The effects of minimum wages on gender pay gap in APEC Economies

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Causes for wage inequality

- Changes in labor demand:
  - Skill biased technological change
  - Job polarization
  - International trade and participation in global value chains
- Changes in labor supply:
  - Higher education
  - Ageing (unskilled workers); low birth rates; immigration
- Labor market institutions and active labor policies:
  - Minimum wages; unionization rate;

The effects of an increase in minimum wages on the wage distribution (mechanisms)

- A spike effect
  - Wages below the new minimum wage create a spike at the new minimum wage ➔ truncate the lower tails of the wage (earnings) distribution
- Spillover effects
  - An increase in minimum wages raises other wages which are greater than the minimum wage in the earnings distribution.
    - If employers substitute lowest skill workers for somewhat higher skill workers in response to the increase in the minimum wage, then wages of workers earning above the minimum wage may increase due to the increase in the demand
    - If employers want to maintain wage differences among skill levels (efficient wage hypothesis)
- Affects wages in the lower tails of the earnings distribution

The effects of the minimum wage on the gender pay gap (Key idea)

- Women are disproportionately represented in the lower tail of the wage distribution.
- To the extent that an increase in the minimum wage affects the lower tail of the wage distribution, women may benefit more from the increase in the minimum wage.
- Empirical question: How much?

Our method: different from previous studies

- Construct unbalanced panel data at the country level.
- Take into account of the effects of macroeconomic variables on the wage distribution, while previous studies mainly use micro-level data within a country or a region.
  - Advantage: Obtain variations in minimum wages over time as well as across countries.
  - On the other hand, previous studies use time series data to obtain variation in the minimum wages since the same minimum wage applies within a country in each period.
  - Or, previous studies must identify groups which are affected differently by a change in the minimum wage. However, identification methods are in general arbitrary and may suffer from endogeneity problems
  - Advantage: take into account of the effects of macroeconomic variables which reflect difference in wage inequalities across countries.

Literature Review: Effects of the minimum wage on the earnings distribution

- Study the causes for the significant increase in wage inequalities in the period of 1979-88 in the U.S.
  - ➢DiNardo et al. (1996): nonparametric method
  - ➢Lee (1999): state panel data (minimum wage to median wage)
  - ➢Autor et al. (2016): state panel data (minimum wage to median wage)

➔the decrease in the real value of federal minimum wages explains the significant increase in wage inequalities.

Literature Review : Effects of the minimum wage on the gender pay gap

- Blau and Kahn (1997): the sharp decline in the NMW between 1979 and 1988 in the US is one of the important institutional factors explaining the widening gender gap during this period.
- Robinson (2002): no evidence that the NMW in the UK affected the gender wage gap in the lower part of the wage distribution.
- Robinson (2005): some evidence of a narrowing of the gender pay gap in regions where women comprise a relatively large share of the low paid workers
- McGuinness et al. (2008): the part-time gender wage gap is decreased by the NMW in Ireland.
- Ganguli and Terrell (2005, 2009): the doubling of the NMW between 1997 and 2003 contributed to the closing of the gender wage gap in Ukraine.
- Bargain et al. (2018): A significant reduction of the gender gap at low wages is observed after the introduction of the minimum wage in Ireland while there is hardly any change in the UK.

Studies that use panel data at the country level

- Newmark and Wascher (2004): study the effects of the minimum wage on youth employment using OECD data.
- Koske et al. (2012): study the effects of macroeconomic variables including labor market institutions and policies on the wage inequality using OECD data.

Data

- OECD Statistics and ILO database
- Due to the data availability, we construct a sample which includes APEC member economies as well as OECD member countries that are under the statutory minimum wage system
- In particular, the sample includes the following APEC member economies: Australia, Canada, Chile, Japan, Korea, Mexico, New Zealand, United States
- Construct unbalanced panel data at the country level using the yearly data of 1990-2017

Empirical Model

- $\ln Y_{it} = \beta_1 \ln MWM_{it}$
- $+\beta_2 (\ln MWM_{it})^2$
- $+\gamma \ln X_{it}$
- $+\alpha_i + \delta_t + \varepsilon_{it}.$

Empirical Model

1. Y_{it} includes several earnings dispersion measures
   - W_5^i/W_1^i : the ratio of fifth to first deciles of the distribution of gross earnings of full-time dependent employees for male and female samples, respectively.
   - W_9^i/W_5^i : the ratio of ninth to fifth deciles of the distributions for male and female samples, respectively
   - Gender pay gap defined by the ratio of the difference in the median earnings between men and women relative to that of men:

