobin’s Q	17.15	17.34	16.25	-1.079	-1.337	9.344	17.84	18.08	17.01
	(7.430)***	(7.484)***	(6.944)***	(-0.0544)	(-0.0650)	(0.486)	(7.650)***	(7.739)***	(7.199)***
High-tech dummy		-15.23	-15.63		6.240	-1.297		-15.84	-16.25
		(-1.827)*	(-1.745)*		(0.0838)	(-0.0160)		(-1.885)*	(-1.792)*
E-index			-3.448			-20.07			-3.049
			(-2.002)**			(-1.054)			(-1.836)*
$emp_relation$	4.424	4.336	4.052	14.84	14.96	11.26	3.739	3.632	3.333
	(4.010)***	(3.926)***	(3.444)***	(2.339)**	(2.355)**	(1.527)	(3.391)***	(3.297)***	(2.844)***
“100 Best” dummy	16.62	16.46	15.39						
	(1.068)	(1.053)	(0.975)						
Sector and year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,831	3,831	3,499	101	101	99	3,730	3,730	3,400
Adjusted R-squared	0.449	0.451	0.455	0.344	0.336	0.819	0.451	0.453	0.459

Table X: Labor Productivity, “100 Best Companies to Work for”, and Matching Schemes

This table reports the average treatment effect of the treated (ATET) based on Propensity Score Matching (PSM). The treatment (control) group consists of firms that are (are not) on the “100 Best” list. None of the firms investigated in Panel A have matching schemes. All of the firms investigated in Panel B have matching schemes. Each firm in the treatment group is paired with either one or three nearest neighbors in the control group. Pairing is based on BVA per employee, *HHI* index, book leverage, Tobin’s *Q*, high-tech dummy, E-index, and the *emp_relations* variable. Dollar values of assets and profits are deflated to 2009 dollars. The *z*-statistics (in parentheses) with ***, **, and * are significant at the 1%, 5%, and 10% levels respectively, using robust Abadie–Imbens standard errors.

Panel A: Firms without Matching Schemes

	No. of Observations in Treatment Group	ATET
One-to-one nearest neighbor pairing	31	65.450 (3.23)***
One-to-three nearest neighbors pairing	31	71.928 (3.33)***

Panel B: Firms with Matching Schemes

	No. of Observations in Treatment Group	ATET
One-to-one nearest neighbor pairing	68	-0.387 (-0.02)
One-to-three nearest neighbors pairing	68	5.785 (0.29)

Table AI: The relation between the optimal match ratio consistent with a separating equilibrium and various model inputs

In all panels of Table AI, $W_r = 1000$ and $U(x, G) = x^\alpha G^\beta$.

Panel A: The relation between the labor productivity increment of a team of socially-conscious employees assuming $\alpha = \beta = 0.5$ and $N = 100$ and the optimal match ratio consistent with a separating equilibrium

Δ	0%	0.5%	1%	1.5%	2%	2.5%	3%	3.5%	4%
h	0	0.515	1.020	1.525	2.030	2.535	3.040	3.545	4.050

If there is a 2% productivity gain associated with a team of socially-conscious employees, the match ratio that maximizes employee utility and maintains a separating equilibrium is 2.03.

Panel B: The relation between the optimal match ratio consistent with a separating equilibrium and the number of employees of a socially-responsible firm assuming that $\alpha = \beta = 0.5$ and $\Delta = 2\%$.

N	25	50	75	100	125	150	175	200	225
h	0.562	1.04	1.533	2.030	2.528	3.026	3.523	4.025	4.524

Panel C: The relation between the optimal match ratio consistent with a separating equilibrium and the preference parameter α of socially-conscious employees assuming $\beta = 1 - \alpha$, $\Delta = 2\%$, and $N = 100$.

α	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7
h	0.894	1.111	1.365	1.667	2.030	2.473	3.028	3.741	4.694

Online Supplement

Item 1: Uniqueness of Nash Equilibrium given a Matching Grant Scheme

Lemma S1: *There exists a unique Nash Equilibrium in the presence of matching grant schemes.*

Proof of Lemma S1: The proof proceeds by contradiction. Suppose the lemma were not true. Then for some h there would exist two different levels of employee contribution, g^{*H} and g^{*L} satisfying (6), with $g^{*H} > g^{*L}$.

