Social Connections and Incentives in the Workplace:

Evidence from Personnel Data

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Questions

- this paper provides evidence on the interplay between social connections, incentives, and productivity

- we address the following questions –

  - whether social connections between workers and managers affect the productivity of connected workers

  - whether the effect of social connections depends on the strength of managerial incentives

  - whether social connections between managers and some workers are beneficial or detrimental to the firm's overall performance

This Paper

- we identify these effects by combining –

  – panel data on individual worker's productivity from personnel records

  – a natural field experiment in which we engineered an exogenous change in managerial incentives from fixed wages, to the same level of fixed wages plus a performance bonus conditional on the average productivity of managed workers

Motivation

- social concerns among workers at the same tier of the firm hierarchy [Lazear 1989, Kandel and Lazear 1992, and Rotemberg 1994]

  – extensive lab evidence [Fehr and Gächter 2000, Charness and Kuhn 2005]

  – recent field evidence [Bandiera et al 2005]

- social connections might also span across layers of the hierarchy (between managers and subordinates)

  – labor relations as a partial gift exchange [Akerlof 1982, Akerlof and Yellen 1988, Fehr and Fischbacher 2002]

- some evidence from non-firm settings [Garicano et al 2005, Laband and Piette 1994]

- evidence from firm settings is scarce

The Effects of Social Connections

- managers might favor socially connected workers at the expense of other potentially more able workers

- however, social connections can also reduce information asymmetries between managers and workers, provide non-monetary mechanisms by which to reward and punish workers, lower costs of communication and problem solving, engender trust

- organizational theory and sociological literature has long discussed the costs and benefits of social connections in the workplace [Mayo 1933, Barnard 1938, Roethlisberger and Dickson 1939, and Roy 1952]

- theory shows that social connections between workers and managers have important consequences for firms' productivity and organizational design [Prendergast and Topel 1996]

Identification Issues

- the identification of the effect of social connections faces two main challenges –

  1. unobservable workers characteristics that might drive both their social connections and their performance (i.e. more able workers are more likely to befriend managers and also more likely to perform well) and unobservable managers characteristics that might drive both their preferences and their performance (e.g. lazier managers are more likely to socialize and also less likely to work hard)

  2. in the absence of an appropriate counterfactual, it is impossible to credibly identify whether the fact that managers treat socially connected workers differently is good or bad for the firm's performance

Our Strategy

- combine a field experiment with data on the social organization of the firm

- exploit two sources of variation:

  1. **quasi random variation in the daily allocation of workers to managers:**

     (a) we observe the <u>same</u> worker on days when he works with managers he is socially connected to and on days he works with managers he is not connected to $\Rightarrow$ control for unobservable worker heterogeneity

     (b) we observe the same manager managing connected <u>and</u> unconnected workers $\Rightarrow$ control for unobservable manager characteristics that affect connected and unconnected workers alike

Our Strategy (continued)

- 2. **experimental variation in managers' incentive scheme:**

  (a) we exogenously changed the <u>incentive scheme for managers</u> $\Rightarrow$ observe the same workers and the same manager on days when manager is paid a fixed wage, and on days when manager is given a performance bonus increasing in the average productivity of the workers she manages

  (b) by engineering an exogenous change in the net benefits of exploiting social connections, we can identify the effect of social connections on the firm's overall performance, i.e. if managers' behavior towards connected workers changes, their previous behavior could not have been maximizing the firm's productivity

  (c) the structure of workers' compensation − piece rates − are left unchanged throughout

Related Literature

- theoretical literature on favoritism (Prendergast and Topel 1996), social relations in the workplace (Rotemberg 1994) collusion and rent-seeking within organizations (Tirole 1992, Milgrom 1988)

- empirical literature on social pressure and favoritism in sports (Garicano et al 2005), in academic publishing (Laband and Piette 1994) and manager-worker relations as function of gender, age and race (Giuliano et al 2005)

- empirical literature on social connections between firms' directors and politicians (Bertrand et al 2005, Kramarz and Thesmar 2005, Mian and Khwaja 2005)

- methodological contribution is to combine benefits of insider econometrics (Ichniowski and Shaw 2003) with those of natural field experiments (Harrison and List 2005)

Context

- leading UK farm, summer 2003

- focus on fruit picking operations

- workforce: managers and workers

- the natural field experiment: exogenous change in the compensation scheme for managers (June 27th)

The Workforce

- workers and managers are hired seasonally from eight countries in Eastern Europe

- workers are <u>not</u> usually hired from the local (UK) labor market

- they live on the farm, housed in caravans of five people each $\Longrightarrow$ opportunity for workers and managers to form strong social connections

Workers

- workers pick fruit, generally on two different fields per day, and are paid piece rates (per kg of fruit)

- within a field-day, each worker is allocated their own row of fruit to pick – his productivity depends on row and field conditions, on his effort and on the managerial effort targeted towards him

- there are no complementarities among workers arising from the production technology

- workers do not choose how many hours to work, which field to work on, nor whom they work with