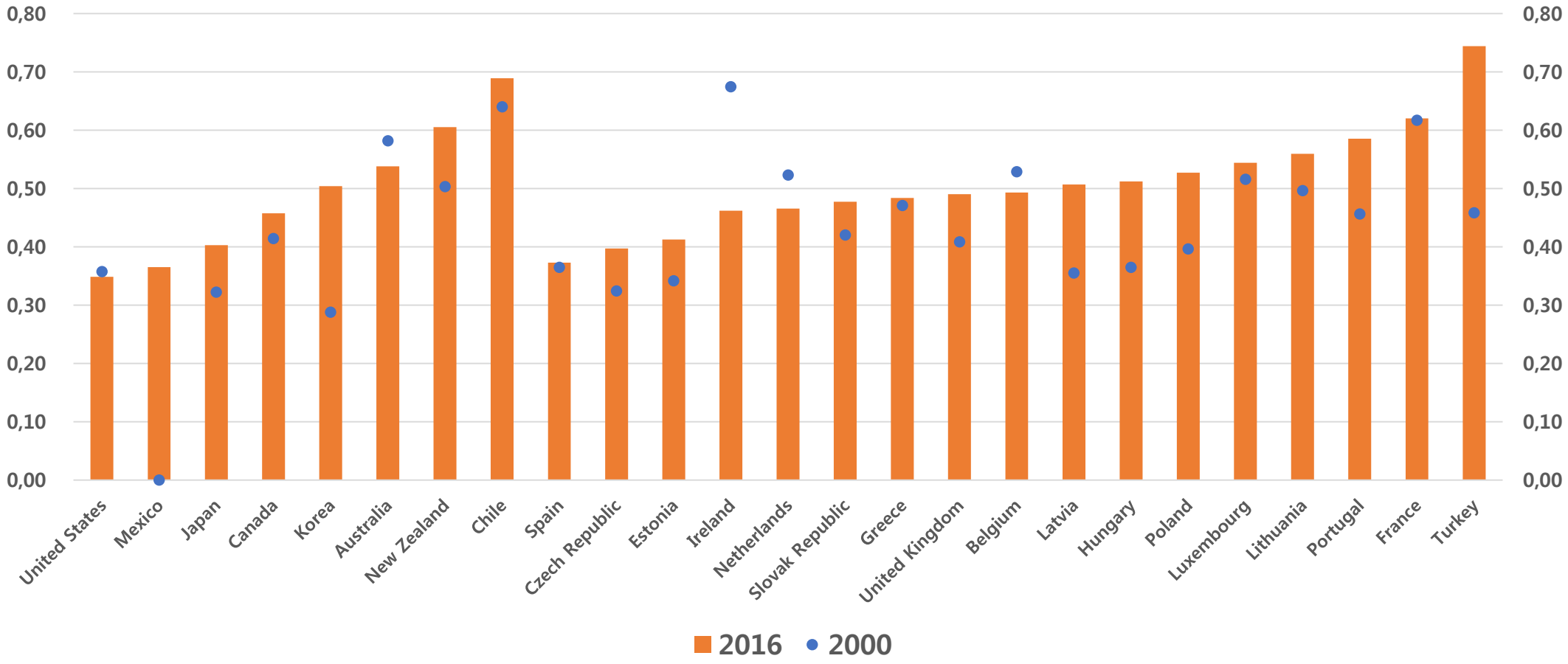
     $$((W_5^M - W_5^W)/W_5^M)$$

   - Incidence of low (high) pay: the share of full-time workers earning less than two-thirds (more than one-and-half time) of gross median earnings for male and female samples, respectively