For g^{*L} relation (6) can be written as

$$U_1(W_R - (1+h)g^{*L}, (1+h)Ng^{*L}) = (1+h)U_2(W_R - (1+h)g^{*L}, (1+h)Ng^{*L}). \quad (S1)$$

Suppose the employee increases her contribution from g^{*L} to g^{*H} . The left-hand-side of equation (S1) increases because $U_{11} < 0$ and $U_{12} \geq 0$. But the right-hand-side of equation (S1) decreases, since $U_{22} < 0$. This means that g^{*H} cannot satisfy equation (6) and thus g^{*H} cannot be an optimal donation. **QED**

Item 2: Limitation on High Match Ratios given Competitive Labor Markets

The following proposition formalizes the explanation for why we do not observe extremely high match ratios in practice. The natural explanation is that very high match ratios imply such low take-home pay at socially-responsible firms that even the most magnanimous of socially-conscious employees would prefer the higher pay and zero match combination offered by a regular firm.

Proposition S1: *Defection will always occur at high enough match ratios if*
 $U(W_R, (N-1)(1+\Delta)W_R) > U(0, N(1+\Delta)W_R)$.

Proof of Proposition S1: The utility of socially-conscious employees who remain with firm S is

$$\max_g U(W_R(1+\Delta) - hg^*(h) - \tilde{g}, (N-1)(1+h)g^*(h) + (1+h)\tilde{g}).$$

A socially-conscious employee will conjecture that if she moves to work for firm R , she will enjoy a utility level of

$$\max_{\hat{g}} U\left(W_R - \hat{g}, (N-1)(1+h)g^*(h) + \hat{g}\right).$$

From Lemma A1, $\lim_{h \rightarrow \infty} (1+h)g^*(h) = (1+\Delta)W_R$; i.e., as the match ratio approaches infinity, her private good consumption will fall to zero if she stays with firm S and her utility at that level is $U(0, N(1+\Delta)W_R)$. If she does move from firm S to firm R , she will enjoy a higher wage of W_R and can choose to make no donation at all, i.e., she can achieve a utility level of at least $U(W_R, (N-1)(1+\Delta)W_R)$. Therefore, if $U(W_R, (N-1)(1+\Delta)W_R) > U(0, N(1+\Delta)W_R)$ then a type S employee will always defect when the match ratio gets high enough. **QED**

Item 3: The Impact of Taxes on Donations

We reconsider employee matching grant schemes when corporate and individual donations are deductible at the corporate and personal rates, τ_c and τ_p respectively. We first show that for a given level of labor productivity the total tax burden remains the same whether the company or its employees donate an amount g per employee. With decentralized giving each employee donates g and the tax paid by each employee on their taxable income of $W - g$ less the corporate tax saving due to the corporate tax deductibility of the employee's wage is

$$\tau_p(W - g) - \tau_c W.$$

Note that the employee's donation is deductible at the personal rate.

Now consider a firm making a lump-sum per employee donation of g_l . The total of taxes paid by each employee on their take-home pay of $W - g_l$ less the corporate tax deduction associated with both the employee's take-home pay and the per employee corporate donation is

$$\tau_p(W - g_l) - \tau_c((W - g_l) + g_l) = \tau_p(W - g_l) - \tau_c W.$$

In this scenario the donation is deductible at the corporate rate. In both scenarios the total taxes paid are identical provided $g = g_l$.