Managers

- each manager is allocated a group of 20 workers

- managers are responsible for field logistics –

  - allocating workers to rows at the start of the day and when finished with original row

  - have full crates of fruit removed from the rows and new empty crates provided to workers

- effort costs to the manager are considerable: workers spread out over one hectare

- managers do not choose which field to work on, nor which workers they work with

The COO

- this permanent employee decides the allocation of workers and managers to fields

- quantity of fruit, hence demand for labor, varies –

  - across fields because fields are of different size

  - within a field over time as plants ripen at different stages

- COO allocates workers and managers to fields on the basis of the demand for labor and demand for non-picking tasks

- maintains a worker-manager ratio of 20

Managers' Effort

- key choice variable is how to allocate her effort among her different workers (e.g. if several workers finish their rows at the same time the manager has to decide whom to reallocate first)

- *in this context, a manager can help a worker by allocating him more of her effort $\implies$ increases the worker's productivity $\implies$ increases the worker's earnings*

- managerial effort can have considerable impact on worker productivity, e.g. manager slacks for 5 minutes an hour, worker productivity is 5/60=8% lower

Data Description: Productivity and Sample

- in this setting, managers can affect workers' earnings by affecting their productivity

- dependent variable is worker productivity, defined as kilos picked per hour

- each worker's productivity is recorded electronically at the field-day level (little ME)

- we focus on one fruit type, and on fields that were operated at least a week either side of the change in managerial incentives

- final sample contains 241 field-days and 12287 worker-field-day observations (295 workers, 10 managers, 13 fields, 94 days)

- as part of the research design, days are almost equally split pre and post bonus

Data Description: Social Connections

- the data identifies all the workers operating on any given field-day, and matches workers to the group of managers who supervise them

- combine with survey data on workers' and managers' background characteristics to measure "social connections"

- **step 1:** create connection dummies for each worker/manager pair $=1$ if worker i and manager $j -$ (i) are of the same nationality, or, (ii) live in the same neighborhood on the farm, or, (iii) joined the farm at the same time

- **step 2:** create connection variable for worker $i = \underline{\text{share}}$ of managers on the field-day who are connected to worker i along $\underline{\text{any}}$ of the three dimensions, thus $= 0$ if worker is not connected to any manager, $= 1$ if worker is connected to all managers on the field

Identifying Assumptions

1. the timing of the change of managerial incentives is uncorrelated with unobserved determinants of productivity; satisfied by design, incentive scheme and timing was exogenously chosen (by us)

2. unobservable determinants of worker-manager pairing which are correlated to productivity are orthogonal to the incentive scheme in place

- in support of (2) we present – [additional evidence in Table A1]

  – descriptive evidence suggesting no difference in the variables of interest under the two schemes

  – regression analysis showing the correlation between the connection variable and observable determinants of productivity is the same under both schemes

Table 1: Descriptives on the Social Connectivity Between Workers and Managers, by Managerial Incentive Scheme (Worker-Field-Day Level)

All observations are at the worker-field-day level
Means, standard deviation between workers in parentheses, and standard deviation within worker in brackets

	Managerial Incentive Scheme	
	Fixed Wages	**Performance Bonus**
Share of managers connected to i (C_{ift})	.433	.439
	(.303)	(.295)
	[.193]	[.150]
Share of managers who are the same nationality as i	.310	.317
	(.359)	(.327)
	[.140]	[.111]
Share of managers who are in the same living area as i	.132	.123
	(.129)	(.172)
	[.157]	[.129]
Share of managers who are from the same arrival cohort as i	.047	.063
	(.102)	(.111)
	[.087]	[.077]

Notes: All variables are defined at the worker-field-day level. A manager and worker are defined to be resident in the same living area if they live within five caravans from each other on the farm. A manager and worker are defined to be in the same arrival cohort if they have identification numbers within five values of each other. A manager and given worker i are defined to be connected if they are either of the same nationality, live in the same area, or are in the same arrival cohort. Each statistic is based on those workers that are connected to at least one manager along at least one of the three dimensions. There are 267 such workers when managers are paid fixed wages, and 212 such connected workers when managers are paid a performance bonus. On average, each worker is observed picking on 21 field-days when managers are paid fixed wages, and 29 field-days when managers are paid a performance bonus. Overall there are 7818 worker-field-day observations when managers are paid fixed wages, and 4469 worker-field-day observations when managers are paid a performance bonus.