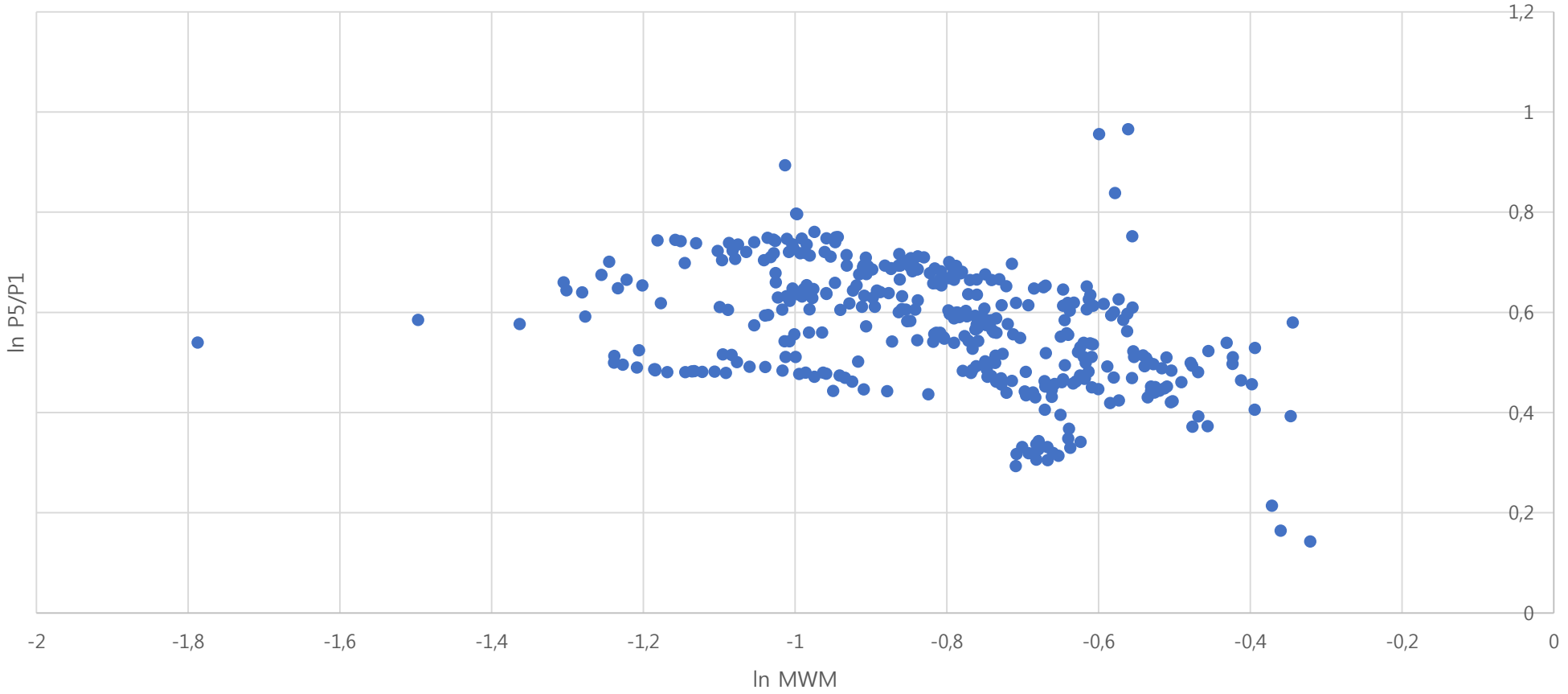
Empirical Model

1. MWM_{it}: the ratio of the minimum wage to the median wage and measures the relative level of the minimum wage by country
2. Include the square of $\ln MWM_{it}$: Capture the different effects of an increase in the minimum wage across countries because $\ln MWM_{it}$ measures the distance between the median wage and the minimum wage at each country

The ratio of the minimum wage to the median wage



Unconditional Correlation between $\ln MWM$ and $\ln W_5/W_1$



Empirical Model

X_{it} includes macroeconomic variables which affect wage inequalities

- First group includes unemployment rates and labor productivity and tends to alleviate omitted variable bias
- Second group includes (old age population + youth population)/adult population and controls for the effects of a change in the labor supply [relative supply of unskilled workers] as well as human capital level
- Third group includes openness and degree of participation in global value chains and controls for the effects of changes in the labor demand [relative demand for unskilled workers]

Empirical Model

- Error terms include α_i, δ_t, ε_{it}.
  - α_i captures country i's fixed effect on the wage inequality (cultural difference, labor market policy difference, difference in labor market institutions, income difference, etc)
  - δ_t captures year fixed effect which affect commonly all countries (global shocks)
  - ε_{it} is a white noise error

Empirical Results

The effects on wage inequality (Women)

Table 2. The effects of minimum wages on $\ln W_6^W / W_1^W$ (Women)

