“Productivity Spillovers Across Firms through Worker Mobility”

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Web Appendix

A1. The choice of the dynamic model for productivity

In Figure A1 (left panel) we present the autocorrelogram of value added per worker with six lags and its 95% confidence interval. The fact that autocorrelation becomes insignificant at the sixth lag justifies the inclusion of five lags of productivity in our regression specifications. Including further lags reduces the sample size dramatically and does not affect the magnitude of the coefficient of our interest. The right panel of Figure A1 shows autocorrelogram of the residuals from equation (3) and its 95% confidence interval, confirming that the hypothesis of no autocorrelation in the error term cannot be rejected at 95% confidence level. This result corroborates our choice of dynamic specification.

A2. Estimating the link between receiving firm’s productivity and the gap by 2-digit NACE industry.

In Table A3 we present results of running equation (5) on the nine 2-digit NACE industries separately. Here we estimate the coefficient on the productivity gap defined for four groups of new workers: new workers coming from more productive firms and from the same industry (gap_p_same), from more productive firms and different industry (gap_p_diff), from less productive firms and same industry (gap_n_same), and from less productive firms and different industry (gap_n_diff). The estimation results suggest that there is a considerable degree of variation in the gap’s coefficients across industries. For two industries out of nine, namely “Textile, cloth and footwear” and “Wood, paper and products thereof”, the condition $\beta_{P,same} > \beta_{P,diff} > 0$, consistent with the spillovers hypothesis, is not satisfied. For the remaining seven industries it is satisfied, and for “Publishing, printing and recording”, “Metals and products thereof”, “Machinery and equipment” and “Electrical and optical equipment” the coefficient $\beta_{P,same}$ is positive and statistically significant at the 95% confidence level. Combined, these four industries account for almost 60% of the entire sample. The case of the “Manufacturing, n.e.c. (not elsewhere classified)” industry, where the coefficients $\beta_{P,same}$ and $\beta_{P,diff}$ are nearly identical, is special. Since this highly synthetic industry group is likely to include firms with widely different production technologies, the ease of knowledge transfer between firms within and outside this industry should not be much different. Hence, one should not expect to see a big difference between $\beta_{P,same}$ and $\beta_{P,diff}$.

A3. Results with firm-specific time trends

Table A4 contains estimation results for an extension of equation (3) where firm-specific time trends are included as additional controls to account for heterogeneity in productivity growth patterns among firms. For

computational reasons, we restrict our sample only to large firms (50+ workers), so the results in Table A4 should be compared with those in Table 4's column (4). We use two methods to estimate the specification with firm-specific time trends. First, we add firm dummies interacted with the time variable and apply OLS to the thus augmented specification. (Results reported in the first column of Table A4). Second, we estimate a random coefficients model which allows the coefficient on the time trend to vary by firm. (Results in the second column of Table A4). The random coefficients estimator (implemented using Stata `xtmixed` command) is more efficient than OLS but it relies on stricter identifying assumptions. Nevertheless, the results from both estimators are similar to each other, and to the benchmark results in Table 4, column 4.

Table A1. The gap and receiving firm's productivity: benchmark results

	(1)	(2)	(3)	(4)
Productivity gap (β)	0.201** (0.038)	0.172** (0.038)	0.122** (0.039)	0.125** (0.039)
Current productivity (α_0)	0.462** (0.009)	0.455** (0.009)	0.407** (0.011)	0.407** (0.011)
Lag1 productivity (α_1)	0.203** (0.009)	0.198** (0.009)	0.192** (0.011)	0.192** (0.011)
Lag2 productivity (α_2)	0.089** (0.008)	0.085** (0.008)	0.081** (0.009)	0.081** (0.009)
Lag3 productivity (α_3)	0.083** (0.007)	0.081** (0.007)	0.078** (0.009)	0.078** (0.008)
Lag4 productivity (α_4)	0.056** (0.006)	0.052** (0.006)	0.062** (0.007)	0.062** (0.007)
log Employment		0.023** (0.001)	0.020** (0.002)	0.020** (0.002)
Hiring share		-0.005 (0.014)	-0.008 (0.015)	0.067 (0.077)
Separation share		5.27e(-5) (3.66e(-5))	9.62e(-5)* (4.29e(-5))	9.73e(-5)* (4.33e(-5))
Experience (log years)			0.025** (0.003)	0.025** (0.003)
College (share of laborforce)			0.007 (0.007)	0.006 (0.008)
University (share of laborforce)			0.071** (0.022)	0.074** (0.023)
Male (share of laborforce)			0.037** (0.008)	0.035** (0.009)
Age			-0.0006 (0.0003)	-0.0006 (0.0003)
Position 2			-0.038** (0.007)	-0.036** (0.007)
Position 3			0.055** (0.019)	0.047* (0.020)
Position 4			0.075** (0.022)	0.072** (0.024)
Experience (new workers)				-0.009 (0.009)
College (new workers)				0.007 (0.038)
University(new workers)				-0.074 (0.104)

Male (new workers)				0.031 (0.040)
Age (new workers)				0.94e(-4) (6.85e(-4))
Position 2 (new workers)				-0.036 (0.038)
Position 3 (new workers)				0.076 (0.080)
Position 4 (new workers)				0.059 (0.128)
Human capital (new workers)				0.027 (0.022)
Constant	-0.018** (0.002)	-0.064** (0.003)	-0.279** (0.026)	-0.281** (0.026)
R2	0.554	0.558	0.490	0.490
N	74,507	74,507	59,665	59,665

Notes: All specifications include industry-year fixed effects. Robust standard errors in parentheses are clustered at the firm level. ** significant at 1%, * significant at 5%. Time period covered is 1995-2007.

