Firms, Skills and Productivity

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Why skill is under spotlight?

➔ Can't persist high economic growth for long without increasing productivity

- Output growth dependent only on factor accumulation has a limit
- Diminishing marginal productivity
- Middle income trap

➔LDC graduation in 2026

- Will lose many benefits internationally (Duty free, quota free market access; TRIPs flexibility, etc.)
- Can't provide some supports to industries (cash incentives, etc.)
- Our industries may become less competitive
- Need to increase productivity to compensate for these losses.

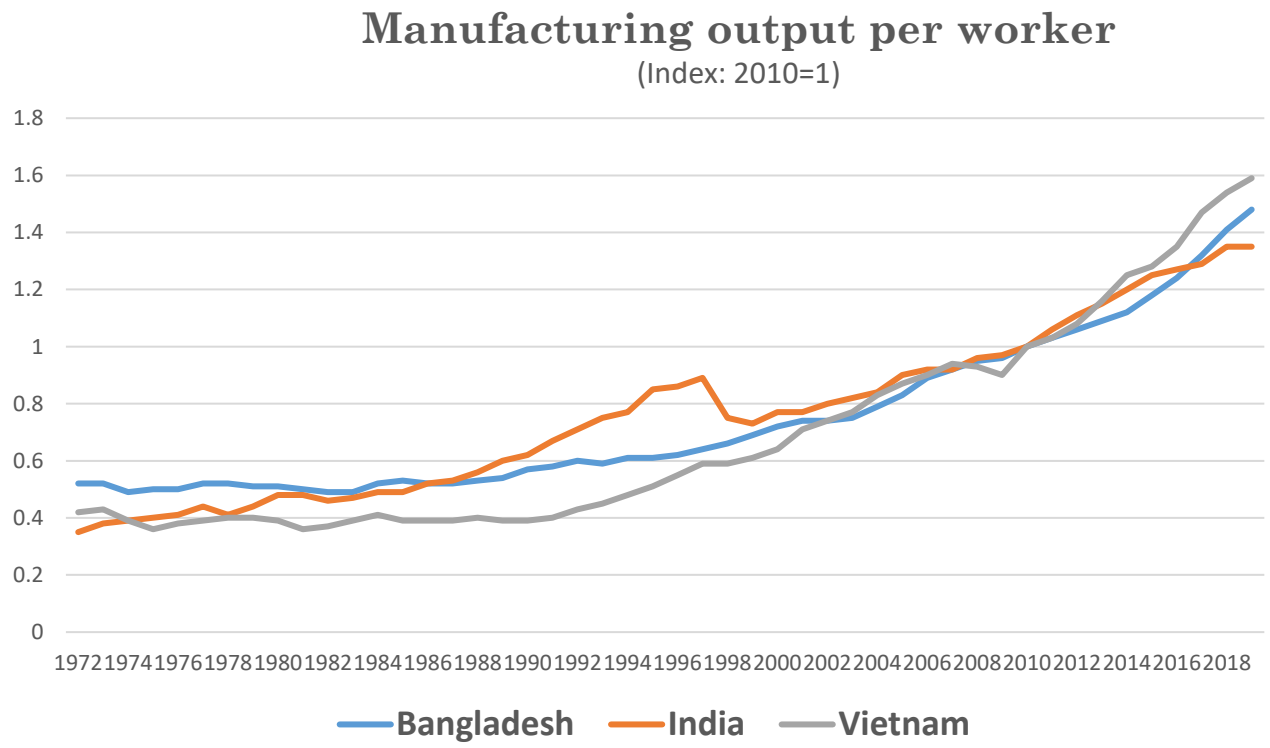
➔Macro stability

- Export earning, remittances, foreign exchange reserve, exchange rate.
- Not earning enough foreign currencies!
- Need skilled workers to make some products competitive in both local and international markets

Three questions

- Q1: What is the extent of labor and overall productivity in BD industries? [SMI data]
- Q2: To what extent skill mismatch (skill gap, vertical and horizontal mismatch) lower productivity? [Primary survey]
- Q3: What constitute skill? [Primary survey]

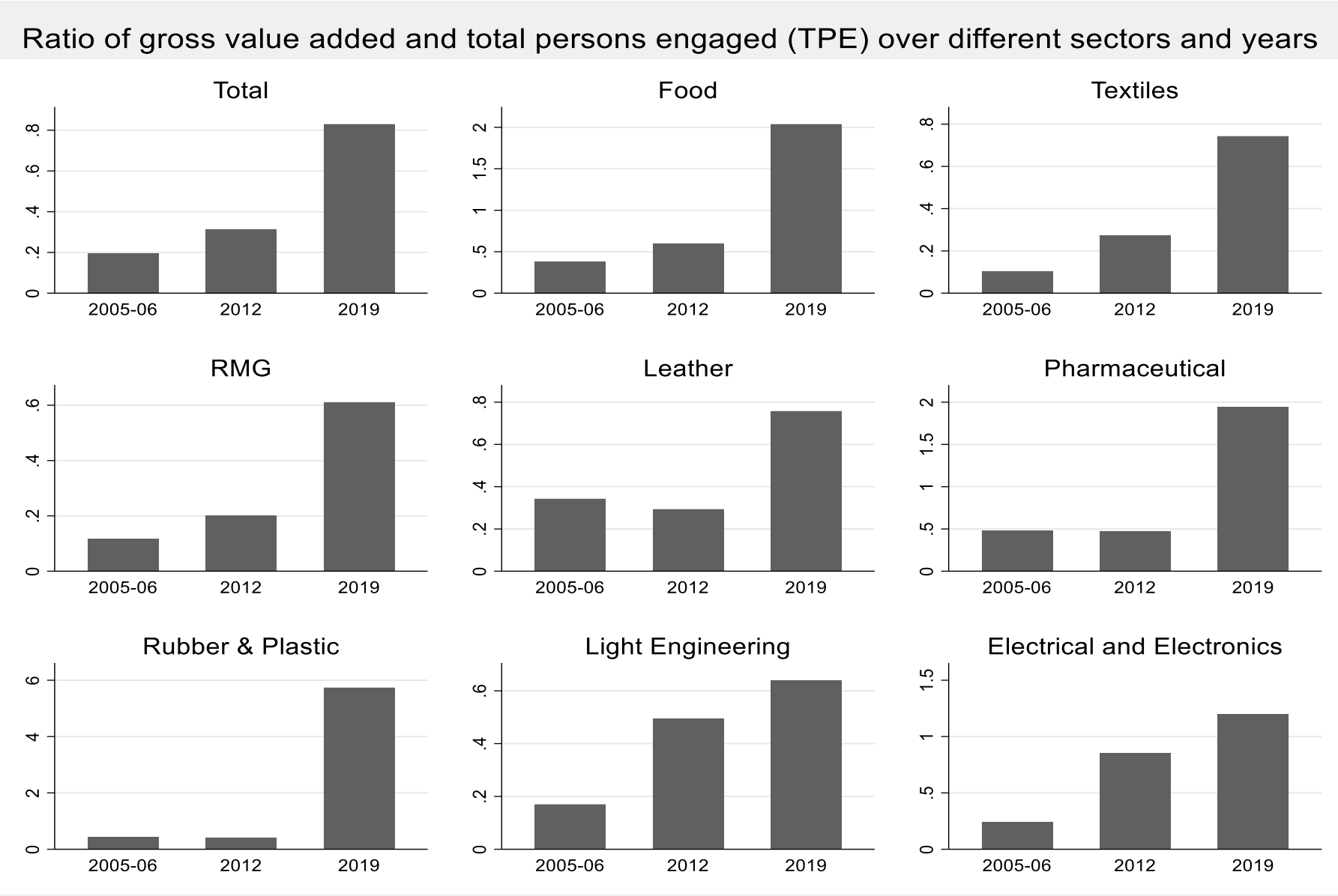
Q1: Labor productivity in industries: cross country trends