Descriptive Evidence on Social Connections

- Table 1 (worker-field-day level) shows –

    - workers' connectivity does not change across the managerial incentive schemes

    - considerable variation in connectivity between and <u>within</u> worker

Regression Analysis on Social Connections

$$
C_{ift} = \alpha_i + \lambda_f + \upsilon B_t + \left[(\phi_0 + \phi_1 B_t) \times X_{ift} \right] + \left[(\varphi_0 + \varphi_1 B_t) \times Z_{ft} \right]
$$

$$
+ \sum_{s \in M_{ft}} \mu_s S_{sft} + u_{ift}
$$

- C_{ift} : share of managers worker i is connected to on field-day ft

- B_t : dummy variable, $= 1$ when managers are paid performance bonuses, $= 0$ when paid fixed wages

- X_{ift}, Z_{ft} : individual and field-day specific determinants of productivity

- identifying assumption requires $\phi_1 = \varphi_1 = 0$

- Table A2 reports p-values of the t-tests on each interaction and on the joint F-test of their significance

- reassuringly, we fail to reject the null of zero coefficients in all cases

Table A2: Allocation of Workers and Managers

Dependent Variable = Log (1+share of managers that are connected to worker i on field f day t)
Each cell reports the p-value of the test of the hypothesis that the coefficient on the interaction term is zero

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Performance bonus for managers x field life cycle	.935	.414	.296	.653	.509	.771	.845
Performance bonus for managers x trend		.219	.305	.293	.274	.231	.239
Performance bonus for managers x worker's experience			.192	.192	.184	.186	.186
Performance bonus for managers x number of workers				.527	.587	.572	.557
Performance bonus for managers x number of managers					.889	.975	.879
Performance bonus for managers x total hours worked						.185	.364
Performance bonus for managers x total kilos of fruit picked							.952
F-test of joint significance of all interaction terms		.346	.334	.617	.684	.665	.795

Notes: A manager and given worker i are defined to be connected if they are either of the same nationality, live in the same area, or are in the same arrival cohort. Standard errors allow for clustering at the worker level. All specifications control for worker, field, and manager fixed effects. The other controls included in each specification include the managerial performance bonus dummy, the worker's picking experience, the field life cycle, and a time trend. The field life cycle is defined as the nth day the field is picked divided by the total number of days the field is picked over the season. The number of workers, number of supervisors, total kilos picked and total hours worked are defined at the field-day level. All continuous variables are in logarithms. The null hypothesis for the F-test is that the coefficients of all the interactions are equal to zero. There are 12287 worker-field-day level observations in each regression.

Identification

- exploit panel data on the productivity of each worker to estimate the difference in his productivity on field-days when he is socially connected to his managers, to field-days when he is socially unconnected to his managers

- compare this difference when the manager is paid a fixed wage to the corresponding difference when the manager is paid a performance bonus based on the average productivity of managed workers

- the same managers and workers are observed under both incentive schemes → control for unobserved individual heterogeneity of managers ('style'), and workers ('ability')

Table 2: Worker Productivity (kg/hr), by Social Connectivity to Managers and Managerial Incentive Scheme

All observations are at the worker-field-day level
Means, standard errors in parentheses

	Managerial Incentive Scheme		
	Fixed Wages	**Performance Bonus**	**Difference**
Unconnected on field-day (DC$_{ift}$=0)	6.95	9.11	2.15***
	(.173)	(.568)	(.530)
Connected on field-day (DC$_{ift}$=1)	8.27	9.23	.962***
	(.244)	(.476)	(.324)
Difference	1.31***	.123	1.20**
	(.257)	(.702)	(.616)

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. All variables are defined at the worker-field-day level. The standard errors are clustered at the worker level. Productivity is measured as the number of kilograms of fruit picked per hour by the worker on the field-day. A manager and given worker i are defined to be connected if they are either of the same nationality, live in the same area, or are in the same arrival cohort. A worker is defined to be unconnected on the field-day if she is not socially connected to any of her managers that field-day. A worker is defined to be connected on the field-day if she is socially connected to at least one of her managers. The standard errors on the differences, and difference-in-difference, are estimated from running the corresponding least squares regression, allowing the standard errors to be clustered by worker.

Results 1: Unconditional Difference-in-Difference

- Table 2 shows –

  – workers have significantly higher productivity when they work under managers they are socially connected to, compared to themselves when they work under managers they are not socially connected to

  – connected workers pick more fruit in the same amount of time

  – this effect only exists when managers are paid a fixed wage

$\Longrightarrow$ *when managers are paid fixed wages, workers earn 16% more if they are socially connected to their manager*

Results 2: Fixed Effects Estimates

$$y_{ift} = \alpha_i + \lambda_f + \gamma_0 \left(1 - B_t\right) \times C_{ift} + \gamma_1 \left(B_t \times C_{ift}\right) + \rho B_t$$

$$+ \sum_k \sum_{d \in N_k} \tau_d^k \left(B_t \times D_{id}^k\right) + \sum_{s \in M_{ft}} \mu_s S_{sft} + \delta X_{ift} + \eta Z_{ft} + u_{ift}$$

- where: y_{ift} is the log of productivity of worker i on field f on day t

- C_{ift}: share of managers worker i is connected to on field-day ft

- B_t: dummy variable, $= 1$ when managers are paid performance bonuses, $= 0$ when paid fixed wages

- workers and managers' fixed effects throughout

- parameters of interest are γ_0 and γ_1 : effect of social connections under wages and under performance bonus

Predictions on γ_0 and γ_1

- null hypothesis is that connections do not affect productivity, $\gamma_0 = \gamma_1 = 0$

