Complementarities between employee involvement and financial participation : Do institutional context, differing measures, and empirical methods matter?

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Abstract: While most studies on complementarities are for the US and the UK, liberal market economies, we investigate whether productivity is greater if firms use employee involvement (EI) in decision-making and financial participation (FP) practices in tandem in a coordinated market economy. Representative data for Finnish manufacturing firms are used. Our diverse specifications reflect varying approaches in theoretical and empirical work on complementarities. Using panel data and looking at the incidence of various EI and FP practices (the extensive margin), we find next to no evidence in support of complementarities. However, we find some evidence for such complementarities using cross sectional data (where we control for several covariates that related work has found to be important for firm performance), and also when we focus on the intensity of FP (the intensive margin). In accounting for differences in empirical findings across varying settings, our findings suggest a role for institutional context and that differing measures and empirical methods matter.

The existence of participatory practices that promote employee involvement in firm decision-making (EI) and financial participation (FP) by employees has become increasingly common and often EI and FP coexist (e.g. Blasi and Kruse 2006 for the US; Kato 2006 for Japan; Kalmi and Kauhanen 2008 for Finland). Many expect stronger benefits from EI and FP if firms use participatory practices together. This is the complementarity hypothesis. However, some researchers contend that, for reasons including adoption costs and information asymmetries, all firms cannot be expected either to adopt or benefit equally from similar sets of EI and FP practices (e.g. Bloom and Van Reenen 2011).

Much empirical work investigates the economic benefits actually emerging from adopting EI and FP practices (Shaw 2009). Furthermore, several investigations find evidence supportive of complementarities (e.g. Pendleton and Robinson 2010). However, this is not always true – e.g. Cappelli and Neumark (2001) do not uncover evidence of such synergies. Moreover, most previous empirical research is based on "liberal market economies" (LMEs) rather than differing institutional contexts, including "coordinated market economies" (CMEs) (Godard 2004).

Our key contribution is to present fresh evidence on whether complementarities exist in a CME. The institutional characteristics of LMEs and CMEs can be expected to lead to profound differences in the economic impact of EI and FP. Indeed we hypothesize that in a CME such as Finland with strong traditions of employee participation and industrial democracy, complementarities may be weaker than in Anglo-American LMEs. However we also hypothesize that, in a mature participatory economy such as Finland, while changes in whether or not a certain program is used---the extensive margin--- may be ineffective, what may matter are changes in coverage or extent of the program-- the intensive margin. To investigate these hypotheses we interrogate new representative survey data for Finnish manufacturing firms.

Two other contributions reflect our data which permit investigation in a single study of the sensitivity of findings to different estimators. Panel data allow for the fixed effects estimator that

account for unobserved firm heterogeneity. Our cross-sectional estimations enable controls for several covariates that related work has identified as important for firm performance, e.g. product market competition, computer use, and family and foreign ownership. Omitting these covariates from cross-sectional OLS models, when they are correlated with EI and FP practices and the dependent variable (firm performance), produces biased estimates of the included EI or FP variables. Second, compared to much previous work, we have information on a broad range of both EI and FP practices. This enables us, again within a single study, to investigate diverse ways to capture the effects of complementarities.

Conceptual framework and Empirical Evidence

The theoretical framework that analyzes complementarities has been laid out in several influential studies (e.g. Milgrom and Roberts 1995; Ben-Ner and Jones 1995). For Milgrom and Roberts (1995, p. 181) a complementarity exists if "doing more of one thing increases the returns to doing (more of) the others". In the context of EI and FP practices, arguably the effects of a single FP and EI practice on goal-alignment and human capital accumulation may be stronger, and work in parallel directions, when firms use these practices together rather than alone.

We first consider the effects of individual forms of participation. By linking employee pay with firm performance, FP aims to align the interests of the firm and its employees-- a *goal-alignment effect*. In turn, EI practices, by reducing asymmetric information between employees and managers, may improve goal alignment and facilitate more favorable labor-management relations within the firm. Relatedly, voluntary information sharing by employers (e.g. through a joint consultation committee) may enhance worker loyalty, cooperative behavior and trust (Kleiner and Bouillon 1991). Second, concerning a *human-capital effect*, FP practices such as profit sharing may reduce the probability of worker turnover (e.g. Azfar and Danninger 2001). A longer vesting period for human-capital investment, may encourage the formation of firm-specific human capital (Freeman

1976; Jones and Kato 1995). In a highly unionized environment, such as Finland, EI practices may provide employees with stronger voice in the workplace which, in turn, reduces workers' voluntary exits thus retaining firm-specific human capital.

Other studies emphasize complementarity mechanisms arising from combinations of EI and FP. Weitzman and Kruse (1990) argue that profit sharing, a group-based FP plan, works only when the free-riding problem is solved through a long-term commitment of workers achieved through EI. Levine and Tyson (1990) argue that cooperative behavior by employees requires financial incentives otherwise employees may not gain financially from improved productivity and lose their motivation to cooperate. While Ben-Ner and Jones (1995) argue that EI practices implemented without FP schemes may lead to increased shirking, Freeman et al. (2010) provide empirical evidence that combinations of EI and FP reduce shirking practices. Kato and Morishima (2002) argue that representative participation in particular may reduce managerial moral hazard and facilitate trust in management, especially when combined with FP.

Empirical studies that directly investigate complementarities between EI and FP practices are scarce. In their pioneering study on a specific steel production process in 26 plants in the US, Ichniowski, Shaw and Prennushi (1997) find support for complementarities among participatory practices. Blasi et al. (2015) present evidence for US firms that EI and FP reinforce each other in reducing employee turnover, although results concerning profitability are unclear. For CMEs, Jones, Kalmi and Kauhanen (2010) present evidence on complementarities for a Finnish food processing firm. For Danish companies, Eriksson (2003) finds some evidence of complementarities between EI and group-based financial incentives. Kato and Morishima (2002) uncover evidence of positive complementarity effects between systems of participatory practices for Japanese listed firms.

However, many studies find no or mixed evidence on complementarities. These include many studies on the UK, such as Addison and Belfield (2000), who use the 1998 UK WERS data,

Robinson and Wilson (2006) who find little evidence of complementarities between different forms of participation, and Sengupta (2008) who finds that share ownership has a positive impact only on productivity but not on profitability when combined with trade unions. Pendleton and Robinson (2010) report that EI is needed to overcome free-riding problems associated with employee stock ownership plans (ESOP), only if there is minority participation in the ESOP. Some studies on the CMEs also find scant evidence, such as Kalmi et al. (2005) who use a sample of European listed firms. Most unusually, when investigating a German steel plant, Frick et al. (2013) find that combinations of teamwork and performance-related pay (PRP) are associated with reduced quality, increased absenteeism, with no productivity gains.