- BD is now above India but below Vietnam
- About 50% higher manufacturing output per worker in 2019 compared to 2010 in BD
- BD's trend is upward unlike India
- Vietnam surpassed BD and India from behind

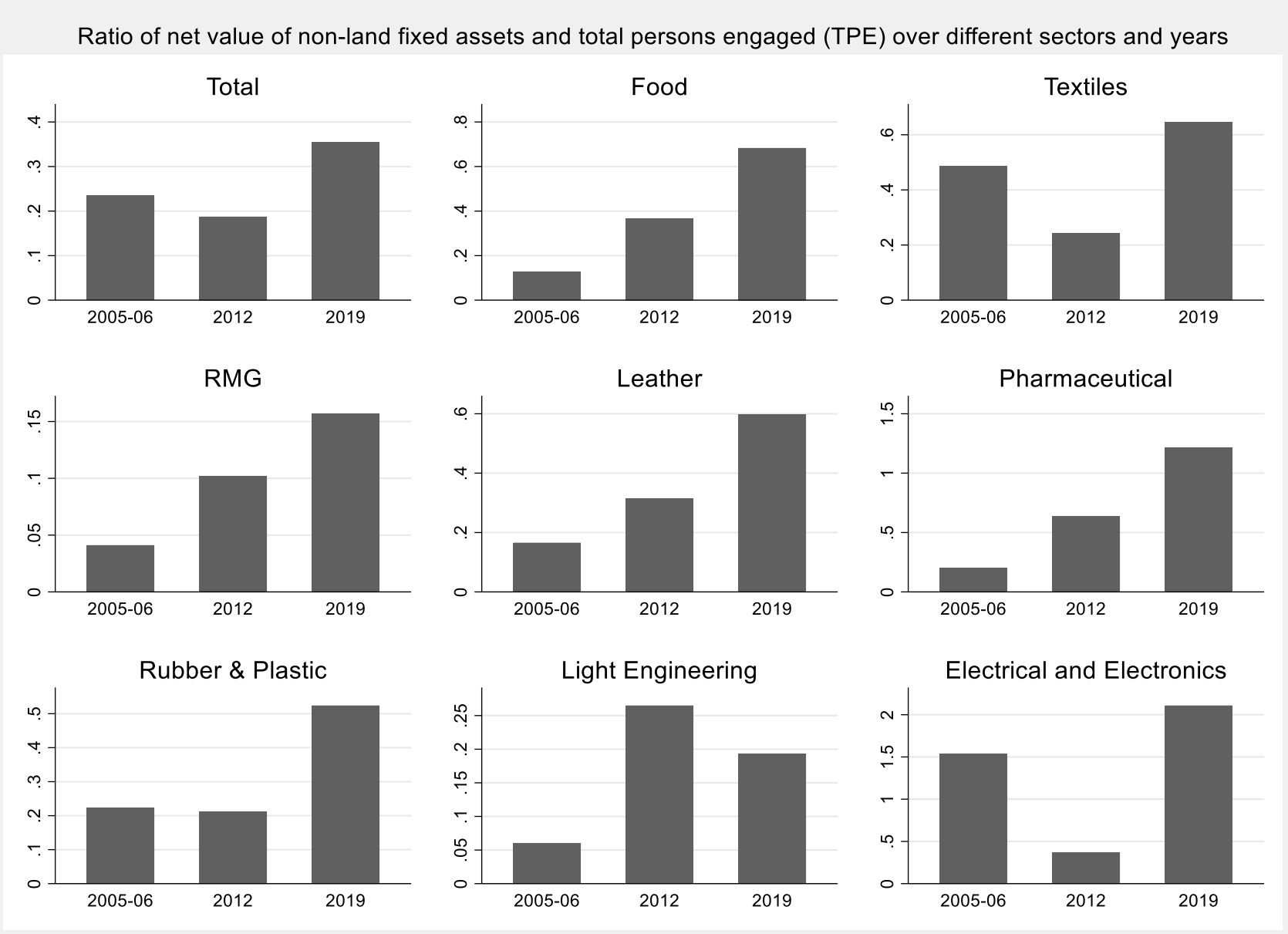
Data source: Asian Productivity Organization

Firm productivity (value added per worker, million BDT)