We now show that Proposition A1 of Appendix III continues to apply in the presence of corporate and personal taxation. Proposition A1 of Appendix III states that the total amount donated to the public good when socially-conscious employees give privately is less than the

corporate lump-sum donation that maximizes employee utility. When the firm donates g_l per employee to the charity, the total amount of the public good is Ng_l and employees are paid at the rate $W_S = W_R(1 + \Delta) - g_l$. Because both salary payments and corporate donations are tax deductible, there is no difference in the shareholders' after-tax profits between decentralized giving that fails to attract socially-conscious employees and lump-sum corporate donations. The utility of socially-conscious employees given the optimal lump-sum donation is given by the solution of

$$\text{Max}_{g_l} U\left(\left(W_R(1 + \Delta) - g_l\right)(1 - \tau_p), Ng_l\right) + \Gamma.$$

At an optimum

$$U_1\left(W_R(1 + \Delta) - \bar{g}_l, N\bar{g}_l\right) = NU_2\left(W_R(1 + \Delta) - \bar{g}_l, N\bar{g}_l\right). \quad (\text{S2})$$

If the firm chooses not to donate and to instead act like a regular firm and fail to attract a team of socially-conscious employees, then the utility of each socially-conscious employee (who then fails to enjoy either the satisfaction or productivity gain from working as a member of a like-minded team) is given by the solution of

$$\text{Max}_g U\left((W_R - g)(1 - \tau_p), Ng\right).$$

In a Nash equilibrium, every employee contributes \bar{g} which satisfies

$$U_1\left((W_R - \bar{g})(1 - \tau_p), N\bar{g}\right) = U_2\left((W_R - \bar{g})(1 - \tau_p), N\bar{g}\right), \quad (\text{S3})$$

A comparison of expressions (S2) and (S3) shows that the presence of taxes does not alter the result that the total amount donated is greater under a lump-sum giving scheme than under decentralized giving.

Finally we reconsider the effect of taxes on Proposition 4. Proposition 4 states that if (i) labor productivity is the same at both socially-responsible and regular firms and (ii) socially-conscious employees gain no benefit from working with like-minded individuals, then socially-conscious employees will always defect to regular firms. When teams of socially-conscious employees working together are *not* more productive, either in pecuniary terms or in terms of the production of a collective warm glow, a socially-conscious employee who would then earn take-home pay of $W_S = W_R - hg^*(h)$ at a type S firm with a matching scheme will determine her optimal gift \tilde{g} by solving

$$\max_{\tilde{g}} U\left(\left(W_S - \tilde{g}\right)\left(1 - \tau_p\right), (N-1)(1+h)g^*(h) + (1+h)\tilde{g}\right),$$

with equilibrium first order condition of

$$\begin{aligned} & -(1-\tau_p)U_1\left(\left[W_R - (1+h)g^*(h)\right]\left(1-\tau_p\right), N(1+h)g^*(h)\right) \\ & + (1+h)U_2\left(\left[W_R - (1+h)g^*(h)\right]\left(1-\tau_p\right), N(1+h)g^*(h)\right) = 0. \end{aligned} \quad (\text{S4})$$

If she defects, she will determine her optimal individual donation \hat{g} by solving

$$\max_{\hat{g}} U\left(\left(W_R - \hat{g}\right)\left(1 - \tau_p\right), (N-1)(1+h)g^*(h) + \hat{g}\right).$$

Our defector could achieve her pre-defection utility level simply by making a post-defection donation of $(1+h)g^*(h)$; i.e. by donating both $g^*(h)$ and enough to cover the lost employer match of $hg^*(h)$. The partial of the defector's utility with respect to her post-defection donation evaluated at $\hat{g} = (1+h)g^*(h)$ is

$$\begin{aligned} & -(1-\tau_p)U_1\left(\left[W_R - (1+h)g^*(h)\right]\left(1-\tau_p\right), N(1+h)g^*(h)\right) \\ & + U_2\left(\left[W_R - (1+h)g^*(h)\right]\left(1-\tau_p\right), N(1+h)g^*(h)\right) < 0. \end{aligned} \quad (\text{S5})$$

The inequality follows from a comparison of the left-hand sides of expressions (S4) and (S5). Thus when teams of socially-conscious employees are *not* more productive, a socially-conscious employee could increase her utility by defecting and choosing to donate an amount less than $(1+h)g^*(h)$. The presence of taxes does not change the result that when (i) labor productivity is the same at both socially-responsible and regular firms and (ii) socially-conscious employees gain no benefit from working with like-minded individuals, socially-conscious employees will not remain at socially-responsible firms.