- if however they do, we expect managers to target the workers they are connected to thus increasing their productivity, $\gamma_0 > 0$, $\gamma_1 > 0$

- if social connections affect the workers' average productivity, we expect the manager to change her targeting choices when her pay depends on the workers' average productivity. In particular –

  - if targeting connected workers <u>reduces</u> average productivity, we expect $\gamma_0 > \gamma_1 \geq 0$

  - if targeting connected workers <u>increases</u> average productivity we expect $\gamma_1 > \gamma_0 \geq 0$

Table 3: Social Connections and Managerial Incentives

Dependent Variable = Log of worker's productivity (kilograms picked per hour on the field-day)
Standard errors reported in parentheses, allowing for clustering at worker level

	(1) Any Managers Connected To	(2) Share of Managers Connected To
Any managers connected to i, fixed wages for managers (DC_{ift})	.041**	
	(.017)	
Any managers connected to i, performance bonus for managers (DC_{ift})	.003	
	(.031)	
Share of managers connected to i, fixed wages for managers (C_{ift})		.133***
		(.037)
Share of managers connected to i, performance bonus for managers (C_{ift})		-.115
		(.082)
Difference-in-difference estimate	.039	.249***
	(.031)	(.086)
Interactions of nationality x performance bonus dummy	Yes [.169]	Yes [.030]
Interactions of living site x performance bonus dummy	Yes [.000]	Yes [.000]
Interactions of arrival cohort x performance bonus dummy	Yes [.000]	Yes [.000]
Adjusted R-squared	.4124	.4130
Number of observations (worker-field-day)	12287	12287

<u>Baseline Results</u> [Table 3, additional results Table A3]

- conditional on other observable determinants of productivity –

  – workers have significantly higher productivity when they work under managers they are socially connected to, compared to themselves when they work under managers they are not socially connected to

  – this effect only exists when managers are paid a fixed wage

- the average worker's productivity is 9.4% higher when he is socially connected to all managers, compared to when he is connected to none

- comparable increase in field-day earnings for the socially connected worker (would correspond to an additional $850 over the season)

- pattern of coefficients rule out a number of alternative hypotheses –

  - workers are always assigned to socially connected managers when productivity on the field is exogenously higher ($\widehat{\gamma}_0 = \widehat{\gamma}_1 > 0$)

  - when workers are on the field-day with managers they are socially connected to, the marginal utility of leisure is higher because they prefer to socialize with their managers ($\widehat{\gamma}_0 = \widehat{\gamma}_1 < 0$)

  - the effect of social connections is driven by workers' rather than managers' behavior ($\widehat{\gamma}_0 = 0 < \widehat{\gamma}_1$)

Robustness Checks

1. concern is that COO intentionally sorts managers and workers into fields on their basis of their social connections. If so, the effect of social connections would be biased downwards

    – exploit the fact that some dimensions of connectivity, such as nationality, are more easily observable to the COO than others, such as time of arrival

2. the DID estimate might be picking up any heterogeneous effects of the managerial bonus scheme across workers

    – introduce a complete set of interactions between each worker's fixed effect and the performance bonus dummy

3. field-day level factors create a spurious correlation between social connections and productivity, e.g. managers lobby the COO to be allocated workers they are connected to on field-days when productivity is exogenously higher

    – include field-day fixed effects

Table 3: Social Connections and Managerial Incentives

Dependent Variable = Log of worker's productivity (kilograms picked per hour on the field-day)
Standard errors reported in parentheses, allowing for clustering at worker level

	(3) Type of Social Connection
Share of managers of same nationality as i, fixed wages for managers	.157***
	(.047)
Share of managers of same nationality as i, performance bonus for managers	-.124
	(.127)
Share of managers living in same area as i, fixed wages for managers	.089**
	(.044)
Share of managers living in same area as i, performance bonus for managers	-.076
	(.070)
Share of managers of same arrival cohort as i, fixed wages for managers	.189**
	(.081)
Share of managers of same arrival cohort as i, performance bonus for managers	-.076
	(.193)
Interactions of nationality x performance bonus dummy	Yes [.056]
Interactions of living site x performance bonus dummy	Yes [.000]
Interactions of arrival cohort x performance bonus dummy	Yes [.000]
Adjusted R-squared	.4135
Number of observations (worker-field-day)	12287

Table 3: Social Connections and Managerial Incentives

Dependent Variable = Log of worker's productivity (kilograms picked per hour on the field-day)
Standard errors reported in parentheses, allowing for clustering at worker level (Column 4), clustering at the field-date level in Colu

	(4) Heterogeneous Effects of the Bonus on Workers	(5) Field-Date Fixed Effects
Share of managers connected to i, fixed wages for managers (C_{ift})	.123***	.099**
	(.037)	(.045)
Share of managers connected to i, performance bonus for managers (C_{ift})	-.096	-.075
	(.082)	(.060)
Difference-in-difference estimate	.219**	.174**
	(.089)	(.075)
Interactions of worker fixed effect x performance bonus dummy	Yes [.000]	Yes [.000]
Field-date fixed effects	No	Yes
Adjusted R-squared	.4214	.5463
Number of observations (worker-field-day)	12287	12287