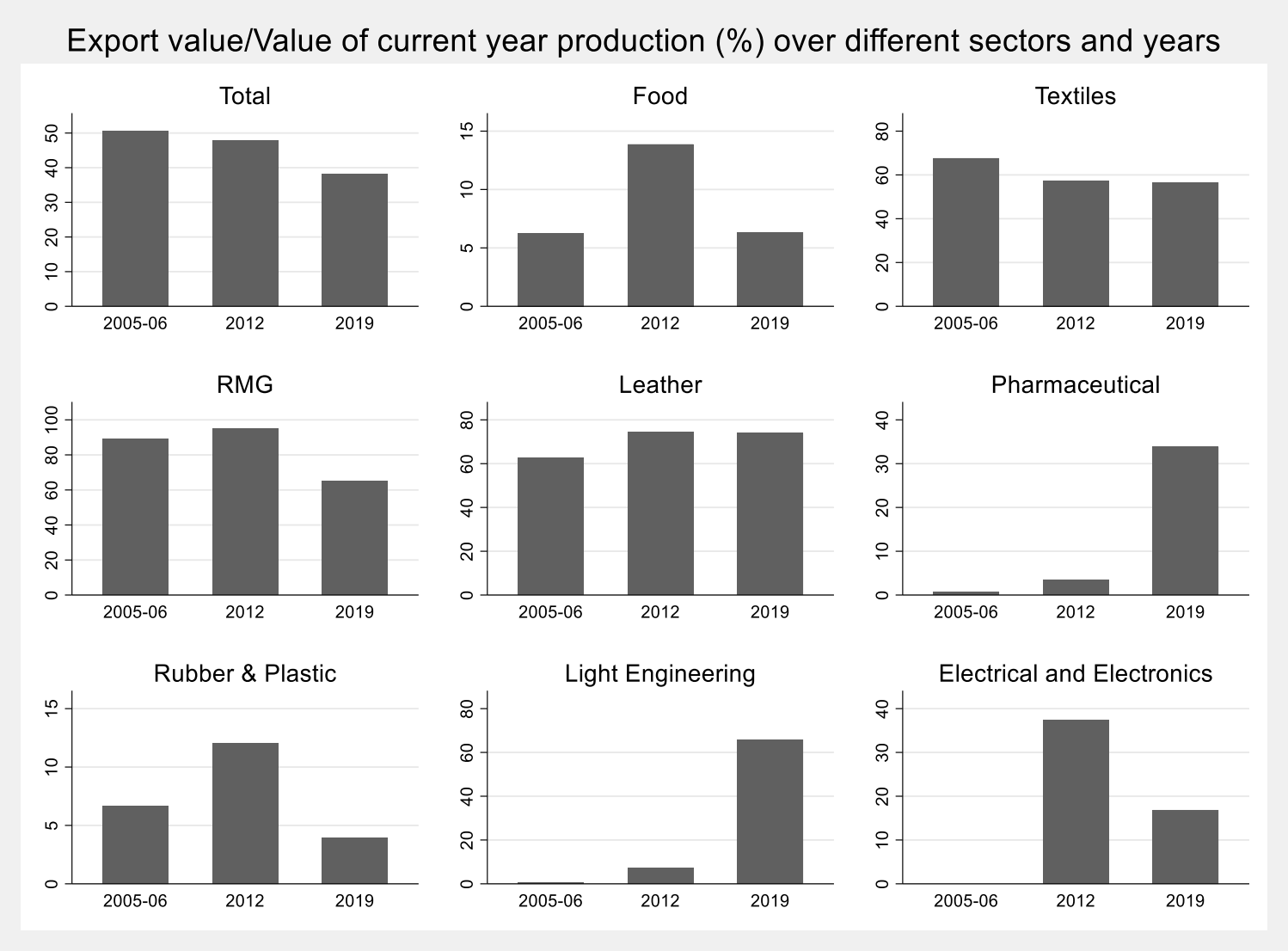
- Survey of Manufacturing Industries (SMI) data
- Value added per worker has increased substantially overtime
- The increase is lower for light engineering and electronics

Firm productivity (Capital per worker, million BDT)



- Capital per worker has also increased substantially overtime
- Increase in output per worker is primarily due to larger and better capital!
- Capital per worker decreased for light engineering!

Firm productivity (Export to output ratio)



Share of output exported has declined at the aggregate level

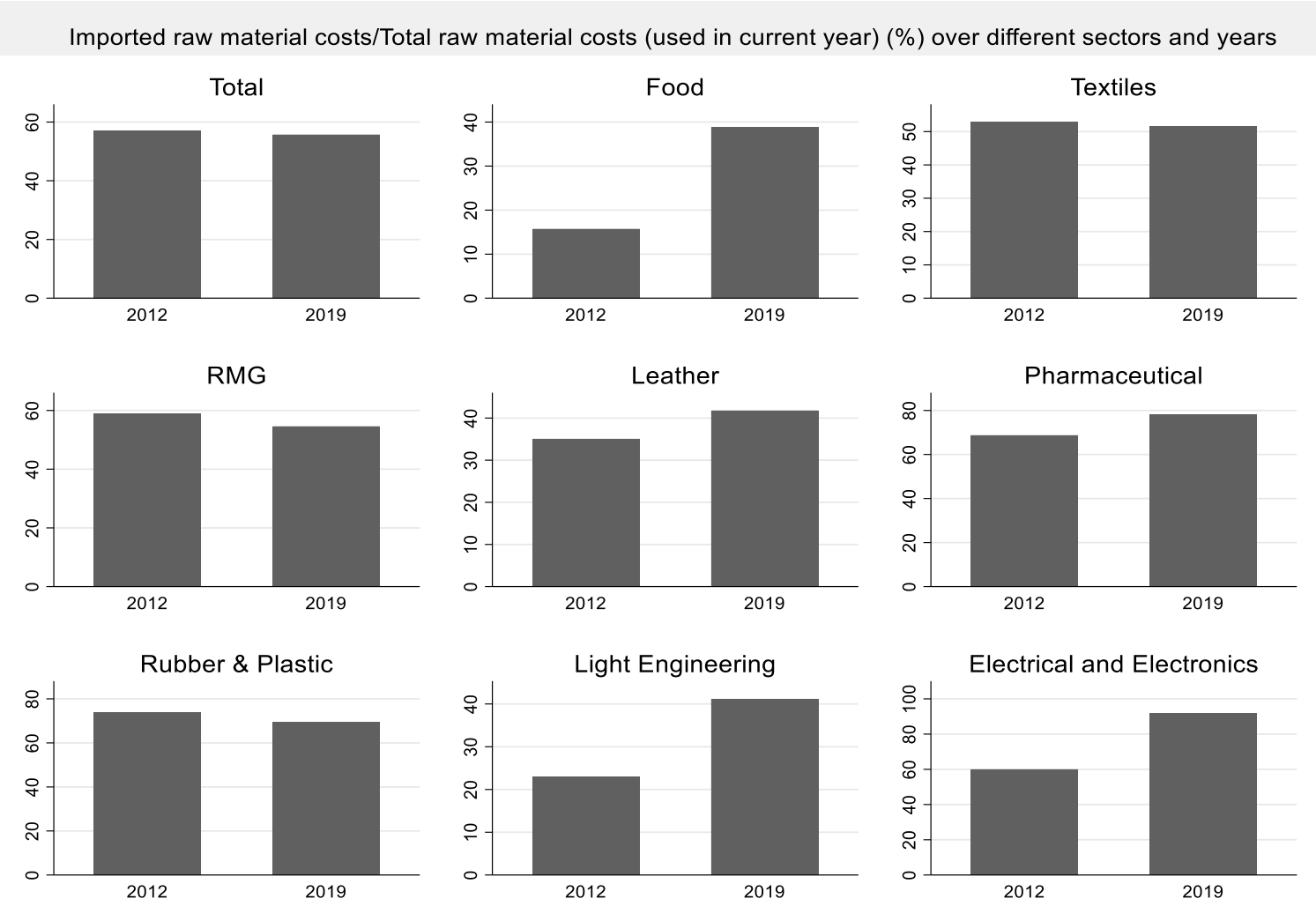
➔ Growth in domestic market for industrial products is higher than growth in export

