Minimum Wage Shock and Prices

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Motivation

- Minimum Wage as a Policy Tool
  - Widely used as a govermnent intervention to protect low-wage workers.
  - Impact on labor markets and firms has been a key area of debate in economics.
  - Previous studies have focused on employment effects, but there is less consensus on the broader firm-level impacts, especially on prices.

Aim

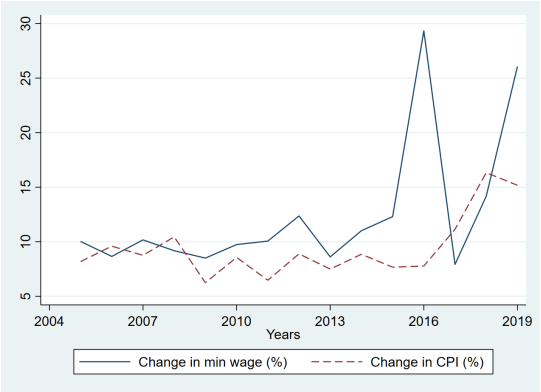
- Aim of this paper is to investigate the effect of minimum wage increase in 2016 on firm level outcomes in Turkish manufacturing.
- We focus on prices, profit rate, employment, sales and production.

Contribution

- There are some evidence documenting the firm level effects of minimum wage shock for developed countries (Lemos, 2008, Draca et al, 2011; Cengiz et. al, 2019; Ashenfelter and Jurajda, 2022; Link, 2022; Agarwal et. al, 2024)
- This study is a first attempt to provide causal response of firms when they face a labor cost shock in a developing country context.
- We also take account the market concentration of industries firms operate.
- We cover all product bundles of firms. Few studies had such granular data. We measure unit prices (sales/quantity).

Turkey's Unique Context (2016)

- In January 2016, Turkey implemented a 33.5% increase in the minimum wage—a significant and sudden policy shift.
- The share of minimum workers is around 40%.
- The large-scale shock provides a natural experiment to study how firms adjusted in response, beyond just employment.



Identification -firm-product level data

Product-level estimation where, f, p, and t represent firms, products, and time respectively,

$$\Delta \log(price_{fpt}) = \alpha + \beta \text{exposure}_f \times D_{\text{year}>2015} + D_f + D_t + D_{fp} + D_{pt} + D_{kt} + D_{rt} + \varepsilon_{fpt}$$

- exposure: 1) share of minimum wage earners to total earners in 2015,2) the ratio of the sum of daily wages below the 2016 daily minimum wage to the gross wage bill for each firm.
- firm, time, product x firm, product x time, sector x time and region x time fixed effects.
- We also calculate the quality adjusted prices following Khaldelwal et al. (2013).

Identification -firm level data

Firm-level estimations

$$y_{ft} = \alpha + \beta \text{exposure}_f \times D_{\text{year}>2015} + D_f + D_t + D_{kt} + D_{rt} + \varepsilon_{fpt}$$

where y_{ft} is log weighted unit prices, log sales, log production value, log employment, and profit rate. Prices at the firm level are calculated as a weighted average where weights are the sales share of each product produced by firm.

Firm, time, sector x time and region x time fixed effects.

Data

We utilize three administrative and one survey dataset provided by TurkStat from 2009 to 2019. Common firm identifier allows us to merge four of them.

1. PRODCOM survey provides information on sales, quantity, production value for 10 digit products of firms with 20 and above employees in manufacturing and mining industry.
2. Employer-employee dataset by Social Security Institute (SSI) have information on workdays, wage, occupation and firm employed on monthly basis for each firm from.
3. Balance-sheet dataset by Ministry of Treasure and Finance gives us the data of all firms' sales, liabilities, profits etc.
4. Trade dataset to identify the firm-product exporter pairs
5. Finally, we obtain industry and province information of firms using Industry and Service Statistics dataset by TurkStat.