From this brief survey, it is clear that no consistent results emerge from empirical studies concerning complementarity. Consequently, this paper aims to present fresh evidence on these issues. In particular, in investigating whether complementarities exist, we hypothesize that institutional context matters. Most prior studies use either UK or US settings that tend to be characterized by low trust, low commitment or arm's length employment relationships. In these LMEs, to stimulate employees to work harder and smarter, employers may use combinations of EI and FP practices—if used alone, they may have limited impact because of an often-prevailing low-trust dynamic. By contrast, since CMEs (such as Finland) have completely different industrial relations systems compared to those prevailing in Anglo-American countries, our findings might be expected to depart from those reported for LMEs. For example, in Finland the overall industrial relations climate has been characterized as collaborative and trust-intensive. By international standards, the statutory protection of employee rights is robust (Kalmi and Kauhanen 2008) and union density is very high (during our observation period well over 70%). Also, Finnish trade unions bargain on wages and a large number of workplace issues. Any thoroughgoing organizational changes affecting employees, including adopting EI practices such as self-managed teams, have to be

discussed with employee representatives. For many FP systems too (e.g. personnel funds), decisions are made cooperatively by employer and employee representatives. In such an environment the expected effects of EI and FP may be less profound than in Anglo-American LMEs. Because of these differences in industrial relations environments, we hypothesize that the complementarity effects of EI and FP are likely to be smaller than in Anglo-American LMEs.

Furthermore we draw on much literature (e.g. Bloom and Van Reenen (2007), Purcell et al. (2008)) that argues that the mere presence (adoption) of a human resource management (HRM) practice (such as profit sharing) may not be as important as actual implementation (and dimensions such as the size, nature and coverage of the profit share). Specifically, in a mature participatory economy such as Finland, with strong traditions of employee participation and industrial democracy (Kalmi and Kauhanen 2008), our second hypothesis is that what matters most is the coverage of the plan and the strength of employee voice in the program rather than whether a certain program is used. In other words, we hypothesize that HRM changes on the intensive margin may be more important than HRM changes on the extensive margin.

As well as providing fresh evidence concerning whether complementarities exist in a CME, we also respond to two other main reasons for the failure to uncover consistent findings in the existing literature -- the use of differing empirical methods (e.g. panel vs cross sectional estimates) and different ways to capture the potential impact of EI and FP (e.g. HRM systems vs summary indices). By investigating, in a single study, diverse ways to capture complementarities and by using diverse estimators we will also shed light on the potential role of differing measures and methods in accounting for variation in reported findings concerning complementarities.

Data and Empirical Strategy

Data

The firm *population* from which we randomly sample is the 1054 Finnish manufacturing companies employing at least 50 persons as listed in Statistics Finland's Business Register in September 2005. We focus on these larger firms because, in smaller firms: (i) EI and FP practices might not be common; (ii) respondents may be reluctant to participate in surveys (e.g. for lack of time); (iii) financial statements are not as easily available; and (iv) to show comparability with previous studies that focus on similar manufacturing firms. A well-known Finnish market research firm, operating in the field for over 20 years, conducted the Computer Assisted Telephone Interviews.[2] Interviewers were specially trained and called firms in a random order and asked the firm's switchboard operator to be connected with: *"a manager who is in charge of the firm's human resource management issues in Finland."* If a respondent was busy when called, the interviewers set a more convenient survey time with the respondent. Interviewers stressed to respondents that full anonymity and confidentiality would be guaranteed. Budget constraints meant that altogether 832 calls (representing more than 80% of the population) were made between December 2005 and January 2006; eventually 398 firms participated fully in the survey (38% of the population and almost 50% of target respondents.) The average running time for an interview was about 30 minutes. When our sample is compared with the underlying population, the characteristics of companies are very similar in terms of size and industry distributions.

Our unit of analysis is firms rather than establishments. In an economy in which there are many large firms with multiple establishments and their headquarter HRM departments are less powerful (such as the US),[3] the incidence, nature and scope of EI and FP may well vary significantly among establishments within the same firm and the choice of firms as the unit of analysis may be problematic. By contrast, for an economy such as Finland, in which there are relatively few large

[2] Compared to mail-in or internet-based interviews, telephone interviews are expected to achieve higher reliability and improved response rates, are substantially cheaper than on-site interviews and yet generate a large and representative sample.
[3] See, for instance, Jacoby et al. (2005).

firms with multiple establishments and when many industrial relations issues are negotiated between management and unions at the headquarters level, the choice of firms as the unit of analysis poses less analytical inconsistency while securing reliable and consistent firm performance data for most firms who respond to the survey.[4] That being said, we acknowledge the possibility of measurement errors caused by heterogeneity in EI and FP among different establishments within the same firm for our multi-establishment firms.

We use labor productivity (firm sales per employee) to measure firm performance since employee participation practices aim to enhance labor productivity more directly than overall firm productivity. Also, in our empirical work, when we estimate production functions, this is a standard procedure (e.g. Kato and Morishima 2002).

However, there is no single convention to guide which participatory practices should proxy for EI. Our survey instrument draws on recent influential literature (e.g. Chi, Freeman and Kleiner 2011) and our knowledge of actual Finnish HRM practices.[5] For EI we focus on seven practices: 1) employee board representation, 2) joint consultation committee, 3) quality circles, 4) self-managed teams, 5) job rotation, 6) suggestion schemes, and 7) job satisfaction surveys. We use binary measures for the incidence of a single practice (=1 if a firm uses a given practice, 0 otherwise).[6]

Our measure of FP includes PRP, personnel fund, broad-based stock option scheme, and broad-based share ownership scheme. PRP is broader than just profit-sharing, because the level of measured performance can vary and since it does not need to include profitability. However, an analysis of the PRP schemes studied in Jones et al. (2012) reveals that they usually (for white-collar,

[4] As shown below (Table 2), the average firm employs fewer than 300 employees and about half of sample firms are single-establishment firms.
[5] The EI and FP practices for which we collect data are those most evident for Finnish manufacturing firms (e.g. Kalmi and Kauhanen 2008).
[6] In constructing a measure of EI our approach resembles that used by many researchers who draw on prominent survey-based studies such as Britain's WERS (e.g. Addison and Belfield (2000); Cox et al., 2006). Thus EI differs from broader concepts such as HPWS for which measures typically include other elements such as training (see, e.g. Huselid, 1995.)

almost always) include profitability as a performance criterion, typically they are broad-based (covering at least 50 percent of all employees), and a large majority actually include all employees. The PRPs in our sample are group-based incentive schemes, and most can be classified as cash-based profit-sharing (following the typology of Poutsma and de Nijs (2003)). While we cannot distinguish between selective and broad-based PRPs throughout the sample period, our survey has information on the proportion of employees covered by PRP schemes in 2005. Thus, in many of our models we include only broad-based PRPs[8] in our definition of FP, instead of including also selective schemes. Personnel funds are a form of deferred profit-sharing where profit-shares are invested either in the sponsoring firm's stock or more broadly in financial markets. If a company sponsors a personnel fund, all employees are covered during their ongoing employment contract, so these are always broad-based group incentive schemes. While most stock option schemes in Finland are selective (Jones et al. 2006), we include only broad-based stock option schemes here. Similarly, we include broad-based share ownership schemes though direct share ownership (other than through personnel funds) is uncommon in Finland (Jones et al. 2012). To measure broad-based share ownership and stock option schemes, as in previous studies (e.g. Kruse et al. 2010), the proportion of employees is at least 50%.