Provided charitable donations by either employees or employers are deductible, this paper's propositions will continue to apply in the presence of taxes. Note that charitable donations are one of the few deductions the US tax code allows individuals who pay the alternative minimum tax (AMT). For those who do not pay the AMT, donations are deductible provided the individual itemizes their deductions. Those who take the standard deduction cannot take an additional deduction for their charitable donations. If employees do take the standard deduction, then both lump-sum donations by their employer and an employee matching grant scheme will be tax-advantaged relative to decentralized giving.

Item 4. Labor Productivity, Matching Schemes and the “100 Best” List: Propensity Score Matching (PSM) Analysis

The treatment group consists of firms with matching schemes. Probit analysis is used to estimate a firm’s likelihood of having a matching scheme based on the variables underlying the regression analyses of Section 5 of the paper.

The PSM analysis is undertaken separately for the firms on the “100 Best” list and for the firms not the list. The first of these two analyses mirrors the analysis in column (6) of Table IX. Ideally, propensity score matching variables should be measured *prior* to the treatment (see Roberts and Whited (2012)), i.e., prior to the adoption of a matching scheme. However, *HEP* does not contain information on when a firm initiated its matching grant program. Therefore, when we use the in-sample values of the propensity score matching variables, we are implicitly assuming that that the matching variables are unaffected by whether a firm adopts a matching scheme. Since we match on the high-tech dummy variable, lagged R&D expenditure is omitted from the list of control variables because these two variables are highly correlated, especially for the set of firms on the “100 Best” list.

Our interest lies in the differential labor productivity between firms with matching grant schemes and those without. Each firm in the treatment group is paired with either one “nearest neighbor” or three “nearest neighbors” in the control group. Panel A of Table SI reports that, consistent with the regression estimates of Section 6, the labor productivity differential between “100 Best” firms with matching schemes and “100 Best” firms without matching schemes is not significant. Panel B, which mirrors the analysis in column (9) of Table IX reports that the average treatment effect of the treated (ATET) is significant for firms not on the “100 Best” list, with a coefficient of 27.615 and a *z*-stat of 7.68 under one-to-one nearest neighbor pairing. The coefficient means that on average, an employee at a non-“100 Best” firm with a matching scheme produces \$27,615 more in outputs than one at a non-“100 Best” firm without such a scheme. If each firm is matched with three “nearest neighbors” in the other group, the ATET is again significant, with a coefficient of 28.999 and a *z*-stat 9.74.

[Please insert Table SI here]

Table SI: Labor Productivity and Matching Grants: Separate Propensity Score Matching Analyses of the Sets of Firms that Are and Are Not on the “100 Best” List

Observations are classified as either in the treatment” group (firms with matching grants) or the control group (firms without matching grants). Each firm in the treatment group is paired with either one or three nearest neighbors in the control group. The average treatment effect of the treated (ATET) is estimated using Propensity Score Matching. Panel A reports the PSM estimator for pairing based on BVA per employee, *HHI* index, book leverage, Tobin’s *Q*, high-tech dummy, E-index, and *employee relations* for firms that are included on the “100 Best” list. Panel B performs the same PSM analysis for those firms that are not on the “100 Best” list. Dollar values of assets and profits are deflated to 2009 dollars. The *z*-statistics (in parentheses) with ***, **, and * are significant at the 1%, 5%, and 10% levels respectively, using robust Abadie–Imbens standard errors.

Panel A: Firms on the “100 Best” List

	No. of Observations in Treatment Group	ATET
One-to-one nearest neighbor pairing	99	-23.272 (-0.47)
One-to-three nearest neighbors pairing	99	-21.665 (-0.44)

Panel B: Firms not on the “100 Best” List

	No. of Observations in Treatment Group	ATET
One-to-one nearest neighbor pairing	3,400	27.615 (7.68)***
One-to-three nearest neighbors pairing	3,400	28.999 (9.74)***