Data

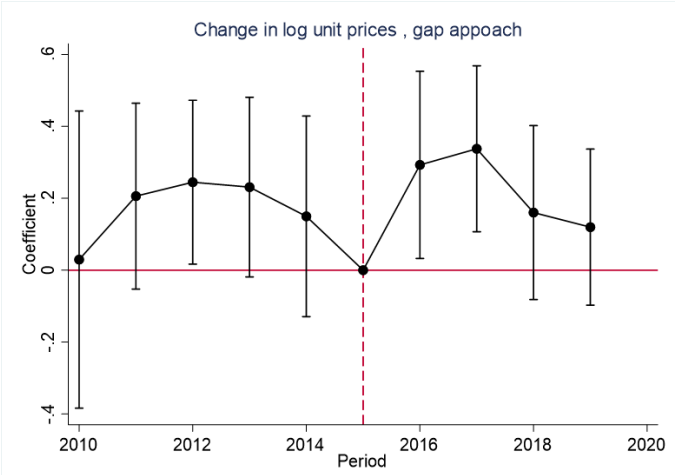
- We focus on manufacturing industry firms with 20 and more employees.
- We restricted the firms active in 2015.
- We have 30,215 firms in sample for the period between 2009 and 2019

Results -firm-product level sample, price model

Dependent Variable:	$\Delta log(price_{fpt})$	$\Delta log(adjusted\ price_{fpt})$
$Exposure_f \times D_{year>2015}$	0.1203***	0.1966***
	(0.0123)	(0.0447)
Fixed-effects		
Firm	Yes	Yes
Year	Yes	Yes
Firm × product	Yes	Yes
Product × year	Yes	Yes
Industry × year	Yes	Yes
Province × year	Yes	Yes
Fit statistics		
Observations	325,464	287,689
R^2	0.3117	0.3767

Clustered (Firm) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Event study -firm-product sample yearly estimates, unit prices



Heterogeneous price effect -main product

Dependent Variable:	$\Delta log(price_{fpt})$	$\Delta log(adjusted\ price_{fpt})$
$Exposure_f \times D_{year>2015}$	0.0941*	0.2280***
	(0.0558)	(0.0284)
Fixed-effects		
Firm	Yes	Yes
Year	Yes	Yes
Industry × year	Yes	Yes
Province × year	Yes	Yes
Fit statistics		
Observations	126,034	130,130
R^2	0.16107	0.33325

Clustered (Firm) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Heterogeneous price effect -exporter vs non-exporter firm-product pairs

	Exporter		Non-exporter	
Dependent Variable:	$\Delta log(price_{fpt})$	$\Delta log(adjusted\ price_{fpt})$	$\Delta log(price_{fpt})$	$\Delta log(adjusted\ price_{fpt})$
$Exposure_f \times D_{year>2015}$	0.0321	0.1525*	0.1558**	0.1783***
	(0.1271)	(0.0819)	(0.0720)	(0.0522)
Fixed-effects				
Firm	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Firm × product	Yes	Yes	Yes	Yes
Product × year	Yes	Yes	Yes	Yes
Industry × year	Yes	Yes	Yes	Yes
Province × year	Yes	Yes	Yes	Yes
Fit statistics				
Observations	96,156	80,413	259,810	207,276
R^2	0.47513	0.33325	0.40385	0.43270