Econometric Concerns 1: Time Varying Effects of Social Connections

- the effect of social connections changes naturally with time. For example –

  – workers try to initially impress managers they are socially connected to

  – managers are better able to initially help workers they are socially connected to

- to address these issues, in Table 5 we –

  – split season up into quarters to identify any time effects of social connections

  – interact social connections with field and worker specific time trends

  – use a placebo bonus on fields operated later in the season

Table 4: Robustness of Results to Time Effects

Dependent Variable = Log of worker's productivity (kilograms picked per hour on the field-day)
Standard errors reported in parentheses, allowing for clustering at worker level

	(1) Farm Level Time Trend	(2) Field Specific Time Trend	(3) Worker Specific Time Trend	(4) Placebo Bonus Based on Field Life Cycle
Share of managers connected to i, fixed wages for managers	.152***	.182***	.173**	
	(.040)	(.059)	(.087)	
Share of managers connected to i, performance bonus for managers	-.071	-.087	.435	
	(.086)	(.113)	(.399)	
Share of managers connected to i, fixed wages for managers x 2nd quarter dummy (31st May)	-.040			
	(.061)			
Share of managers connected to i, performance bonus for managers x 4th quarter dummy (29th July)	-.116			
	(.099)			
Share of managers connected to i, fixed wages for managers x field life cycle		-.134		
		(.120)		
Share of managers connected to i, performance bonus for managers x field life cycle		-.117		
		(.195)		
Share of managers connected to i, fixed wages for managers x days on farm for worker i			-.017	
			(.031)	
Share of managers connected to i, performance bonus for managers x days on farm for worker i			-.141	
			(.105)	
Share of managers connected to i, placebo bonus based on field life cycle = 0				-.087
				(.088)
Share of managers connected to i, placebo bonus based on field life cycle = 1				-.033
				(.149)
Interactions of nationality x performance bonus dummy	Yes	Yes	Yes	Yes
Interactions of living site x performance bonus dummy	Yes	Yes	Yes	Yes
Interactions of arrival cohort x performance bonus dummy	Yes	Yes	Yes	Yes
Adjusted R-squared	.4142	.4269	.4142	.5618
Number of observations (worker-field-day)	12287	12287	12287	1584

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. Standard errors allow for clustering at the worker level. All specifications control for worker, field, and manager fixed effects. The other controls included in each specification include the managerial performance bonus dummy, the worker's picking experience, the field life cycle, and a time trend. The field life cycle is defined as the nth day the field is picked divided by the total number of days the field is picked over the season. All continuous variables are in logarithms. A manager and given worker i are defined to be connected if they are either of the same nationality, live in the same area, or are in the same arrival cohort. The samples in Columns 1 to 3 are restricted to workers that are connected to at least one manager on at least one field-day. In Column 1 the 2nd quarter dummy is defined to be equal to zero before May 31st and one thereafter. The 4th quarter dummy is defined to be equal to zero before July 29th and one thereafter. These dummy variables split the pre and post bonus periods equally into two halves. In Column 3 the days on the farm for a worker are defined as the number of days elapsed since the worker first arrived on the farm. In Column 4 the placebo bonus dummy based on the field life cycle is defined to be zero if the field is less than .53 of the way though its life cycle, and one otherwise. In this column the sample is restricted to fields that are only operated in the period when managers are paid a performance bonus (after June 27th). The interaction terms at the foot of the table are defined with respect to the placebo bonus dummy variable in Column 4. The difference-in-difference estimate is the difference in the effect of social connections on worker productivity by managerial incentive scheme.

Econometric Concerns 2: Sample Selection

- workers arrive and depart at different times, mostly because of differences in university calendars and when their work permit is approved

- our estimates might still capture that workers who stay post bonus have different returns to social connections

- Table 6 restricts the sample to workers whom we observe under both incentive schemes: (i) picking for at least one day; (ii) picking for at least one week; (iii) present at the farm for at least 3 weeks either side of the change in managerial incentives

Table 5: Robustness of Results to Using Alternative Samples of Workers

Dependent Variable = Log of worker's productivity (kilograms picked per hour on the field-day)
Standard errors reported in parentheses, allowing for clustering at worker level

	(1) Available for Picking Three Weeks Either Side of the Change in Managerial Incentives	(2) Pick Under Both Managerial Incentive Schemes	(3) Pick At Least Six Days Under Both Managerial Incentive Schemes
Share of managers connected to *i*, fixed wages for managers	.145***	.130***	.158***
	(.043)	(.039)	(.041)
Share of managers connected to *i*, performance bonus for managers	-.053	-.108	-.083
	(.114)	(.083)	(.088)
Difference-in-difference estimate	.198*	.238***	.241***
	(.118)	(.088)	(.096)
Interactions of nationality x performance bonus dummy	Yes	Yes	Yes
Interactions of living site x performance bonus dummy	Yes	Yes	Yes
Interactions of arrival cohort x performance bonus dummy	Yes	Yes	Yes
Adjusted R-squared	.4219	.4303	.4278
Number of observations (worker-field-day)	8069	10542	8884