Table A2. Receiving firm's productivity and the gap calculated separately for more and less productive sending firms.

	(1)
Positive productivity gap (β_P)	0.280** (0.089)
Negative productivity gap (β_N)	-0.011 (0.078)
Current productivity (α_0)	0.399** (0.011)
Lag1 productivity (α_1)	0.192** (0.011)
Lag2 productivity (α_2)	0.081** (0.008)
Lag3 productivity (α_3)	0.082** (0.008)
Lag4 productivity (α_4)	0.065** (0.007)
log Employment	0.021** (0.002)
Share of new workers from more productive firms	-0.174 (0.110)
Share of new workers from less productive firms	-0.250* (0.118)
Separation share	9.72e(-5)* (4.27e(-5))
Experience (log years)	0.021** (0.004)
High school (share of laborforce)	---
College (share of laborforce)	0.010 (0.008)
University (share of laborforce)	0.077** (0.023)
Male (share of laborforce)	0.047** (0.009)
Age	-0.0001 (0.0003)
Position 1	---
Position 2	-0.038** (0.007)
Position 3	0.052**

	(0.019)
Position 4	0.071**
	(0.023)
Experience P (new workers)	-0.014
	(0.011)
High school P (new workers)	-0.025
	(0.031)
College P (new workers)	0.005
	(0.034)
University P (new workers)	0.129
	(0.112)
Male P (new workers)	-0.042
	(0.041)
Age P (new workers)	0.0014
	(0.0010)
Position 1 P (new workers)	-0.001
	(0.051)
Position 2 P (new workers)	-0.031
	(0.041)
Position 3 P (new workers)	-0.032
	(0.041)
Position 4 P (new workers)	-0.165
	(0.157)
Human capital P (new workers)	0.101**
	(0.029)
Experience N (new workers)	-0.026*
	(0.013)
High school N (new workers)	---
College N (new workers)	-0.019
	(0.047)
University N (new workers)	-0.042
	(0.192)
Male N (new workers)	0.045
	(0.051)
Age N (new workers)	-0.0011
	(0.0012)
Position 1 N (new workers)	---
Position 2 N (new workers)	0.038
	(0.054)
Position 3 N (new workers)	0.029
	(0.064)

Position 4 N (new workers)	0.019 (0.128)
Human capital N (new workers)	0.050 (0.045)
Constant	-0.267** (0.027)
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R2	0.491
N	59,665
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Table A3. Receiving firm's productivity and the gap calculated separately for more and less productive sending firms and by industry

	gap_p_same	gap_p_diff	gap_n_same	gap_n_diff	N	R2
Food, beverages, tobacco	0.183 (0.154)	0.002 (0.166)	0.237 (0.262)	-0.673* (0.274)	6,899	0.694
Textiles, clothing, footwear	-0.546 (0.311)	-0.637 (0.514)	0.302 (0.334)	0.730 (0.552)	3,074	0.523
Wood, paper, and products thereof	0.300 (0.441)	-0.232 (0.289)	0.042 (0.441)	-0.095 (0.325)	3,150	0.427
Publishing, printing, recording	0.522** (0.197)	0.146 (0.245)	0.506 (0.295)	0.054 (0.276)	6,957	0.477
Fuel, chemical and other non-metallic mineral products	0.046 (0.421)	0.040 (0.368)	0.227 (0.286)	-0.204 (0.175)	6,268	0.553
Metals and products thereof (excluding machinery)	0.717** (0.222)	0.239 (0.151)	0.211 (0.173)	0.035 (0.134)	12,429	0.409
Machinery and equipment	0.608** (0.234)	0.230 (0.209)	-0.167 (0.293)	-0.239 (0.200)	10,270	0.363
Electrical and optical equipment	0.749* (0.358)	0.584 (0.566)	0.068 (0.214)	0.107 (0.807)	5,748	0.364
Manufacturing, n.e.c.	0.523 (0.390)	0.496 (0.299)	0.159 (0.227)	0.010 (0.202)	4,870	0.464

Notes: All specifications include industry-year fixed effects and average size of sending firm as additional controls. Robust standard errors in parentheses are clustered at the firm level. ** significant at 1%, * significant at 5%. Time period covered is 1995-2007.

Table A4. Estimation results with firm-specific time trend

	(1)	(2)
Positive productivity gap	0.776** (0.248)	0.842** (0.218)
Negative productivity gap	0.214 (0.257)	0.364 (0.233)
Estimator:	OLS	xtmixed
N	8,636	8,636

Notes: All specifications include industry-year fixed effects and average size of sending firm as additional controls. Robust standard errors in parentheses are clustered at the firm level. ** significant at 1%, * significant at 5%. Time period covered is 1995-2007. Estimation results are presented only for a subsample of firms with 50 workers or more.

Figure A1. Autocorrelogram of labor productivity (left panel) and of the residuals from equation 3 (right panel).