➔ Domestic demand led industrialization

Agro, RMG, electronics responding to higher domestic demand

Light engineering is dubious!

Ratio of imported raw materials to total raw materials

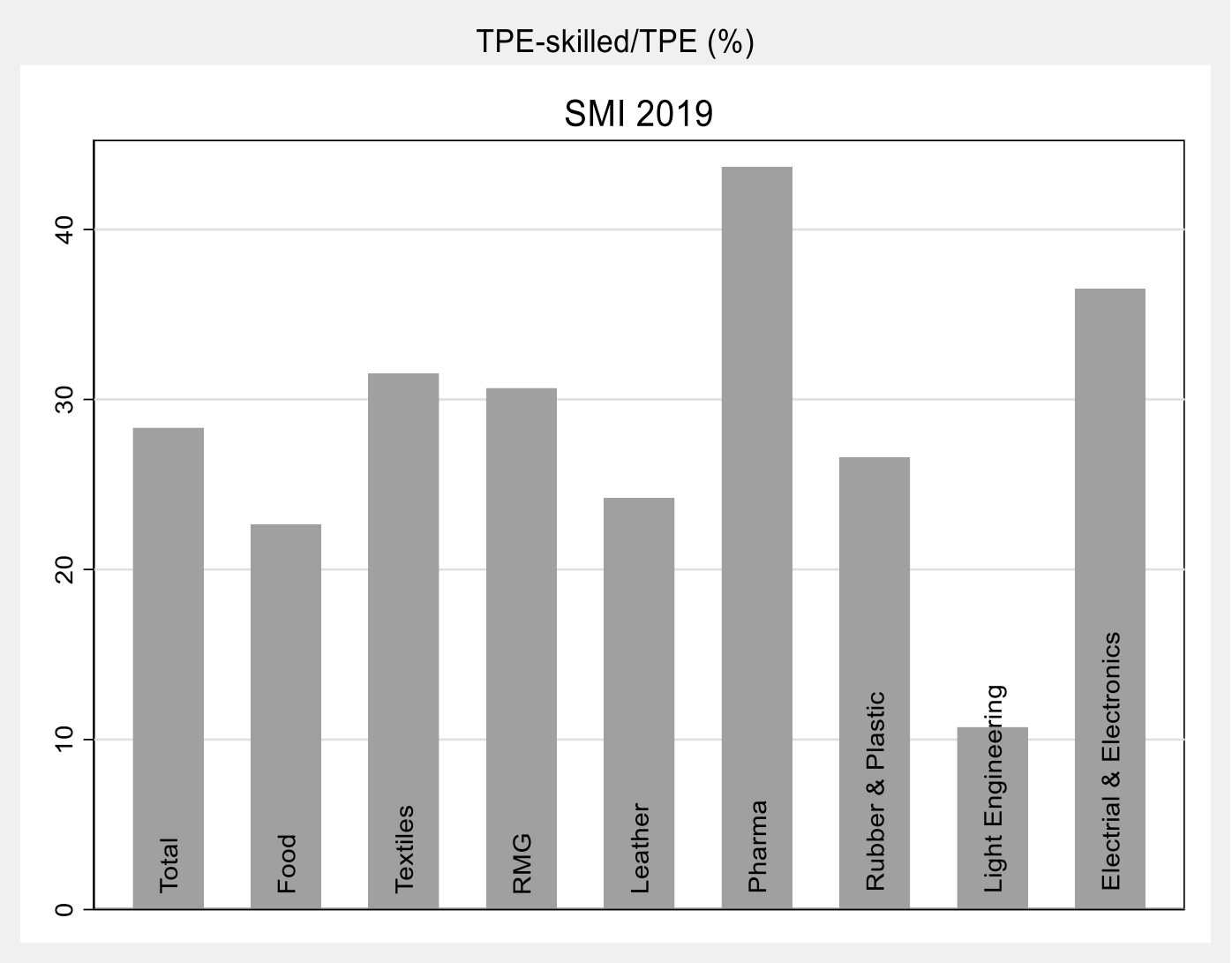


No change at the aggregate level!

Higher value addition in RMG!

Agro, LE and electronics importing new and better raw materials (because they are producing new goods!)