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. Standard errors allow for clustering at the worker level. All specifications control for worker, field, and manager fixed effects. The other controls included in each specification include the managerial performance bonus dummy, the worker's picking experience, the field life cycle, and a time trend. The field life cycle is defined as the nth day the field is picked divided by the total number of days the field is picked over the season. All continuous variables are in logarithms. A manager and given worker *i* are defined to be connected if they are either of the same nationality, live in the same area, or are in the same arrival cohort. The samples are all restricted to workers that are connected to at least one manager on at least one field-day. The sample in Column 1 is further restricted to workers that are physically present on the farm three weeks wither side of the change in managerial incentives (June 27th). The sample in Column 2 is further restricted to workers that are observed picking fruit on at least one day under both managerial incentive schemes. The sample in Column 3 is further restricted to workers that are observed picking for at least six days under both managerial incentive schemes. The difference-in-difference estimate is the difference in the effect of social connections on worker productivity by managerial incentive scheme.

A Falsification Exercise

- concern is that the measures of social connections are not picking up anything real

- define spurious measures of social connections –

  - first name initial (A-Z)

  - day of month of birth (1-31)

  - day of week of birth (Monday-Sunday)

- [Table A4]

Table A4: Spurious Measures of Social Connections and Managerial Incentives

Dependent Variable = Log of worker's productivity (kilogram picked per hour on the field-day)
Standard errors reported in parentheses, allowing for clustering at worker level

	First Name Initial	Day of Month of Birth	Day of Week of Birth
Share of managers that have same first name initial as *i*, fixed wages for managers	-.010		
	(.050)		
Share of managers that have same first name initial as *i*, performance bonus for managers	-.093		
	(.108)		
Share of managers that were born on the same day of the month as *i*, fixed wages for managers		.084	
		(.069)	
Share of managers that were born on the same day of the month as *i*, performance bonus for managers		.142	
		(.128)	
Share of managers that were born on the same day of the week as *i*, fixed wages for managers			-.085
			(.175)
Share of managers that were born on the same day of the week as *i*, performance bonus for managers			-.306
			(.302)
Difference-in-difference estimate	.083	-.058	.221
	(.129)	(.140)	(.203)
Interactions of first name initial x performance bonus dummy	Yes	No	No
Interactions of day of month of birth x performance bonus dummy	No	Yes	No
Interactions of day of week of birth x performance bonus dummy	No	No	Yes
Adjusted R-squared	.4563	.4249	.4524
Number of observations (worker-field-day)	5546	2274	2412

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. Standard errors allow for clustering at the worker level. All specifications control for worker, field, and manager fixed effects. The other controls included in each specification include the managerial performance bonus dummy, the worker's picking experience, the field life cycle, and a time trend. The field life cycle is defined as the nth day the field is picked divided by the total number of days the field is picked over the season. All continuous variables are in logarithms. A manager and given worker *i* are defined to be connected if they are either of the same nationality, live in the same area, or are in the same arrival cohort. In Column 1 the sample is restricted to workers that are sometimes connected to at least one manager on a field-day by first name initial (A-Z). In Column 2 the sample is restricted to workers that are sometimes connected to at least one manager on a field-day by day of month of birth (1-31). In Column 3 the sample is restricted to workers that are sometimes connected to at least one manager on a field-day by day of week of birth (Monday-Sunday). The difference-in-difference estimate is the difference in the effect of social connections on worker productivity by managerial incentive scheme.

Social Connections and The Firm's Overall Performance

- shed light on the mechanism through which social connections reduce average productivity in this setting

- theory indicates that social connections reduce average productivity if three conditions hold –

(a) the effect of social connections on the complementarity between managerial and worker effort is weak (k_i close to one when $\sigma_i = \sigma$)

(b) the manager is connected to some but not all workers

(c) favors are rival, namely if the manager devotes time to help one worker he has less time to devote to others

(a) likely to be true in our setting – little scope for communication or problem solving for example, workers already paid piece rates so little need to incentivize them further with non-monetary rewards and punishments

(b) easily verified to be true – on average, 60% of workers on the field-day are connected to at least one manager on a given field-day

   – the mean and variance of the of the share of workers connected to managers on the field-day do not differ significantly under the two managerial incentive schemes (no evidence of sorting by the COO)

(c) test whether the extent of favoritism depends on the composition of the group of workers on the same field-day

- measure competition for favors in two ways;

  * by the share of workers who are connected to at least one manager on the same field-day as worker i, $\frac{1}{N_{ft}}\sum DC_{ift}$

  * the average level of social connections of workers on the field-day, as given by $\frac{1}{N_{ft}}\sum C_{ift}$

Table 6: Rival Favors

Dependent Variable = Log of worker's productivity (kilograms picked per hour on the field-day)
Standard errors reported in parentheses, allowing for clustering at worker level