We obtain data on each EI and FP practice prior to 2005 by asking whether the practice was used in 2002. If it was in place in 2002 but not in 2005, we ask when it was terminated; if it existed in 2005 but not in 2002, we ask when the practice was started. If it existed both in 2002 and 2005, we assume it existed throughout the period. As with all surveys this strategy may be prone to respondent's recall errors. Since information on these practices is based on one survey and one respondent in each firm, our data potentially also suffer from the "single respondent problem" (Gerhart et al. 2000). However, using single respondents is good for consistency of information.

[8] These account for over 70% of all PRPs.

Furthermore, the extent of such problems is apt to be no greater than in studies that rely on multiple surveys or which, at least in the past, used managerial responses to gather performance data (e.g. WERS). In such cases, the separation of respondents across surveys (at least partially), might produce inconsistent reporting and in some cases exacerbate measurement error. We focus on the incidence of practices within firms, which we believe produces less "recall measurement error" than "participation ratios" for employees in practices, although it yields less information on the actual scope of practices. Also, since survey respondents are those most knowledgeable managers about HRM in the organization, this reduces problems associated with single respondent bias (Huselid and Becker 2000). Lastly, we asked each respondent to recall the incidence of each practice only for the preceding three years.

Table 1 shows the incidence of EI and FP practices amongst survey firms in 2002 and 2005. The incidence of EI indicates significant heterogeneity in the popularity of EI. For instance, in 2005 the most common forms of EI are job rotation (84%), job satisfaction surveys (82%) and suggestion schemes (76%), whereas self-managed teams (35%) and board representation (12%) occur much less frequently. During this period there were also significant increases in the incidence of many practices--e.g. 62% of firms have joint consultation committees in 2002 but by 2005 the figure has jumped to 75%.

Between 2002 and 2005 the most popular form of FP is PRP. The incidence of PRP grew from 55% in 2002 to 68% in 2005. The incidence of personnel funds decreased slightly from 6% in 2002 to 5% in 2005. Broad-based stock option schemes and broad-based share ownership schemes are rarely used. The percentage of firms without any form of FP decreased from 42% in 2002 to 31% in 2005.

[Table 1 about here]

Company financial statement data are obtained from a firm that specializes in providing firm-level data (including income statements and balance sheets) for 60-80,000 Finnish firms per year during 2002-2005. These data have been used in many previous empirical studies.

Besides EI and FP, a rich literature finds that other factors are importantly related to firm performance. These include computer use (Brynjolfsson and Hitt 2000), foreign ownership (Aitken and Harrison 1999), family ownership (Bennedsen et al. 2007) and product market competition (Bloom and Van Reenen 2007). Our survey data enable us, mainly in cross-sectional empirical work, to control for these covariates.

Empirical strategy

We estimate augmented Cobb-Douglas (CD) production functions since this is the practice in related literature, such as evaluating the productivity effects of EI (e.g. Zwick 2004) or stock options (e.g. Jones, Kalmi and Mäkinen 2010).

In the following empirical analysis, we use both cross sectional (2005) and panel-data (2002-2005). Cross-section estimates are subject to omitted variable bias caused by unobserved firm heterogeneity. For instance, a firm with an innovative corporate culture and history is more likely than the average firm to adopt new HRM practices such as FP and EI. Thus cross-section estimates of the productivity effect of FP and EI may capture not only the productivity effect of FP and EI, but also the productivity effect of innovative corporate culture, resulting in the overestimation of the productivity effect of FP and EI. By contrast, fixed effect estimates exploit the fact that some unobserved firm heterogeneity such as corporate culture is often time-invariant in the short term, and allow for the removal of such unobserved yet time-invariant confounders. However fixed-effect estimates may not always be preferred over cross-section estimates, especially if key variables of

interest are measured with error or change only slowly. Hence, we report both cross-section and fixed effect estimates, while discussing the limitations of each approach.

A key feature of our empirical strategy is to estimate various specifications reflecting three approaches concerning the appropriate way to capture the effect of EI and FP practices on production. In implementing the first method, the *additive scale approach*, we begin with a cross section model that uses a simple count of EI and/or FP practices. The model provides the "direct effect" estimates of EI and FP and a comparison to the "complementarity effect" estimates of EI and FP. The augmented cross-sectional Cobb-Douglas production function is:

$$(1) \qquad \ln(Y/L)_i = c + \beta_1 \ln(K/L)_i + \beta_2 \ln(M/L)_i + \beta_3 X_i + \beta_4 FP4_i + \lambda_1 EI7_i + \varepsilon_i,$$

where for firm *i*, $\ln(Y/L)_i$ is the natural logarithm of firm sales per worker (labor productivity), *c* is a constant term, $\ln(K/L)_i$ is the capital labor ratio (capital is the sum of tangible and intangible assets at the end of a given year), $\ln(M/L)_i$ is intermediate inputs per worker (materials), and ε_i is an error term assumed to be independently and identically distributed.

This *"Additive Scale Approach"* has been used widely, including Freeman and Kleiner (2000). Specifically, $FP4_i$ is the number of FP practices in use by firm *i*. We consider four specific practices: (i) *PRP; (ii) personnel fund; (iii) broad-based stock option scheme; and (iv) broad-based share ownership scheme*, and hence $FP4_i$ takes a value between 0 and 4. Likewise, $EI7_i$ is the number of EI programs in firm *i*, and we consider seven programs: (i) *joint consultation committee; (ii) quality circles; (iii) self-managed teams; (iv) board representation; (v) job rotation; (vi) suggestion scheme; and (vii) job satisfaction survey*[9]. $EI7_i$ takes a value between 0 and 7.