Skilled vs. non-skilled workers



Skilled workers: professionals/semi professinals

About 30% are skilled workers

Skilled workers are the lowest in LE and highest in Pharma

Q2: Skill and productivity

- Labor Market Study under Skills for Employment Investment Programme (SEIP)
- 10 Sectors (Agro-food industry, electronics, construction, light engineering, ICT, RMG, hotel and tourism, ship-building, leather and footwear, and nursing)
- Two industries with low value addition per worker: LE and electroncis
- Light Engineering: Capital machinery, construction equipment, spare parts for automobiles/factories/agro-processing, body for bus/car/van
- Electronics: Light, fan, battery, generators, electric meters

- Firm linked workers survey
- Firms: 190 ; Workers: 2398 [Workers per firm: 12.6]
- How firms were selected: Randomly picked from 4 regions:
  - Dhaka, Gazipur, Narayanganj
  - Chittagong
  - Bogura, Natore
  - Jessore, Khulna, Jhenaidah

Conceptual Issues: Skill Mismatch

- **Skill Mismatch**

Skill mismatch refers to various types of imbalances between skills offered (supplied) and skills needed (demanded) in the labor market.

- Various types of skill mismatch

➔ Skill Gap (below desired level of proficiency)
➔ Skill Shortage (not enough skilled workers in the market)
➔ Vertical Mismatch (over-education, under-education)
➔Horizontal Mismatch (field of study)

- Skill mismatch, in all of its forms, is a major source of labor underutilization.

Vertical mismatch (Over-education and Under-education)

- Measured at the level of individual's circumstances, over-education and under-education refer to the degree to which workers' education levels are above, below or poorly matched to those required for their current jobs.

Measurement:

- Comparison of desired and actual level of education level for an occupation

Horizontal Mismatch (mismatch of field of study)

- Horizontal Mismatch refers to situations where workers get employed in jobs that are neither related to their education, nor their skills and knowledge. The measure identifies any mismatch between the workers' primary field of study and the skill required for their current jobs.

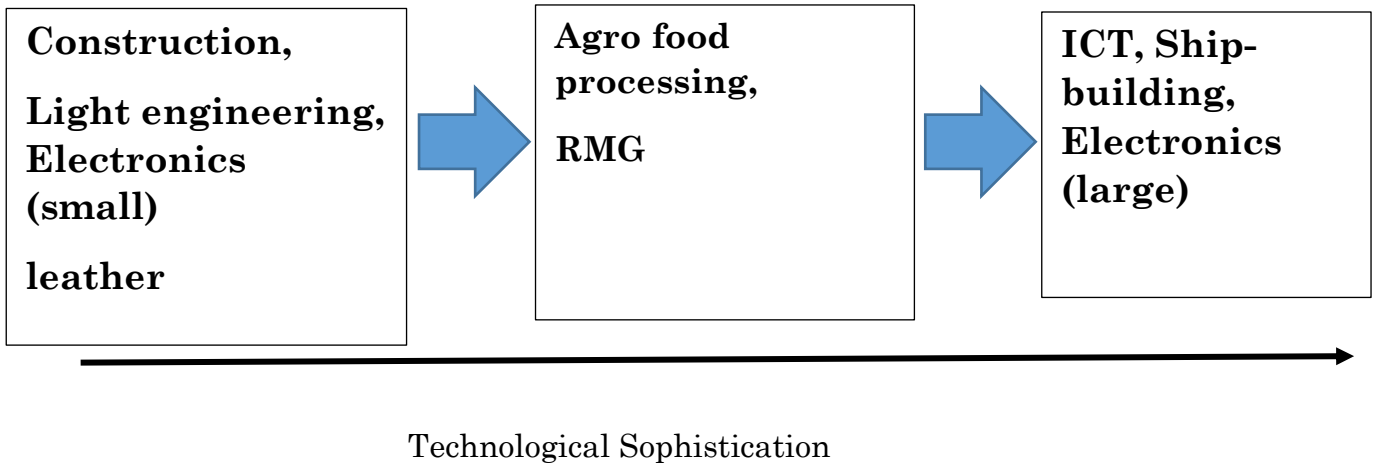
Measurement:

- Comparison of desired and actual level of field of education for an occupation

Characteristics of skill mismatch in BD labor market

Skill Gap

Stylized Fact 1: Skill gap increases with the level of technological sophistication of sectors



Construction

Occupation	Average Level of Skill (1-10)	Skill Gap (10 minus skill level)
Senior Management	9	1
Engineering Employees	8	2
Administrative Employees	8	2
Earth Worker, Piling and Foundation Worker	9	1
Pillar and Grade-beam Builder	9	1
Rod Binder	9	1
Mason	9	1
Sanitary Worker and Plumber	9	1
Painter	8	2
Electrician	8	2
Total	**8.5**	**1.5**

Light engineering

	Level of proficiency of the workers (1-10 scale)	Skill gap (10 minus level of proficiency)
Manager	7.84	2.16
Professionals	**7.00**	**3**
Technician	7.85	2.15
Sales and clerk	7.28	2.72
Crafts and other	**6.64**	**3.36**
Total	6.94	3.06

Electronics

	Level of proficiency of the workers (1-10 scale)	Skill gap (10 minus level of proficiency)
Manager	7.07	2.93
Professionals	**6.98**	**3.02**
Technician	**7.00**	**3.00**
Sales and clerk	7.62	2.38
Crafts and other	**6.16**	**3.84**
Total	6.45	3.55

Implications for skill program design?

➔ Gradually move towards technologically sophisticated industries

- **Stylized Fact 2**: Skill gap is higher for senior level technical positions

ICT Sector

Skill gap is higher at the senior level than the entry level!

➔ Lack of qualified senior professionals!

➔ Entry level professionals are not upgrading to the desired level!

Implications for skill program design?

➔ Interventions at the senior level

		Rate overall skills gap (1 to 5: low to high) (% of Firms)				
		Very low	Low	Moderate	High	Very high
Software Developer	Entry-level	59	17	18	5	0
	Intermediate or Experienced	34	24	32	7	2
	Senior-level or Supervisor	18	25	**38**	**18**	2
Mobile App Developer	Entry-level	51	18	24	6	1
	Intermediate or Experienced	22	17	**46**	11	3
	Senior-level or Supervisor	2	30	**43**	**21**	4
Game Developer	Entry-level	15	38	46	0	0
	Intermediate or Experienced	6	38	25	25	6
	Senior-level or Supervisor	17	25	25	17	17
Applications developers/programmers	Entry-level	64	20	8	8	0
	Intermediate or Experienced	38	19	34	8	1
	Senior-level or Supervisor	15	28	**38**	**18**	1
Web Dev. & Graphic & multimedia designers	Entry-level	64	16	13	5	2
	Intermediate or Experienced	43	12	32	11	2
	Senior-level or Supervisor	22	28	**33**	**16**	1
	Intermediate or Experienced	30	23	33	11	3
	Senior-level or Supervisor	17	24	33	21	5
	Intermediate or Experienced	38	31	26	4	1
	Senior-level or Supervisor	18	29	**37**	**15**	1
Data Scientist	Entry-level	56	18	10	15	0
	Intermediate or Experienced	39	16	**37**	5	3
	Senior-level or Supervisor	27	6	**39**	**21**	6