	Any Managers Connected To		Share of Managers Connected To	
	(1)	**(2)**	**(3)**	**(4)**
Any managers connected to *i*, fixed wages for managers	.041**	.191***	.133***	.318***
	(.017)	(.044)	(.037)	(.092)
Any managers connected to *i*, fixed wages for managers		-.261***		
x share of workers on the field that are socially connected to managers		(.075)		
Share of managers connected to *i*, fixed wages for managers				-.551**
x average social connectivity of workers on the field-date to managers				(.252)
Any managers connected to *i*, performance bonus for managers	.003	-.168	-.115	-.119
	(.031)	(.123)	(.082)	(.223)
Any managers connected to *i*, performance bonus for managers		.273		
x share of workers on the field that are socially connected to managers		(.215)		
Share of managers connected to *i*, performance bonus for managers				.030
x average social connectivity of workers on the field-date to managers				(.685)
Share of workers on the field that are socially connected to managers, fixed wages for managers		.045 (.067)		
Share of workers on the field that are socially connected to managers, performance bonus for managers		-.045 (.209)		
Average social connectivity of workers on the field-date to managers, fixed wages for managers				.059 (.133)
Average social connectivity of workers on the field-date to managers, performance bonus for managers				-.268 (.324)
Interactions of nationality x performance bonus dummy	Yes	Yes	Yes	Yes
Interactions of living site x performance bonus dummy	Yes	Yes	Yes	Yes
Interactions of arrival cohort x performance bonus dummy	Yes	Yes	Yes	Yes
Adjusted R-squared	.4124	.4131	.4130	.4131
Number of observations (worker-field-day)	12287	12287	12287	12287

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. Standard errors allow for clustering at the worker level. All specifications control for worker, field, and manager fixed effects. The other controls included in each specification include the managerial performance bonus dummy, the worker's picking experience, the field life cycle, and a time trend. The field life cycle is defined as the nth day the field is picked divided by the total number of days the field is picked over the season. All continuous variables are in logarithms. A manager and given worker i are defined to be connected if they are either of the same nationality, live in the same area, or are in the same arrival cohort. In Columns 1 to 4 the sample is restricted to workers that are connected to at least one manager on at least one field-day. A worker is defined to be unconnected on the field-day if she is not socially connected to any of her managers that field-day, and the worker is defined to be connected on the field-day if she is socially connected to at least one of her managers.

Favors are Rival

- Table 6 shows the effect of being connected is smaller when the share of connected workers is higher

- being connected increases productivity by –

  – 13% if the share of connected workers on the field is 25%

  – 8% if the share of connected workers on the field is 50%

  – 4% if the share of connected workers is 75%

  – zero if all workers are connected

- as theory suggests, when all workers are connected the manager cannot redistribute effort from unconnected to connected workers, hence the effects of social connections are zero

- share of workers connected on the field-day does not have a direct effect on productivity. This further supports the identifying assumption that the allocation of workers and managers to fields is uncorrelated to the average productivity on the field-day

Interpretation

- this finding sheds light on the mechanism behind why exploiting social connections across tiers of the firm hierarchy may be detrimental to overall firm performance

- on field-days in which connected workers are of high ability, social connections reinforce managerial incentives to target high ability workers. There is therefore no tension between the allocation of managerial effort that maximizes the manager's utility and that which maximizes average productivity overall

- on the other hand, on field-days in which connected workers are of low ability and unconnected workers are of high ability, in order to favor connected workers the manager distorts her effort away from unconnected workers of higher ability. In this case, the existence of social connections is detrimental to the firm's performance

Discussion: External Validity

- inevitable trade-off: precision versus generality

- here social connections matter and have a substantial effect on productivity
  – do we expect this to be true in general?

- key features of our firm:

  – managers' actions are observable by all workers $\implies$ reduce the scope for favoritism

  – managers and workers are very likely to establish social connections $\implies$ increases the scope for favoritism

  – managers only have one margin along which to influence the outcomes of workers they are socially connected to (no promotion, job assignment decisions, or need for subjective performance evaluation)

- in other contexts favoritism can take other forms such as letting friends slack, allocate friends more desirable tasks, helping friends get promoted

Discussion: External Validity (continued)

- here social connections have a negative effect on firm performance when managerial incentives are low powered – do we expect this to be true in general?