X_i is a vector of firm characteristics and other controls for firm *i*, specifically: ln (age of firm) and $\ln(age)^2$; share of employees using computers almost daily in their work; share of employee

[9] By including job satisfaction as an indicator of EI we draw on previous findings for the US (e.g. Jones, Kato and Weinberg, 2003) as well as for Finland (e.g. Kalmi and Kauhanen, 2008). Also in regressions, when we removed this component of EI from the EI indices, results were essentially unaffected.

training; and union density; and dummy variables indicating 10 different regions; 9 two-digit manufacturing industry classifications; foreign majority owner; publicly listed firm; multi-plant firm; family ownership (membership in the Finnish Family Firms Association); intensive product market competition. Using this unusually comprehensive set of controls reduces the usual concern over omitted variable bias, in particular for cross-section estimates. Note that when we use panel data and estimate fixed effect models, some controls are excluded (some are time-invariant and thus absorbed by firm fixed effects) and some data are available only for 2005. Finally all value variables are deflated to constant 2000 Euros using the CPI deflator. Table 2 presents summary company statistics for panel data during 2002-2005 and for cross-sectional data in 2005.

(Table 2 about here)

To test complementarity between FP and EI, we augment Eq. (1) with the interaction term involving $FP4_i$ and $EI7_i$ and estimate:

$$(2) \qquad \ln(Y/L)_i = c + \beta_1 \ln(K/L)_i + \beta_2 \ln(M/L)_i + \beta_3 X_i + \beta_4 FP4_i + \lambda EI7_i + \gamma FP4_i * EI7_i + \varepsilon_i,$$

A positive sign of γ (the coefficient on the interaction term) indicates positive complementarity between EI7 and FP4.

To implement the second "*EI focus approach"*, different combinations of the seven EI practices are constructed. The key idea is that different forms of EI may differ in their function and intensity and therefore have different implications for organizational performance (e.g. Ben-Ner and Jones 1995). In particular, representative forms of EI are more likely to give employees voice in company strategic decision-making, whereas direct participation methods mainly relate to work process. The former are expected to have a stronger association with firm-level aggregate performance, and possibly produce a stronger complementarity with FP (Robinson and Wilson 2006). In turn, direct participation can differ considerably in intensity-- quality circles and

autonomous teams are more powerful organizational practices than others such as suggestion schemes. Therefore, we create three dummy variables: EI_REP, the count of joint consultation committee and board representation (a value between 0 and 2); EI_STRONG (stronger forms of EI, where employees get to make decisions) the count of quality circles and self-managed teams (also a value between 0 and 2); and EI_WEAK (weaker forms of EI, where employees are limited to expressing a view) the count of job rotation[10], suggestion scheme, and job satisfaction survey (a value between 0 and 3). Thus, we estimate:

$$(3) \qquad \ln(Y/L)_i = c + \beta_1 \ln(K/L)_i + \beta_2 \ln(M/L)_i + \beta_3 X_i + \beta_4 FP4_i + \lambda_1 EI\_REP_i + \lambda_2 EI\_STRONG_i + \lambda_3 EI\_WEAK_i + \varepsilon_i.$$

To explore complementarities, we estimate:

$$(4) \qquad \ln(Y/L)_i = c + \beta_1 \ln(K/L)_i + \beta_2 \ln(M/L)_i + \beta_3 X_i + \beta_4 FP4_i + \lambda_1 EI\_REP_i + \lambda_2 EI\_STRONG_i + \lambda_3 EI\_WEAK_i + \lambda_{41} FP4_i*EI\_REP_i + \lambda_{42} FP4_i*EI\_STRONG_i + \lambda_{43} FP4_i*EI\_WEAK_i + \varepsilon_i.$$

Since using a full set of EIs and FPs and their interactive terms may cause substantial efficiency losses, our third approach is to construct hierarchical categories of HRM systems (see, e.g., Ichniowski, Shaw and Prennushi 1997). Here individual EI and FP practices are mapped into ordered categories of HRM systems, from the 'most elementary', TRADITIONAL, to the 'most innovative' system, EIFPFULL (see Table 3).[11]

[Table 3 around here]

Thus, we estimate:

$$(5) \qquad \ln(Y/L)_i = c + \beta_1 \ln(K/L)_i + \beta_2 \ln(M/L)_i + \beta_3 X_i + \beta_4 EIFPFULL_i + \beta_5 EIFPPART_i + \beta_6 EIONLY1_i + \beta_7 EIONLY2_i + \varepsilon_i.$$

[10] We recognize that job rotation may be viewed as a relatively strong form of EI, so we re-estimated the regressions by assigning job rotation in EI_STRONG: reassuringly we found no discernible change in the results.

[11] While it would be conceptually possible to include another FPONLY row we do not do so because essentially this would be an empirically empty category. For example in 2005 FPONLY = 0 while in 2004 FPONLY =1.

Examining descriptive data on HRM systems during 2002-2005 (Table 4) show the most participatory EIFPFULL increasing (29% of firms in 2002, 42% in 2005). The share of firms with EIFPPART remained stable. However, the share of firms with HRM Systems that cannot exploit the potential complementarities between EI and FP (EIONLY1, EIONLY2 and TRADITIONAL) decreased.

Consistent with positive complementarities between EI and FP, Table 4 shows that the most advanced HRM Systems EIFPFULL and EIFPPART (where firms can exploit potential complementarities) exhibit the greatest average productivity. Using an exponential transformation, in 2005 average labor productivity is about 178,000 euros (per worker) in firms with HRM Systems EIFPFULL or EIFPPART and close to 110,000 euros (per worker) in firms with TRADITIONAL. Before accepting this finding, however, we need to control for other factors that may explain variation in average labor productivity across firms.

[Table 4 about here]

Last we provide some evidence on the hypothesis that changes on the intensive margin may be more important than changes on the extensive margin. Our data allow us to consider the proportion of white-collar workers covered by PRP and the proportion of blue-collar workers covered by PRP, and thereby estimate the productivity effect of the scope of PRP (intensive margin) as opposed to the incidence of PRP (extensive margin) for the 2005 cross-section.[12]

$$(6) \qquad \ln(Y/L)_i = c + \beta_1 \ln(K/L)_i + \beta_2 \ln(M/L)_i + \beta_3 X_i + \beta_4 PWC_i + \beta_5 PBC_i + \lambda EI7_i + \varepsilon_i,$$

where, in firm *i*, PWC_i=proportion of white-collar workers covered by PRP and PBC_i=proportion of blue-collar workers covered by PRP. The mean and s.d. for PWC_i and PBC_i are 54.08 (47.23) and 54.07 (48.71), respectively. To investigate complementarity between PRP gauged by this alternative measure and EI, we augment Eq. (6) with the relevant interaction terms:

[12] Similar data on the intensive margin for EI (e.g., the proportion of workers covered or participating in an EI program) are unavailable; therefore we focus on PRP and the intensive margin.

$$(7) \quad \ln(Y/L)_i = c + \beta_1 \ln(K/L)_i + \beta_2 \ln(M/L)_i + \beta_3 X_i + \beta_4 PWC_i + \beta_5 PBC_i + \lambda EI7_i + \beta_6 PWC_i * EI7_i + \beta_7 PBC_i * EI7_i + \varepsilon_i,$$

Another feature that defines our empirical strategy reflects our having panel data on EI and FP practices. Therefore, for all models (except for Equations (6) and (7)), we can directly apply the fixed effects estimator to assess the association of EI and FP practices with firm performance, while simultaneously controlling for unobserved heterogeneity across firms.