Clustered (Firm) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

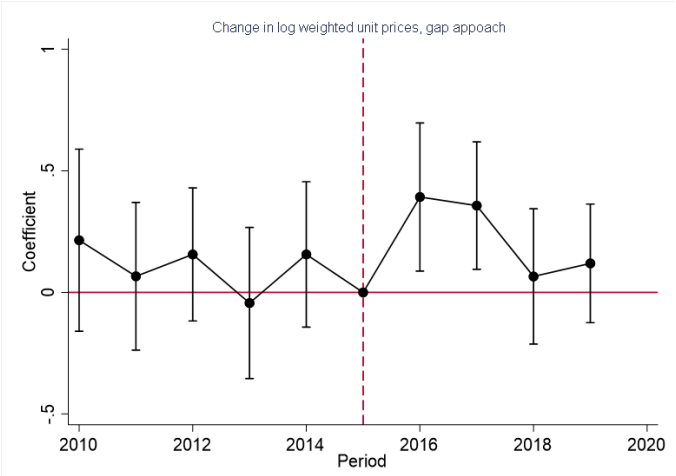
Results -firm level sample, price model

Dependent Variable:	$\Delta log(price_{ft})$	$\Delta log(adjusted\ price_{fpt})$
$Exposure_f \times D_{year>2015}$	0.1795^{***}	0.2877^{***}
	(0.0622)	(0.0447)
Fixed-effects		
Firm	Yes	Yes
Year	Yes	Yes
Industry × year	Yes	Yes
Province × year	Yes	Yes
Fit statistics		
Observations	164,827	145,953
R^2	0.1294	0.1943

Clustered (Firm) standard-errors in parentheses

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Event study -firm level sample yearly estimates, weighted unit prices



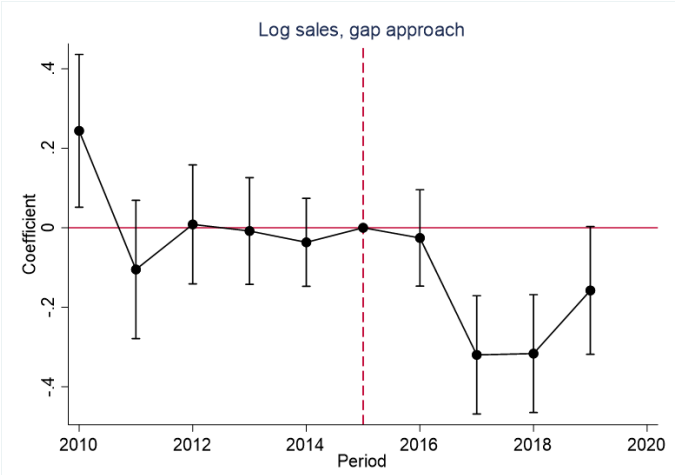
Results -firm level sample, other firm outcomes

Dependent Variable:	$log(sales_{ft})$	$log(production\ value_{ft})$	$log(employment_{ft})$	$(profit/sales)_{ft}$
$Exposure_f \times D_{year>2015}$	-0.2006***	-0.2525***	-0.4502***	-0.0233***
	(0.0564)	(0.0565)	(0.0391)	(0.0087)
Fixed-effects				
Firm	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Industry × year	Yes	Yes	Yes	Yes
Province × year	Yes	Yes	Yes	Yes
Fit statistics				
Observations	217,771	217,268	217,604	200,480
R^2	0.8817	0.8754	0.8915	0.5275

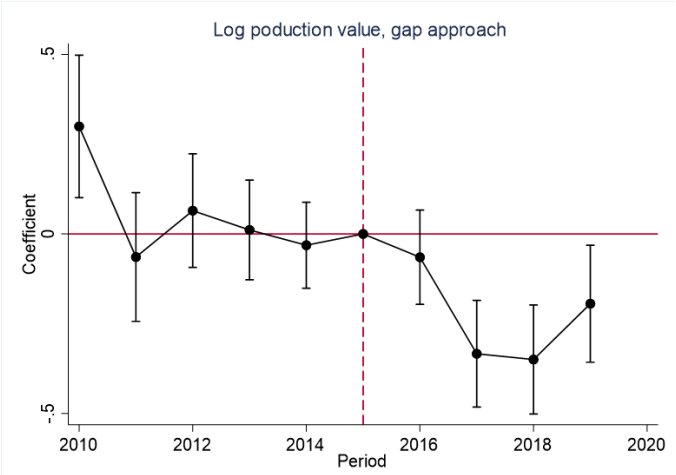
Clustered (Firm) standard-errors in parentheses