- key feature of our firm is the simple technology, which does not require much communication or joint problem solving by managers and workers

- in other settings where joint problem solving, subjective performance evaluations, and non-monetary incentives are more relevant, social connections might be productivity enhancing

- Ichniowski and Shaw (2005) present evidence from steel finishing lines – a relatively complex task that involves problem solving – of such positive effects of improved communication within and between tiers of the firm hierarchy

Optimal Managerial Incentives

- social connections between managers and workers can provide an alternative, and possibly cheaper, mechanism to the provision of monetary incentives

- may thus be in a firm's best interests to foster social ties between management and workers ('team building exercises')

- if managers derive utility from helping connected workers, implies that being socially connected to their subordinates lowers the managers' participation constraint and thus the firm's wage bill may be reduced

- however, this strategy may be suboptimal if it leads to the self selection of lower quality managers to the firm over time

Conclusion

- combine a field experiment on managerial incentives with personnel data on daily workers' productivity and on the social relations between workers and managers to provide evidence on the effect of social connections –

  - social connections generate favoritism and affect productivity,

  - the extent of favoritism depends on the incentive structure of managers

  - favoritism is detrimental to the firm's productivity when managers are paid fixed wages

Conclusion

- results indicate that managers' behavior is shaped by both social interactions and monetary incentives

  - key to understand individual responses to a given set of incentives

  - key to design optimal compensation schemes for both workers and managers

- the interplay of social connections and organizational design might explain some of the differences in performance among otherwise observationally similar firms

Table A1: Social Connections, Selection, and Managerial Incentives

Conditional logit estimates
Column 1: Dependent Variable = 1 if worker _i_ is chosen to pick on day _t_ in main site, 0 if worker is assigned to non-picking tasks
Column 2: Dependent Variable = 1 if worker _i_ is unemployed on day _t,_ 0 if assigned to non-picking tasks
Odd ratios reported, standard errors in parentheses, clustered by worker

	Probability of Being Selected to Pick	Probability of Being Unemployed
Performance bonus for managers	1.34	2.04*
	(.495)	(.764)
Performance bonus for managers x worker _i_ is socially connected	.524	.605
	(.214)	(.253)
Total yield in site 1	2.24***	.802***
	(.153)	(.057)
Total yield in site 2	.883***	.800***
	(.036)	(.032)
Number of workers available to pick fruit	.380***	1.83***
	(.037)	(.178)
Worker _i_'s previous deviation from mean productivity	1.16*	1.07
	(.091)	(.107)
Log-likelihood	-5186.8	-3208.5
Number of observations (worker-day)	15551	9808

Notes: *** denotes that the odd ratio is significantly different from one at 1%, ** at 5%, and * at 10% levels. Conditional logit estimates are reported where observations are grouped by worker. All continuous variables are divided by their standard deviations so that one unit increase can be interpreted as increase by one standard deviation. A manager and given worker i are defined to be connected if they are either of the same nationality, live in the same area, or are in the same arrival cohort. "Total yield" on the site is the total kilograms of the fruit picked on the site-day. The "number of workers available to pick fruit" is the total number of individuals that are on the farm that day and are available for fruit picking. "Worker _i_'s previous deviation from mean productivity" is defined on the last day the worker was selected to pick. We first take the deviation of the worker's productivity from the field average productivity on each field he picked on the day he was last selected to pick, and then calculate a weighted average of this across all fields he worked on where the weights are based on the number of pickers on the field. Worker _i_ is defined to be unemployed on day _t_ if she is present on the farm but is not assigned to any paid tasks.

Table A3: Continuous Measures of Social Connections and Managerial Incentives

Dependent Variable = Log of worker's productivity (kilogram picked per hour on the field-day)
Standard errors reported in parentheses, allowing for clustering at worker level

	Nationality	Living Area	Arrival Cohort
Share of managers of same nationality as *i*, fixed wages for managers	.158***		
	(.047)		
Share of managers of same nationality as *i*, performance bonus for managers	-.074		
	(.128)		
Share of managers living in same area as *i*, fixed wages for managers		.097**	
		(.044)	
Share of managers living in same area as *i*, performance bonus for managers		-.052	
		(.077)	
Share of managers of same arrival cohort as *i*, fixed wages for managers			.169*
			(.097)
Share of managers of same arrival cohort as *i*, performance bonus for managers			-.240*
			(.133)
Difference-in-difference estimate	.231*	.149*	.409**
	(.140)	(.078)	(.170)
Interactions of nationality x performance bonus dummy	Yes [.089]	No	No
Interactions of living area x performance bonus dummy	No	Yes [.000]	No
Interactions of arrival cohort x performance bonus dummy	No	No	Yes [.000]
Adjusted R-squared	.4291	.3722	.4914
Number of observations (worker-field-day)	8238	8262	3980

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. Standard errors allow for clustering at the worker level. All specifications control for worker, field, and manager fixed effects. The other controls included in each specification include the managerial performance bonus dummy, the worker's picking experience, the field life cycle, and a time trend. The field life cycle is defined as the nth day the field is picked divided by the total number of days the field is picked over the season. All continuous variables are in logarithms. A manager and given worker *i* are defined to be connected if they are either of the same nationality, live in the same area, or are in the same arrival cohort. In Column 1 the sample is restricted to workers that are sometimes connected to at least one manager on a field-day by nationality. In Column 2 the sample is restricted to workers that are sometimes connected to at least one manager on a field-day by living area. In Column 3 the sample is restricted to workers that are sometimes connected to at least one manager on a field-day by arrival cohort. At the foot of each column we report the p-value on the F-test on the joint significance the interaction terms with the performance bonus dummy. The difference-in-difference estimate is the difference in the effect of social connections on worker productivity by managerial incentive scheme.