Empirical findings

Cross section 2005

Table 5 reports cross sectional findings for 2005. We report in that table findings that are based on the M-estimator (-rreg- in Stata®) that is more robust to vertical outliers[13] than the OLS estimator[14]. In column (1) we use the additive scale approach to assess the direct effects of overall EI and FP and find that EI7 is insignificant, but FP4 is positively significant (0.03) at the 10% level However, when we include the interaction term involving EI7 and FP4 the estimated coefficient is statistically insignificant—there is no evidence for synergy between EI and FP. Also the coefficient of FP4 is statistically insignificant in column (2).

Columns (3) and (4) report findings based on the second approach -- measures of EI reflect different foci of practices: representative, weaker and stronger forms of EI. In column (3), representative EI is positively significant (.051) at the 1% level and FP is also positively significant (.033) at the 10 percent level. Column (4) looks at potential complementarities between EI and FP. The estimated coefficient on the interaction term involving representative forms of EI and FP is

[13] The residuals of 24 observations in column (1) have studentized residuals that exceed +2 or -2, a common cutoff for points of concern.
[14] OLS results are available upon request.

positively significant (0.087) at the 1% level, suggesting that FP and representative EI complement each other in boosting productivity.

[Table 5 about here]

Table 6 reports cross sectional estimates for 2005 for our continuous PRP variable specification (equations (6) and (7)). To deal with outlying observations, we continue to use the M-estimator. In the baseline model, (column (1)), the estimated coefficient on PWC is positive and statistically significant at the 10 percent level, indicating that a firm with a higher proportion of white-collar workers covered by PRP is, on average, more productive than other firms. In other words, there is a positive association between the breadth of PRP as applied to white-collar workers and enterprise productivity. More importantly, as shown in column (2), when augmented with interaction terms involving the continuous variable of PRP (one for white-collar and the other for blue-collar workers) and EI, we find evidence for complementarity between PRP and EI—for white-collar workers (PWC) the estimated coefficient on EI7 (our EI variable) and the breadth of PRP is positive and statistically significant at the 10 percent level. While no similar results are found for the proportion of blue-collar workers covered by PRP, the literature on the high-performance work system (HPWS) suggests that the systems characterized by EI and FP works well when workers engage in complex jobs (e.g. Boning, Ichniowski, and Shaw, 2007). Arguably white-collar jobs are less routine and more complex than blue-collar jobs. As such, our result is consistent with the finding in the HPWS literature that employees differ in their expectations and desires regarding participation and EI whereby, compared to blue collar workers, white collar workers may respond more positively to greater EI and FP.

In sum, our cross-sectional estimates inform us that the way in which the effect of complementarities is captured matters. Insofar as the incidence of EI and FP (extensive margin) is concerned, there is little evidence in support of complementarities between EI and FP. But when we

further disaggregate EI into different types, we find evidence for complementarity between representative EI and FP. In addition, when using continuous measures of PRP (an important component of FP), we find evidence in support of complementarities for white-collar workers. As such, our cross-section estimates support our second hypothesis on the stronger potential impact of practices that enhance the intensive vs the extensive margin in CMEs.

[Table 6 about here]

Panel data 2002-2005

The retrospective nature of our survey allows us to utilize information on changes in the use of EI and FP practices (and HRM systems) among sample firms during 2002-2005. As such, we can estimate fixed effect models and eliminate possible omitted variable bias caused by unobserved fixed cofounders, such as managerial quality (the extent to which this is stable during 2002-2005).

Table 7 shows how firms' overall use of EI7 and FP is related to firm productivity. In column (1), where we use the pooled OLS for a comparison with the fixed effects estimator, we find a significant association (0.049) between FP and firm productivity at the 1% level, while the coefficient of EI7 is statistically insignificant. Since there is likely to be a great deal of unobserved heterogeneity across sample firms, in columns (2)-(3) we use the fixed effects estimator. In column (2)[17] FP is positive but insignificant (0.019), while we find a significant and negative association (-0.020) between EI7 and firm productivity at the 1% level. This adverse effect on productivity is consistent with our hypothesis that, in a highly collaborative and trust-intensive environment, the cost of introducing a new practice may exceed its productivity gain, and result in a fall in value added.[18] In column (3), to look at complementarities between EI7 and FP, an interaction term is

[17] Most firm characteristics such as publicly listed (0/1), multiplant (0/1), foreign majority ownership (0/1), 10 region dummies and 9 two-digit manufacturing industry dummies are time-invariant over the time period under study (2002-2005), and thereby drop from the fixed effect estimations.

[18] Such initial productivity losses following the introduction of a new HRM practice have been previously documented, e.g. Jones and Kato (1995).

included. Though EI7 remains negatively significant (-0.020) at the 1% level, we find no evidence of complementarities.[19]

[Table 7 about here]

Table 8 shows how firms' representative, weaker and stronger forms of EI, and FP are associated with firm productivity. In column (1), where we use the pooled OLS for a comparison with the fixed effects estimates, the estimated FP coefficient (0.046) is statistically significant at the 1% level while of the three subgroups of EI, only the coefficient of representative EI is significant (0.033). The three subgroups of EI are jointly significant at the 10% level and participatory practices (EIs and FP) are jointly significant at the 1% level. In columns (2)-(3) we use the fixed effects estimator. In column (2), only the coefficient of weaker forms of EI (-0.049) is significant at the 1% level. In column (3) we focus on complementarities among the three subgroups of EI (i.e. REP (representative), WEAK (weaker) and STRONG (stronger) forms and FP. We continue to find that the coefficient of weaker forms of EI (-0.032) is statistically significant but only at the 10% level. We also find that the estimated coefficient of FP (0.081) is significant at 10% level. Again, however, we find no evidence of complementarities.[20]

[Table 8 about here]

Table 9 provides evidence on complementarities using the HRM systems approach. Note that only advanced participatory systems EIFPFULL and EIFPPART can exploit complementarities between EI and FP since other systems (EIONLY1, EIONLY2) exclude FP practices. The reference category is the most elementary TRADITIONAL. In column (1) the robust M-estimator provides

[19] Since the importance of participatory practices might differ between low and high productivity firms, in unreported regressions we split our sample into low and high productivity firms using the sample median of labor productivity as a cutoff. We continue to find no evidence of complementarities. We also split our sample into small and large firms using the sample median of employment and continue to find no evidence of complementarities. Also EI7 and FP are statistically insignificant. Unreported regressions are available upon request.