Skill Shortage

- **Stylized Fact 3:** White collar jobs (managers and professionals) are harder-to-fill occupations

Occupation (BSCO 1 digit)	Immediately	Less than a week	More than a week but less than a month	More than a month
Managers	9.43	18.11	**61.29**	**11.17**
Professionals	14.33	19.45	**55.63**	**10.58**
Technicians and associate professionals	25.23	28.97	43.93	1.87
Craft and related trades workers	38.89	19.44	38.89	2.78
Plant and machine operators, and assemblers	22.5	30	45	2.5
Elementary occupations	27.54	27.54	43.48	1.45
Total	16.25	21.69	53.99	8.07

Agro-processing Sector

Table: Time needed to fill up current vacancies in (percentage of firms)

Hard to fill vacancies (example 2)

Occupations	If a vacancy is occurred/posted/advertised today, how long will it take to fill up the position?			
	Almost instantly	Less than a week	More than a week and less than a month	A month or more than a month
Manager	0.74	10.29	**14.71**	**74.28**
Professional		5.56	**27.78**	**66.67**
Sales and clerk	3.51	42.11	00	54.38
Technician	4.44	31.11	33.33	31.11
Craft and others	4.35	19.9	54.35	21.39
Full sample	3.4	17.28	47	32.32

Light engineering Sector

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Light engineering Sector

Table: Time needed to fill up current vacancies in (percentage of firms)

Vertical mismatch

- Table: Desired and actual level of education (in Years)

Occupations	No. of reported workers	Desired level of education by the firms	Actual level of education by the firms
Managers	948	11.004	9.788
Professionals	22	14.318	12.409
Technicians and associate professionals	162	10.710	8.370
Service and sales workers	97	9.649	7.639
Craft workers and plant operators	992	9.252	6.184
Total	2221	10.174	8.007

Table: Incidence of vertical mismatch

Occupations	No. of reported workers	No. (share) of workers with vertical mismatch	No. (share) of workers with over-education	No. (share) of workers with under-education
Managers	948	625 (65.93)	190 (20.04)	435 (45.89)
Professionals	22	10 (45.45)	2 (9.09)	8 (36.36)
Technicians and associate professionals	162	131 (80.86)	16 (9.88)	115 (70.99)
Service and sales workers	97	60 (61.86)	11 (11.34)	49 (50.52)
Craft workers and plant operators	992	862 (86.90)	118 (11.90)	744 (75.00)
Total	2221	1688 (76.00)	337 (15.17)	1351 (60.83)

Table: Vertical mismatch and size of firms

	Large firms				Small firms			
Occupations	Workers	No (share) of workers with vertical mismatch	No (share) of workers with over-education	No (share) of workers with under-education	Workers	No (share) of workers with vertical mismatch	No (share) of workers with over-education	No (share) of workers with under-education
Managers	683	447 (65.45)	155 (22.69)	292 (42.75)	265	178 (67.17)	35 (13.21)	143 (53.96)
Professionals	12	5 (41.67)		5 (41.67)	10	5 (50.00)	2 (20)	3 (30.00)
Technicians and associate professionals	78	58 (74.36)	7 (8.97)	51 (65.38)	84	73 (86.90)	9 (10.71)	64 (76.19)
Service and sales workers	43	14 (32.56)	6 (13.95)	8 (18.60)	54	46 (85.19)	5 (9.26)	41 (75.93)
Craft workers and plant operators	295	244 (82.71)	36 (12.20)	208 (70.51)	697	618 (88.67)	82 (11.76)	536 (76.90)
Total	1111	768 (69.13)	204 (18.36)	564 (50.77)	1110	920 (82.88)	133 (11.98)	787 (70.90)

Horizontal mismatch

Table: Desired education background of workers by firms

Occupations	Workers	Share of workers for which firms desired science background	Share of workers for which firms desired humanities background	Share of workers for which firms desired commerce background	Share of workers for which firms desired no specific background
Managers	948	231 (24.37)	15 (1.58)	92 (9.70)	610 (64.35)
Professionals	22	4 (18.18)	0 (0)	17 (77.27)	1 (4.55)
Technicians and associate professionals	162	64 (39.51)	1 (0.62)	4 (2.47)	93 (57.41)
Service and sales workers	97	6 (6.19)	2 (2.06)	8 (8.25)	81 (83.51)
Craft workers and plant operators	992	138 (13.91)	4 (0.40)	6 (0.60)	844 (85.08)
Total	2221	443 (19.95)	22 (0.99)	127 (5.72)	1629 (73.35)

Table: Actual education background of the workers

Occupations	Workers	Share of workers with science background	Share of workers with humanities background	Share of workers with commerce background	Share of workers with no specific background
Managers	948	208 (21.94)	156 (16.46)	42 (4.43)	542 (54.17)
Professionals	22	4 (18.18)	2 (9.09)	10 (45.45)	6 (27.27)
Technicians and associate professionals	162	15 (9.26)	28 (17.28)	2 (1.23)	117 (72.22)
Service and sales workers	97	6 (6.19)	24 (24.74)	3 (3.09)	64 (65.98)
Craft workers and plant operators	992	21 (2.12)	35 (3.53)	6 (0.60)	930 (93.75)
Total	2221	254 (11.44)	245 (11.03)	63 (2.84)	1659 (74.70)

Table: Incidence of horizontal mismatch

Occupations	Workers	Share of workers with horizontal mismatch	Share of workers with horizontal mismatch (large)	Share of workers with horizontal mismatch (small)
Managers	948	303 (31.96)	216 (22.78)	87 (9.18)
Professionals	22	8 (36.36)	4 (18.18)	4 (18.18)
Technicians and associate professionals	162	72 (44.44)	37 (22.84)	35 (21.60)
Service and sales workers	97	29 (29.90)	17 (17.53)	12 (12.37)
Craft workers and plant operators	992	178 (17.94)	66 (6.65)	112 (11.29)
Total	2221	590 (26.56)	340 (15.31)	250 (11.26)

Summary of the extent of mismatch

- There is about 2 years gap between desired level of education and actual level of education (class X vs. class VIII)
- About three-fourth of the workers are subject to vertical mismatch. Under-education is more severe (60%).
- Incidence of under-education is the highest among the floor workers.
- Smaller firms are not getting educated workers (vertical mismatch is higher: 83% vs. 70%)
- These low-tech firms do not have preferences over subject (76%). Low horizontal mismatch 27%.
- Incidence of horizontal mismatch is the highest for the technicians and associate professionals (44%).