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

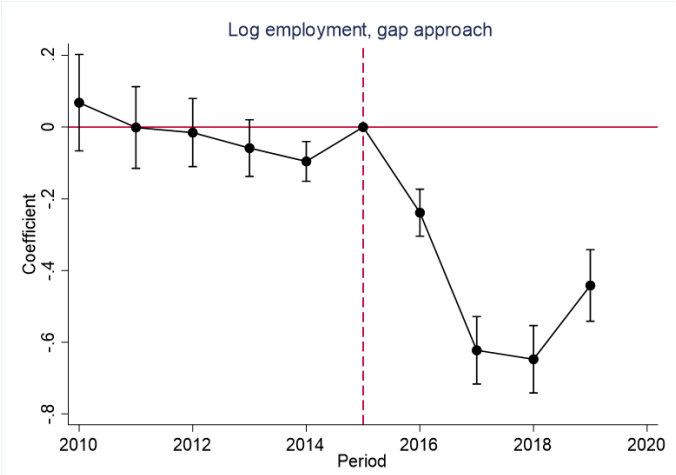
Event study -firm level sample yearly estimates, sales



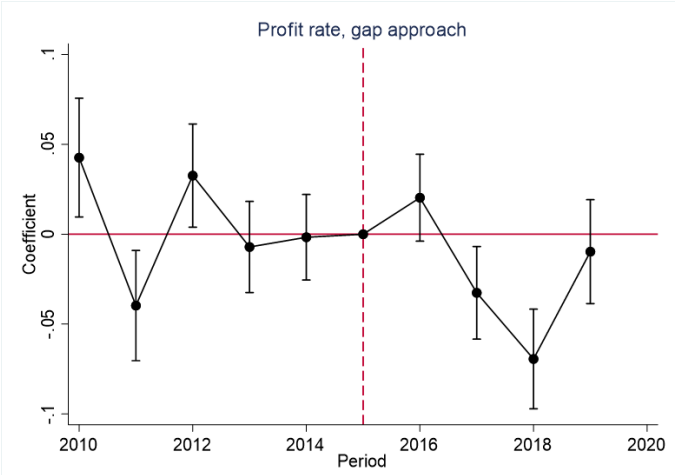
Event study -firm level sample yearly estimates, production value



Event study -firm level sample yearly estimates, employment



Event study -firm level sample yearly estimates, profit rate



Results -firm level sample, price model with market concentration

Dependent Variable:	$\Delta log(price_{ft})$	$\Delta log(adjusted\ price_{fpt})$
$Exposure_f \times D_{year>2015}$	0.1131*	0.2740***
	(0.0672)	(0.0486)
$Exposure_f \times D_{year>2015}$	2.105**	0.4341
HHI_k	(0.8228)	(0.6316)
Fixed-effects		
Firm	Yes	Yes
Year	Yes	Yes
Industry $\times$ year	Yes	Yes
Province $\times$ year	Yes	Yes
Fit statistics		
Observations	164,827	145,953
R^2	0.1294	0.1943

Clustered (Firm) standard-errors in parentheses

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Results -firm level sample, other firm outcomes, market concentration

Dependent Variable:	$log(sales_{ft})$	$log(production\ value_{ft})$	$log(employment_{ft})$	$(profit/sales)_{ft}$
$Exposure_f \times D_{year>2015}$	-0.1777***	-0.2355***	-0.4038***	-0.0092
	(0.0633)	(0.0640)	(0.0438)	(0.0097)
$Exposure_f \times D_{year>2015}$	-0.7113	-0.5271	-1.4430**	-0.4423***
HHI_k	(0.9390)	(0.9481)	(0.6080)	(0.1349)
Fixed-effects				
Firm	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Industry × year	Yes	Yes	Yes	Yes
Province × year	Yes	Yes	Yes	Yes
Fit statistics				
Observations	217,771	217,268	217,604	200,480
R^2	0.8817	0.8754	0.8915	0.5276

Clustered (Firm) standard-errors in parentheses

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Conclusion

- We find a positive effect of the minimum wage increase on prices in Turkish manufacturing (1 percentage point increase in labor cost leads to 0.12 percentage increase in prices.)
- Positive effect is also evident in weighted firm-level prices
- Firms in less competitive industries are more likely to reflect this labor cost shock to their prices.
- Minimum wage shock also affect the other firm outcomes (sales, production, employment and profits) negatively.

Conclusion

T H A N K Y O U!