[20] In unreported regressions we split our sample into low and high productivity firms by using the sample median of labor productivity. We continue to find no evidence of complementarities. Among individual EI practices, only for high productivity firms is the coefficient of the weaker forms of EI negatively significant.

HRM system estimates using a cross section for 2005 and a broad set of firm controls (similar to those used earlier and reported in Table 5). We find no statistically significant coefficients on any system variable, suggesting that the firm with more innovative HRM practices is no more or less productive than the firm without these practices. As a robustness check, we estimate column (1) using broad-based FP only (i.e. PRP is replaced with broad-based PRP in FP), and find little change in the results (not reported here but available upon request). In column (2) we use a pooled OLS approach. The estimated coefficient of EIFPFULL is positive (.039) but insignificant. In contrast, the coefficient of EIFPPART is positive and significant (.048) at the 10% level.

To account for unobserved firm heterogeneity, we estimate fixed effect models and report the results in column (3) of Table 9. The coefficients on EIFPFULL and EIFPPART are not statistically significant even at the 10 percent level. As such, a switch from the traditional HRM system to an advanced system yields no significant productivity gain. Interestingly the estimated coefficient on EIONLY2 is negative and statistically significant at the 1 percent level, suggesting that adopting stronger forms of EI without introducing FP results in an 8 percent productivity loss.

In sum panel data methods yield next to no evidence in support of complementarities. As such these findings provide strong support for our hypothesis that complementarities will be weaker in CMEs than in LMEs. This result is found for all three ways used to capture the impact of EI and FP and when categorical measures of EI and FP are used.

Finally while providing no evidence for EI-FP complementarities, our panel data analysis provides evidence for the negative productivity effect of EI. Though the majority of prior studies on EI find either positive or no productivity effect of EI, the finding of significant negative effects is rather unusual.

[Table 9 about here]

Conclusions

Between 2002 and 2005, the incidence of FP and EI practices grew in Finnish manufacturing. The spread of more participatory HRM systems and "shared capitalism" are largely consistent with changes observed in other institutional environments (e.g. Kruse, Freeman and Blasi, 2010 for the US). At the same time, we find substantial heterogeneity in the presence of EI and FP practices across firms including substantial growth in the use of such practices in tandem. To explore potential complementary benefits between EI and FP, we gather new representative survey data covering diverse practices.

Previous empirical work in this area is limited both in scope and nature, and has produced rather contradictory results. However most previous research has focused on either US or UK cases, "liberal market economies"; very little work has been undertaken for "coordinated market economies" (Godard 2004). We hypothesize that in a CME such as Finland with strong traditions of employee participation and industrial democracy, complementarities can be expected to be significantly weaker than in LMEs. We also hypothesize that, in a mature participatory economy such as Finland, while changes in whether or not a certain program exists---the extensive margin---may be ineffective, what may matter are changes in coverage or extent-- the intensive margin. By using detailed cross-sectional data we take into account the determinants of business performance that often have been omitted from studies of the effects of EI and FP (and so leads to possible omitted variable bias). At the same time, by using panel data we control for unobserved firm heterogeneity. We also note that the existing literature is characterized by using different methods to capture the potential impact of EI and FP (e.g. HRM systems vs summary indices). By investigating in a single study, diverse ways to capture complementarities and by using diverse estimators we also shed light on the potential role of those matters in accounting for variation in reported findings concerning complementarities.

Our findings are somewhat sensitive to estimating method. When we utilize within-firm

variations in the fixed effect models, we find next to no evidence for complementarities between EI and FP. However, when we focus on between-firm variations in cross-sectional estimations, we find evidence for complementarities. Even though fixed effect estimates are often considered more reliable than cross-section estimates (because they account for unobserved fixed confounders), in the context of our study we are somewhat agnostic about the supremacy of fixed-effect estimates. Our cross-section estimates are conditional on a set of controls that are more extensive than those contained in most prior studies, and hence are less susceptible to bias caused by unobserved confounders. Second, our panel may not be long enough to capture the lagged productivity effect of EI and FP.

We also find that the way in which complementarities are captured bears on the pattern of findings. For example cross sectional estimates using the additive scale approach reveal no evidence of interactions between EI and FP whereas when we construct measures with different foci (reflecting representative, weaker and stronger forms of EI) we do find evidence of complementarities.

When we focus on the incidence of EI and FP, typically we find evidence at best of weak complementarities—thus supporting our core hypothesis that institutional context matters. Specifically, in a country like Finland with a strong tradition of employee participation and industrial democracy, within-firm variations in EI and FP as measured by their incidence (as in our fixed effect estimations) may be expected to have little impact on productivity. Adding a new participatory practice to a well-established set of complementary practices is not expected to yield a strong complementary effect. At the outset, the firm may know which practices strongly complement each other and hence should comprise the initial bundle. Likewise, the firm excludes other practices from the initially bundled set because they were deemed to have little complementarity with the initially chosen set of practices. Hence, when what was initially an excluded practice is subsequently added,

it is unsurprising that a negligible complementary effect with FP will emerge. Indeed, in such an environment, the cost of introducing new practices may exceed productivity gains, and result in declining value added. [21]

We also provide evidence on our second hypothesis that, in an economy such as Finland, while changes in the extensive margin may be ineffective, changes on the intensive margin may be effective. Unfortunately, due to data limitations, we are unable to study changes on the intensive margin in the fixed effect framework and thus we have no definitive answer concerning the relative importance of the intensive margin and the extensive margin. However, by using the proportion of white-collar and blue-collar workers covered by PRP, we estimate the productivity effect of PRP on the intensive margin cross-sectionally and find results mostly consistent with this hypothesis. Specifically, the firm with a greater proportion of white-collar workers covered by PRP was more productive than other firms. Moreover, the positive productivity effect of the breadth of PRP was greater for firms with more EI programs---there is evidence of a complementarity between EI and PRP.