Impact of skill mismatch on labor productivity

- Firm-occupation level (monthly salary per occupation)

$$\log(wages) = \gamma_0 + \gamma_1\, Skill\ mismatch + \gamma_2 Occupation\ categories + \gamma_3\, Years\ of\ schooling + \gamma_4 size\ of\ firm + \gamma_5 \log\left(\frac{K}{L}\right) + u$$

Skill mismatch: skill gap, vertical mismatch, and horizontal mismatch

- Table: Skill gap and productivity [dep. variable: log(wages)]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Overall	Overall 1	Overall 2	Blue	White	Large	Small
Skill gap	**-0.349*** **	**-0.279** **	**-0.190** **	**-0.162***	**0.163**	**-0.207*** **	**0.034**
	(0.101)	(0.099)	(0.062)	(0.087)	(0.107)	(0.03)	(0.062)
Total workers			0.003***	0.002***	0.007***	0.002***	-0.017***
			(0.001)	(0.001)	(0.002)	(0.001)	(0.004)
Average education	0.032***	0.003***	0.040***	0.038***	0.035***	0.032***	0.003***
	(0.002)	(0.001)	(0.004)	(0.003)	(0.004)	(0.003)	(0.001)
Log (K/L)			0.133***	0.195***	0.077	0.102	0.007
			(0.046)	(0.058)	(0.049)	(0.069)	(0.045)
Constant	17.593***	20.678***	14.278***	15.339***	15.454***	14.468***	14.876***
	(0.085)	(0.119)	(0.577)	(0.723)	(0.582)	(0.870)	(0.454)
Observations	2,221	2,221	2,221	1,229	992	1,104	1,110
R-squared	0.019	0.179	0.308	0.266	0.277	0.256	0.235

- Proficiency: 1-10 scale
- Skill gap: 10 – proficiency level
- Average skill gap: 30%

Table: Vertical mismatch and productivity [dep. variable: log(wages)]

	(1)	(2)	(3)	White	Blue	Large	Small
Vertical mismatch	-0.028						
	(0.020)						
Over-education		**0.091*** **					
		(0.020)					
Under-education			**-0.081*** **	0.006	**-0.163*** **	**-0.100*** **	-0.063**
			(0.025)	(0.003)	(0.035)	(0.029)	(0.031)
Average education	-0.024***	-0.026***	-0.030***	0.003***	-0.044***	-0.023***	-0.031***
	(0.003)	(0.003)	(0.003)	(0.001)	(0.005)	(0.005)	(0.003)
Total workers	0.000***	0.000***	0.000***	-0.000***	0.000***	0.000***	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Log(K/L)	0.028***	0.025***	0.025***	0.000	0.040***	0.024***	0.006
	(0.007)	(0.007)	(0.006)	(0.001)	(0.010)	(0.007)	(0.010)
Constant	11.521***	11.546***	11.642***	10.527***	11.610***	11.700***	11.647***
	(0.091)	(0.089)	(0.091)	(0.019)	(0.146)	(0.106)	(0.148)
Observations	2,221	2,221	2,221	992	1,229	1,104	1,110
R-squared	0.833	0.835	0.836	0.128	0.734	0.894	0.690

Table: Horizontal mismatch and wages

[dep. variable: log(wages)]

		White	Blue	Large	Small
Horizontal mismatch	-0.052***	0.004	-0.086***	-0.028	**-0.084*** **
	(0.019)	(0.002)	(0.029)	(0.020)	(0.027)
Average education	-0.022***	0.002***	-0.031***	-0.015***	-0.025***
	(0.003)	(0.001)	(0.004)	(0.003)	(0.004)
Total workers	0.000***	-0.000***	0.000***	0.000***	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Log(K/L)	0.028***	-0.000	0.047***	0.027***	0.008
	(0.007)	(0.001)	(0.011)	(0.007)	(0.010)
Constant	11.492***	10.537***	11.339***	11.538***	11.562***
	(0.089)	(0.019)	(0.142)	(0.101)	(0.149)
Observations	2,221	992	1,229	1,104	1,110
R-squared	0.834	0.124	0.727	0.891	0.692

Summary of regression results

- Skill gap, under education and subject mismatch are negatively associated with productivity (wages)

- Impact is higher for smaller firms! ➔ overall low productivity

Q3: Who are the skilled workers?

- Cognitive skill (e.g. literacy, numeracy)
- Socio-emotional skill (e.g., set of soft skills)
- Task relates skill (craftsmanship)

Indirect measure of skill: Managers'/owners' perception about the proficiency level of the workers of a particular occupation

- Managers/owners were asked to scale the level of proficiency scale on 1-10 scale (higher value implies more proficient)
- Converted 1-10 scale to z-score with mean= 0 and std. dev. =1

Understanding of how skill is formed is critical for policy!

- Skill production function:
- Skill = f(education, training, experience)
- Which factor is more important and what is its policy implications?