	(1)	(2)	(3)	(4)	(5)
ln MWM	-0.713**	-0.651**	-0.664***	-0.688***	-0.688***
	(0.264)	(0.241)	(0.232)	(0.226)	(0.227)
$(\ln MWM)^2$	-0.328**	-0.283**	-0.292**	-0.298**	-0.299**
	(0.123)	(0.118)	(0.112)	(0.113)	(0.114)
ln unemployment rate		0.030*	0.033*	0.029	0.029
		(0.017)	(0.017)	(0.018)	(0.019)
ln labor productivity		0.059	0.091	0.083	0.083
		(0.052)	(0.064)	(0.063)	(0.063)
ln (pop1524+pop65+)/(pop2564)			0.110	0.126	0.126
			(0.112)	(0.122)	(0.123)
ln human capital				0.166	0.166
				(0.324)	(0.318)
ln (Import/GDP)					-0.001
					(0.029)
No. obs	379	371	371	371	371
R-squared	0.264	0.305	0.320	0.324	0.324
No. countries	27	26	26	26	26

Note: All specifications control for country fixed and year fixed effects. Numbers in parenthesis are clustered robust standard errors. *, **, *** means 10%, 5%, and 1% significant levels. pop1524 means total population aged 15-25 years, pop65+ means total population aged over 65 years, and, pop2564 means total population aged 25-64 years.

The effects on wage inequality (Men)

Table 3. The effects of minimum wages on $\ln W_5^M / W_1^M$ (Men)

	(1)	(2)	(3)	(4)	(5)
ln MWM	-0.577***	-0.528**	-0.533***	-0.522***	-0.502***
	(0.207)	(0.192)	(0.175)	(0.156)	(0.175)
$(\ln MWM)^2$	-0.306**	-0.274***	-0.280***	-0.276***	-0.259**
	(0.115)	(0.096)	(0.089)	(0.081)	(0.093)
ln unemployment rate		0.015	0.017	0.019*	0.026**
		(0.012)	(0.011)	(0.011)	(0.012)
ln labor productivity		0.124**	0.152**	0.156**	0.164**
		(0.047)	(0.066)	(0.064)	(0.069)
ln (pop1524+pop65+)/(pop2564)			0.091	0.086	0.097
			(0.119)	(0.119)	(0.121)
ln human capital				-0.057	-0.122
				(0.244)	(0.250)
ln (Import/GDP)					0.039
					(0.027)
No. obs	379	371	371	371	371
R-squared	0.210	0.267	0.277	0.278	0.289
No. countries	27	26	26	26	26

Nate: All specifications control for country fixed and year fixed effects. Numbers in parenthesis are clustered robust standard errors. *, **, *** means 10%, 5%, and 1% significant levels. pop1524 means total population aged 15-25 years, pop65+ means total population aged over 65 years, and pop2564 means total population aged 25-64 years.

Marginal Effects

- Marginal effects: how much wage inequalities change in response to a 1% change in MWM_{it} evaluated (e.g., at $\ln MWM_{it}$)? $\beta_1 + 2\beta_2 \ln MWM_{it}$
- Can calculate the magnitude of the marginal effect evaluated at each country's level of MWM_{it}.
- Note that MWM_{it} is the ratio of the minimum wage to the median earnings and thus $\ln MWM_{it}$ measures the distance between the minimum wage and the median wage in the log wage distribution

Marginal Effects of minimum wage on the wage inequality for APEC economies in 2017

- The level of MWM in 2017:
  - U.S. : 0.34; Mexico: 0.40; Japan: 0.42; Canada: 0.46; Korea:0.53; Australia:0.55; New Zealand: 0.60; Chile: 0.71.
- Using estimates in column (5) in Table 2 and MWM_{it} above, we can calculate the marginal effects of 1% increase in MWM_{it} on women's wage inequality (W_5^W/W_1^W) for each economy in 2017:
  - U.S. : -0.04%; Mexico: -0.14%; Japan: -0.17%; Canada: -0.22%; Korea: -0.31%; Australia:-0.33%; New Zealand: -0.38%; Chile: -0.48%.
- And men's wage inequality (W_5^M/W_1^M) :
  - U.S. : 0.06%; Mexico: -0.03%; Japan: -0.05%; Canada: -0.10%; Korea: -0.17%; Australia:-0.19%; New Zealand: -0.24%; Chile: -0.32%.