We recognize that there are potential limitations in our study. Even though using longitudinal data is unusual, the data are retrospective and therefore prone to recall error, though we minimize this by keeping the period relatively short and interviewing the manager most knowledgeable about the subject. Also we have single respondents, which is good for the consistency of information, but may bias survey responses towards a managerial perspective. The EI practices and FP classes in this study, though broad, are not all-encompassing. The use of dummy variables, although consistent with our overall approach, may bias results if practices are not broad-based, and our tests of the second hypothesis concerning the intensive margin are limited by the available data ---data on the intensive margin are limited to FP and even intensive margin data on FP are available only cross-

[21] This argument is consistent with the design perspective in Bloom and van Reenen (2011).

sectionally. Despite the limitations inevitably present in survey studies, we believe our data have accurately captured the state of HRM practices in Finland and their impact on firm performance. One particular potentially important task for future research in the field is to extend the cross-section analysis of the productivity effect of PRP and EI on the intensive margin to panel-data analysis using a fixed effects estimator. It would be better still if comparable and comprehensive longitudinal data for a range of countries with differing styles of capitalism could be assembled and used to investigate more directly the issues we address in this paper.

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Table 1. The incidence of seven EI and four FP practices in 2002 and 2005

	2002	2005
Employee involvement		
Board representation	52 (13.1%)	46 (11.6%)
Joint consultation committee	246 (61.8%)	297 (74.6%)
Quality circle	182 (45.7%)	219 (55.0%)
Self-managed team	104 (26.1%)	138 (34.7%)
Job rotation	296 (74.4%)	333 (83.7%)
Suggestion scheme	270 (67.8%)	302 (75.9%)
Job satisfaction survey	325 (81.7%)	327 (82.2%)
Financial participation		
PRP	220 (55.3%)	269 (67.6%)
Personnel fund	24 (6.0%)	21 (5.3%)
Broad-based stock option scheme	6 (1.5%)	4 (1.0%)
Broad-based share ownership	7 (1.8%)	6 (1.5%)

Notes: Altogether 398 firms fully participated in our HRM survey. Missing values are treated as a non-existence of practice.

Table 2. Summary firm statistics

Variable	Definition	Obs.	Mean	Std.dev.
Panel data 2002-2005: key production variables				
Sales	sales (€1000)	1,200	71,071	206,409
Labor	# employees	1,200	283.5	548.6
Capital	sum of intangible and tangible fixed assets (€1000)	1,200	25,346	112,904
Panel data 2002-2005: firm characteristics				
Foreign majority owner	=1, the major owner is foreign in 2005, 0 otherwise	1,200	0.20	0.40
Publicly listed	=1, firm publicly listed in 2005, 0 otherwise	1,200	0.07	0.25
Firm age	Age	1,200	16.6	12.4
Multi-plant	=1, firm has more than one plant in 2005, 0 otherwise	1,200	0.54	0.50
Cross-sectional data 2005: key production variables				
Sales	sales (€1000)	301	78,891	220,297
Labor	# employees	301	286.8	553.2
Capital	sum of intangible and tangible fixed assets (€1000)	301	26,228	121,826
Cross-sectional data 2005: firm characteristics				
Computer use	Share of employees using computers almost daily	301	0.57	0.29
Foreign majority owner	=1, major owner is foreign, 0 otherwise	301	0.21	0.41
Family firm	=1, firm is a member of the Finnish Family Firms Association, 0 otherwise	301	0.11	0.32
Multi-plant	=1, firm has more than one plant, 0 otherwise	301	0.52	0.50
Very hard competition	=1, product market competition scored 5 on the scale 1-5, 0 otherwise	301	0.40	0.49
Publicly listed	=1, firm publicly listed, 0 otherwise	301	0.06	0.23
Firm age	Age	301	16.2	11.0
Union density	Share of employees in union	301	0.84	0.16
Training	Share of employee received training	301	0.57	0.34

Notes: Statistics are for observations used in estimations. Owing to missing firm characteristics and financial statements data the number of firms in 2005 (301) differs from the number of firms (398) that fully participated in the survey; similarly for the panel data for 2002-2005.

Table 3. Construction of HRM systems:

	EI_Rep	EI_Strong	EI_Weak	FP
EIFPFULL=1 if	At least one	At least one	At least one	At least one
EIFPPART=1 if	At least one		may or may not have one	At least one
EIONLY1=1 if	At least one	none	At least one	none
EIONLY2=1 if	none	At least one	At least one	none
TRADITIONAL=1 if	none	none	may or may not have one	none

Table 4. The HRM systems approach: incidence of HRM systems and average labor productivity

	Incidence of HRM Systems				Average labor productivity			
	2002	2003	2004	2005	2002	2003	2004	2005
EIIFPFULL ("the most participatory system")	112 (28.5%)	126 (32.1%)	140 (35.6%)	163 (41.5%)	5.14 (.60)	5.13 (.64)	5.13 (.58)	5.17 (.58)
EIFPPART	117 (29.8%)	113 (28.8%)	110 (28.0%)	112 (28.5%)	5.07 (.74)	5.11 (.69)	5.13 (.65)	5.19 (.60)
EIONLY1	93 (23.7%)	93 (23.7%)	95 (24.2%)	82 (20.9%)	4.82 (.47)	4.83 (.46)	4.85 (.43)	4.89 (.47)
EIONLY2	21 (5.3%)	19 (4.8%)	15 (3.8%)	16 (4.1%)	4.83 (.40)	4.88 (.36)	4.90 (.42)	4.93 (.37)
TRADITIONAL ("the most elementary system")	47 (12.0%)	40 (10.2%)	32 (8.1%)	20 (5.1%)	4.77 (.52)	4.83 (.57)	4.90 (.65)	4.70 (.60)
N	393	393	393	393	207	207	207	207

Notes: Average (real) labor productivity figures are in logs (ln(*Y/L*)).

Table 5. Cross-section estimates of the productivity effect of EI and FP and their complementarities in 2005

	(1) M-estimator	(2) M-estimator	(3) M-estimator	(4) M-estimator
Ln(K/L)	0.042 *** (0.011)	0.041 *** (0.011)	0.041 *** (0.011)	0.040 *** (0.011)
Ln(M/L)	0.639 *** (0.015)	0.639 *** (0.015)	0.632 *** (0.015)	0.633 *** (0.016)
EI7 (employee involvement)	0.008 (0.008)	0.004 (0.011)	-	-
EI_REP (representative EI)	-	-	0.051 *** (0.021)	0.003 (0.029)
EI_WEAK (weaker EI)	-	-	0.006 (0.015)	0.016 (0.018)
EI_STRONG (stronger EI)	-	-	-0.011 (0.015)	-0.007 (0.020)
FP4_BROAD (broad-based financial participation)	0.032 * (0.018)	-0.003 (0.056)	0.033 * (0.019)	0.023 (0.067)
EI7 x FP4_BROAD		0.008 (0.013)		
EI_REP x FP4_BROAD	-	-	-	0.087 *** (0.034)
EI_WEAK x FP4_BROAD	-	-	-	-0.029 (0.025)
EI_STRONG x FP4_BROAD	-	-	-	0.000 (0.025)
Obs.	301	301	301	301
Adjusted R^2	0.91	0.91	0.91	0.91