- $Skill\ measure\ _{ij} = \beta_0 + \beta_1\ education + \beta_2\ training + \beta_3\ experience + \beta_4\ demographics\ + \beta_5\ Occupation\ categories + \beta_6\ physical\ labor + \beta_7\ health + \beta_8\ relationship\ with\ manager + \theta_j + u_{ij}$

Table: Skill Production Function (Dependent variable: Measure of skill (z-score))

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5
Years of education		-0.002			0.006
		(0.006)			(0.006)
Vocational training (dummy)			**0.129***		**0.130***
			(0.076)		(0.071)
Months of experiences				**0.003*****	**0.003*****
				(0.000)	(0.000)
Personal relationship with manager (z-score)	0.377***	0.378***	0.375***	0.324***	0.320***
	(0.038)	(0.038)	(0.037)	(0.034)	(0.033)
Gender (male)	-0.019	-0.016	-0.020	-0.018	-0.027
	(0.110)	(0.112)	(0.110)	(0.091)	(0.092)
Age (years)	0.011***	0.011***	0.011***	-0.003	-0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Parents' education	-0.006	-0.006	-0.007	0.007	0.006
	(0.006)	(0.007)	(0.006)	(0.006)	(0.006)
Extent of physical labor	-0.068***	-0.068***	-0.069***	-0.054**	-0.053**
	(0.025)	(0.025)	(0.025)	(0.023)	(0.023)
Chronic diseases (dummy)	0.262***	0.262***	0.261***	0.096	0.094
	(0.075)	(0.075)	(0.075)	(0.067)	(0.068)
Control for occupational categories	Yes	Yes	Yes	Yes	Yes
Observations	2,331	2,331	2,331	2,331	2,331
R-squared	0.173	0.173	0.174	0.268	0.270
Number of firms	190	190	190	190	190

- Experience is the key determinant
- Vocational training matters
- Years of education has no role

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Electronics	Light Engineering	Larger firms (output)	Smaller firms (output)	Larger firms (employment)	Smaller firms (employment)	Blue collar jobs	Non-blue collar jobs
Years of education	0.012	-0.002	0.002	0.013	0.005	0.010	0.011	-0.010
	(0.010)	(0.009)	(0.008)	(0.011)	(0.007)	(0.011)	(0.008)	(0.010)
Vocational training (dummy)	**0.221****	0.038	0.048	**0.184***	0.064	**0.213***	0.109	**0.235***
	(0.091)	(0.083)	(0.079)	(0.108)	(0.075)	(0.121)	(0.095)	(0.139)
Experiences (months)	**0.003*****	**0.003*****	**0.003*****	**0.004*****	**0.003*****	**0.004*****	**0.004*****	**0.003*****
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Relationship with workers (z-score)	0.442***	0.199***	0.261***	0.412***	0.328***	0.320***	0.360***	0.204***
	(0.048)	(0.040)	(0.043)	(0.053)	(0.044)	(0.050)	(0.035)	(0.071)
Gender (male)	0.516***	-0.219**	-0.101	0.204	0.004	-0.082	-0.020	-0.130
	(0.115)	(0.103)	(0.100)	(0.222)	(0.111)	(0.161)	(0.104)	(0.151)
Age (years)	-0.002	-0.004	-0.002	-0.008*	-0.002	-0.005	-0.005*	0.001
	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)
Parental education	-0.001	0.011	0.013	-0.005	0.005	0.004	0.004	0.007
	(0.009)	(0.009)	(0.009)	(0.010)	(0.008)	(0.011)	(0.008)	(0.012)
Extent of physical labor	-0.028	-0.125**	-0.034	-0.057*	-0.024	-0.079**	-0.044	-0.108**
	(0.026)	(0.047)	(0.031)	(0.033)	(0.031)	(0.034)	(0.030)	(0.051)
Chronic diseases	0.108	0.068	0.085	0.112	0.101	0.067	0.066	0.320**
	(0.077)	(0.140)	(0.112)	(0.091)	(0.093)	(0.104)	(0.081)	(0.136)
Control for occupational categories	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,405	926	1,170	1,147	1,182	1,100	1,850	481
R-squared	0.328	0.225	0.242	0.309	0.290	0.263	0.262	0.193
Number of firms	117	73	92	98	90	98	189	142

Table: Impact heterogeneity (Dependent variable: Skill measures (z-score))

Blue collar jobs: Craft workers and plant operators

Vocational training matters more in smaller firms and for non-blue collar jobs

VARIABLES	PSC larger firms	PSC smaller firms	JSC larger firms	JSC smaller firms	SSC larger firms	SSC smaller firms
PSC or class 5 passed	0.040	0.076				
	(0.066)	(0.064)				
JSC or class 8 passed			**0.144****	0.059		
			(0.061)	(0.077)		
SSC passed					**0.185*****	**0.132***
					(0.067)	(0.073)
Vocational training (dummy)	0.050	0.184*	0.044	0.187*	0.040	0.184*
	(0.079)	(0.107)	(0.079)	(0.108)	(0.080)	(0.111)
Experiences (months)	0.003***	0.004***	0.003***	0.004***	0.003***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Relationship with workers (z-score)	0.260***	0.415***	0.256***	0.415***	0.263***	0.413***
	(0.043)	(0.053)	(0.043)	(0.053)	(0.042)	(0.052)
Gender (male)	-0.098	0.215	-0.110	0.216	-0.094	0.217
	(0.099)	(0.222)	(0.102)	(0.224)	(0.098)	(0.224)
Age (years)	-0.002	-0.008*	-0.002	-0.008*	-0.002	-0.008*
	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)
Extent of physical labor	-0.034	-0.060*	-0.030	-0.059*	-0.026	-0.055*
	(0.031)	(0.033)	(0.031)	(0.033)	(0.031)	(0.033)
Chronic diseases	0.085	0.120	0.076	0.114	0.073	0.110
	(0.112)	(0.090)	(0.112)	(0.090)	(0.113)	(0.090)
Observations	1,170	1,147	1,170	1,147	1,170	1,147
R-squared	0.243	0.309	0.247	0.309	0.247	0.310
Number of firms	92	98	92	98	92	98

Robustness checks with alternate education vars.

Table: Impact heterogeneity by education and firm size (Dependent variable: Skill measures (z-score))

Education matters mostly if the workers are SSC passed

Impact is more pronounced for larger firms

Summary of results

- Experience is most significant predictor of skill level
- **Education matters** mostly if the workers are at least SSC passed in **larger firms**
- **Vocational training** matters more in **smaller firms**!

Conclusion and policy implications

What we have learnt so far:

➔ Value addition per worker has increased overtime but primarily due to new and better capital!

➔Skill gap, vertical mismatch (lower than desired level education) and horizontal mismatch (different field of study from the desired) lowers productivity

➔How to improve skill: what should be the entry point of intervention?

➔Experience is the key determinant of skill formation (not a policy variable!)

➔ If we want growth to be driven by large firms: Education

➔IF we want growth to be driven by smaller firms: Vocational training

➔ We need both!