The effects on gender pay gap

Table 1. The effects of minimum wages on gender pay gap

	(1)	(2)	(3)	(4)	(5)
ln MWM	-2.344**	-2.519**	-2.581**	-2.506**	-2.667**
	(1.112)	(1.091)	(1.033)	(1.027)	(1.090)
$(\ln MWM)^2$	-1.282**	-1.407**	-1.476**	-1.455**	-1.604***
	(0.521)	(0.523)	(0.544)	(0.541)	(0.567)
ln unemployment rate		-0.108	-0.073	-0.061	-0.122
		(0.093)	(0.083)	(0.082)	(0.114)
ln labor productivity		0.081	0.512	0.540*	0.480
		(0.353)	(0.336)	(0.313)	(0.359)
ln (pop1524+pop65+)/(pop2564)			1.409***	1.366**	1.271**
			(0.448)	(0.516)	(0.490)
ln human capital				-0.451	0.064
				(1.308)	(1.676)
ln (Import/GDP)					-0.338
					(0.316)
No. obs	378	370	370	370	370
R-squared	0.250	0.256	0.290	0.291	0.303
No. countries	27	26	26	26	26

Note: All specifications control for country fixed and year fixed effects. Numbers in parenthesis are clustered robust standard errors. *, **, *** means 10%, 5%, and 1% significant levels. pop1524 means total population aged 15-25 years, pop65+ means total population aged over 65 years, and, pop2564 means total population aged 25-64 years.

Marginal Effects of minimum wage on the gender pay gap for APEC economies in 2017

- The level of MWM in 2017:
  - ◆U.S. : 0.34; Mexico: 0.40; Japan: 0.42; Canada: 0.46; Korea:0.53; Australia:0.55; New Zealand: 0.60; Chile: 0.71.
- Using estimates in column (5) in Table 1 and MWM_{it} above, we can calculate the marginal effects of 1% increase in MWM_{it} on gender pay gap $((W_5^M - W_5^W)/W_5^M)$ for each country in 2017:
  - ◆U.S. : 0.79%; Mexico: 0.27%; Japan: 0.12%; Canada: -0.18%; Korea: -0.63%; Australia:-0.75%; New Zealand: -1.03%; Chile: -1.57%.

Robustness: the effects on $\ln W_9^W / W_5^W$

Table 4. The effects of minimum wages on $\ln W_9^W / W_5^W$ (Women)

	(1)	(2)	(3)	(4)	(5)
ln MWM	0.092	0.133	0.113	0.146	0.153
	(0.218)	(0.175)	(0.124)	(0.106)	(0.109)
(ln MWM)^2	0.037	0.062	0.046	0.055	0.063
	(0.127)	(0.088)	(0.062)	(0.054)	(0.057)
ln unemployment rate		0.003	0.007	0.012	0.016
		(0.024)	(0.021)	(0.022)	(0.021)
ln labor productivity		0.195***	0.248***	0.258***	0.259***
		(0.063)	(0.058)	(0.060)	(0.060)
ln (pop1524+pop65+)/(pop2564)			0.186***	0.163***	0.169***
			(0.052)	(0.055)	(0.054)
ln human capital				-0.235	-0.265*
				(0.150)	(0.153)
ln (Import/GDP)					0.022
					(0.021)
No. obs	379	371	371	371	371
R-squared	0.405	0.511	0.543	0.549	0.552
No. countries	27	26	26	26	26

Note: All specifications control for country fixed and year fixed effects. Numbers in parenthesis are clustered robust standard errors. *, **, *** means 10%, 5%, and 1% significant levels. pop1524 means total population aged 15-25 years, pop65+ means total population aged over 65 years, and pop2564 means total population aged 25-64 years.

Robustness: the effects on $\ln W_9^M / W_5^M$

Table 5. The effects of minimum wages on $\ln W_9^M / W_5^M$ (Men)

	(1)	(2)	(3)	(4)	(5)
ln MWM	0.258	0.221*	0.221*	0.248**	0.267*
	(0.164)	(0.123)	(0.123)	(0.118)	(0.139)
(ln MWM)^2	0.137	0.119*	0.120*	0.128**	0.144*
	(0.091)	(0.063)	(0.063)	(0.059)	(0.071)
ln unemployment rate		-0.008	-0.008	-0.004	0.002
		(0.007)	(0.008)	(0.011)	(0.009)
ln labor productivity		0.106***	0.102**	0.113**	0.121**
		(0.032)	(0.046)	(0.051)	(0.044)
ln (pop1524+pop65+)/(pop2564)			-0.011	-0.023	-0.014
			(0.077)	(0.079)	(0.073)
ln human capital				-0.140	-0.199
				(0.211)	(0.211)
ln (Import/GDP)					0.035
					(0.029)
No. obs	379	371	371	371	371
R-squared	0.601	0.653	0.653	0.655	0.661
No. countries	27	26	26	26	26

Note: All specifications control for country fixed and year fixed effects. Numbers in parenthesis are clustered robust standard errors. *, **, *** means 10%, 5%, and 1% significant levels. pop1524 means total population aged 15-25 years, pop65+ means total population aged over 65 years, and pop2564 means total population aged 25-64 years.