Notes: Standard errors in parentheses. ***/**/*/ significant at 1/5/10% level. Firm controls=ln(firm age), ln(firm age)^2, share of computer use, publicly listed (0/1), family firm (0/1), very hard product market competition (0/1), multiplant firm (0/1), foreign majority ownership (0/1), share of employee training and union density. All models include a constant term, 10 region dummies and 9 two-digit manufacturing industry dummies

Table 6. Cross-section estimates of the productivity effect of EI and FP in 2005: using the proportion of white-collar and blue-collar workers covered by PRP

	(1) M-estimator	(2) M-estimator
Ln(K/L)	0.043*** (0.011)	0.042*** (0.011)
Ln(M/L)	0.633*** (0.015)	0.633*** (0.015)
PWC	0.0006* (0.0003)	-0.0011 (0.0010)
PBC	-0.0000 (0.0003)	0.0011 (0.0010)
EI7 (employee involvement)	0.008 (0.008)	0.0009 (0.0116)
PWC x EI7		0.0004* (0.0002)
PBC x EI7		-0.0003 (0.0002)
Obs.	299	299
Adjusted R^2	0.914	0.916

Notes: Standard errors in parentheses. ***/**/*/ significant at 1/5/10% level. Firm controls=ln(firm age), ln(firm age)^2, share of computer use, publicly listed (0/1), family firm (0/1), very hard product market competition (0/1), multiplant firm (0/1), foreign majority ownership (0/1), share of employee training and union density. All models also include a constant term, 10 region dummies and 9 two-digit manufacturing industry dummies.

Table 7. Panel data estimates of the productivity effect of EI and FP during 2002-2005

	(1) POLS 2002-2005	(2) FE 2002-2005	(3) FE 2002-2005
Ln(K/L)	0.041 *** (0.014)	0.046 (0.040)	0.046 (0.040)
Ln(M/L)	0.630 *** (0.022)	0.679 *** (0.085)	0.679 *** (0.085)
EI7 (employee involvement)	-0.004 (0.006)	-0.020 *** (0.007)	-0.020 *** (0.007)
FP4 (financial participation)	0.049 *** (0.017)	0.019 (0.016)	0.020 (0.035)
EI7 x FP4 (H_0: "no complementarities")	-	-	-0.000 (0.008)
Firm fixed effects	No	Yes	Yes
Obs.	1,200	1,200	1,200
Firms	358	358	358
Adjusted R^2	0.89	0.67	0.67

Notes: Firm-level clustered standard errors in parentheses. ***/**/* significant at 1/5/10% level. In column (1) controls include a constant term, ln(firm age), ln(firm age)^2, publicly listed (0/1), multiplant (0/1), foreign majority ownership (0/1), year dummies, 10 region dummies and 9 two-digit manufacturing industry dummies. In columns (2)-(5) controls include a constant term, ln(firm age), ln(firm age)^2, and year dummies. POLS=the pooled OLS estimator. FE= the fixed effect estimator.

Table 8. Panel data estimates of the productivity effect of EI and FP during 2002-2005: using disaggregated measures of EI

	(1) POLS 2002-2005	(2) FE 2002-2005	(3) FE 2002-2005
Ln(K/L)	0.039 *** (0.013)	0.049 (0.039)	0.049 (0.039)
Ln(M/L)	0.629 *** (0.022)	0.676 *** (0.084)	0.675 *** (0.083)
EI_STRONG (stronger EI)	-0.017 (0.013)	0.014 (0.013)	-0.003 (0.015)
EI_REP (representative EI)	0.033 * (0.018)	-0.021 (0.018)	-0.017 (0.021)
EI_WEAK (weaker EI)	-0.016 (0.011)	-0.049 *** (0.016)	-0.032 ** (0.014)
FP4 (financial participation)	0.046 *** (0.018)	0.020 (0.016)	0.081 * (0.045)
EI_REP x FP4	-	-	-0.007 (0.019)
EI_WEAK x FP4	-	-	-0.029 (0.018)
EI_STRONG x FP4	-	-	0.023 (0.016)
F-test: three interaction terms jointly=0 (*p*-value); "H_0: no complementarities between EI&FP"	-	-	1.38 (0.250)
Firm fixed effects	No	Yes	Yes
Obs.	1,200	1,200	1,200
Firms	358	358	358
Adjusted R^2	0.89	0.67	0.68

Notes: Firm-level clustered standard errors in parentheses. ***/**/* significant at 1/5/10% level. In column (1) controls include a constant term, ln(firm age), ln(firm age)^2, publicly listed (0/1), multiplant (0/1), foreign majority ownership (0/1), year dummies, 10 region dummies and 9 two-digit manufacturing industry dummies. In columns (2)-(5) controls include a constant term, ln(firm age), ln(firm age)^2, and year dummies. POLS=the pooled OLS estimator. FE= the fixed effect estimator.

Table 9. Cross-section and panel estimates of the productivity effect of EI and FP: using a system approach

	(1) M-estimator 2005	(2) POLS 2002-2005	(3) FE 2002-2005
Ln(K/L)	0.034 *** (0.011)	0.041 *** (0.014)	0.045 (0.041)
Ln(M/L)	0.638 *** (0.016)	0.627 *** (0.022)	0.679 *** (0.086)
EIFPFULL	0.042 (0.047)	0.039 (0.029)	-0.001 (0.033)
EIFPPART	0.021 (0.048)	0.048 * (0.026)	0.003 (0.029)
EIONLY1	-0.048 (0.049)	-0.021 (0.028)	-0.034 (0.023)
EIONLY2	0.044 (0.073)	-0.007 (0.034)	-0.079 *** (0.023)
Obs.	287	1,200	1,200
Firms	287	358	358
Adjusted R^2	0.91	0.89	0.67

Notes: Firm-level clustered standard errors in parentheses. ***/**/*/ significant at 1/5/10% level. In column (1) controls include a constant term, ln(firm age), ln(firm age)^2, share of computer use, publicly listed (0/1), family firm (0/1), very hard product market competition (0/1), multiplant firm (0/1), foreign majority ownership (0/1), share of employee training, union density, 10 region dummies and 9 two-digit manufacturing industry dummies. In column (2) controls include a constant term, ln(firm age), ln(firm age)2, publicly listed (0/1), multiplant (0/1), foreign majority ownership (0/1), year dummies, 10 region dummies and 9 two-digit manufacturing industry dummies. In column (3) controls include ln(firm age), ln(firm age)^2, and year dummies. POLS=the pooled OLS estimator. FE=the fixed effects estimator.