Marginal Effects of minimum wage on the wage inequality for APEC economies in 2017

- The level of MWM in 2017:
  - ◆U.S. : 0.34; Mexico: 0.40; Japan: 0.42; Canada: 0.46; Korea:0.53; Australia:0.55; New Zealand: 0.60; Chile: 0.71.
- Using estimates in column (5) in Table 2 and MWM_{it} above, we can calculate the marginal effects of 1% increase in MWM_{it} on women's wage inequality (W_9^W/W_5^W) for each country in 2017:
  - ◆U.S. : 0.02%; Mexico: 0.04%; Japan: 0.04%; Canada: 0.06%; Korea: 0.07%; Australia:0.08%; New Zealand: 0.09%; Chile: 0.11%.
- And men's wage inequality (W_9^M/W_5^M) :
  - ◆U.S. : -0.04%; Mexico: 0.00%; Japan: 0.02%; Canada: 0.04%; Korea: 0.08%; Australia:0.09%; New Zealand: 0.12%; Chile: 0.17%.

Robustness:

- A change in the minimum wage does not much affect wages in the upper-tail of the wage distribution. These results provide evidence that our estimates are not derived from spurious relations.

Low and high pay incidence

Table 6. The effects of minimum wages on low and high pay incidence by sex

	(1)	(2)	(3)	(4)
	low pay incidence		high pay incidence	
	women	men	women	men
ln MWM	-0.562	-1.325**	3.931**	1.518**
	(0.343)	(0.522)	(1.570)	(0.691)
$(\ln MWM)^2$	-0.125	-0.633**	3.280**	1.011**
	(0.227)	(0.299)	(1.175)	(0.440)
ln unemployment rate	0.000	0.107***	-0.022	-0.028
	(0.033)	(0.030)	(0.115)	(0.029)
ln labor productivity	0.427**	0.301	-0.003	-0.139
	(0.158)	(0.221)	(0.542)	(0.137)
ln (pop1524+pop65+)/(pop2564)	0.113	0.184	-0.538	0.054
	(0.232)	(0.389)	(0.565)	(0.195)
ln human capital	-0.771	0.055	-2.290	-0.245
	(0.793)	(1.048)	(3.045)	(0.603)
ln (Import/GDP)	0.106	0.290***	-0.052	-0.100
	(0.085)	(0.104)	(0.287)	(0.058)
No. obs	361	361	129	129
R-squared	0.304	0.383	0.385	0.215
No. countries	26	26	15	15

Note: All specifications control for country fixed and year fixed effects. Numbers in parenthesis are clustered robust standard errors. *, **, *** means 10%, 5%, and 1% significant levels. pop1524 means total population aged 15-25 years, pop65+ means total population aged over 65 years, and pop2564 means total population aged 25-64 years.

Marginal Effects of minimum wage on the low and high pay incidence for APEC economies in 2017

- The level of MWM in 2017:
  - ◆U.S. : 0.34; Mexico: 0.40; Japan: 0.42; Canada: 0.46; Korea:0.53; Australia:0.55; New Zealand: 0.60; Chile: 0.71.
- Using estimates in column (5) in Table 6 and MWM_{it} above, we can calculate the marginal effects of 1% increase in MWM_{it} on women's low pay incidence for each country in 2017:
  - ◆U.S. : -0.29%; Mexico: -0.33%; Japan: -0.35%; Canada: -0.37%; Korea: -0.40%; Australia:-0.41%; New Zealand: -0.43%; Chile: -0.48%.
- And men's low pay incidence:
  - ◆U.S. : 0.04%; Mexico: -0.16%; Japan: -0.23%; Canada: -0.34%; Korea: -0.52%; Australia:-0.57%; New Zealand: -0.68%; Chile: -0.89%.

Summary

- Minimum wages can contribute to reducing gender pay gap

◆We find that an increase in minimum wages reduces the gender pay gap defined by the ratio of the difference men's and women's median earnings to the men's median earnings.

◆We find that an increase in minimum wages reduces the wage inequality in the lower-tail of the wage distribution for both men and women. Overall, the effects are greater in the women's wage distribution than the men's wage distribution

◆The effects of a change in minimum wages are nonlinear.