Online Exports and the Wage Gap

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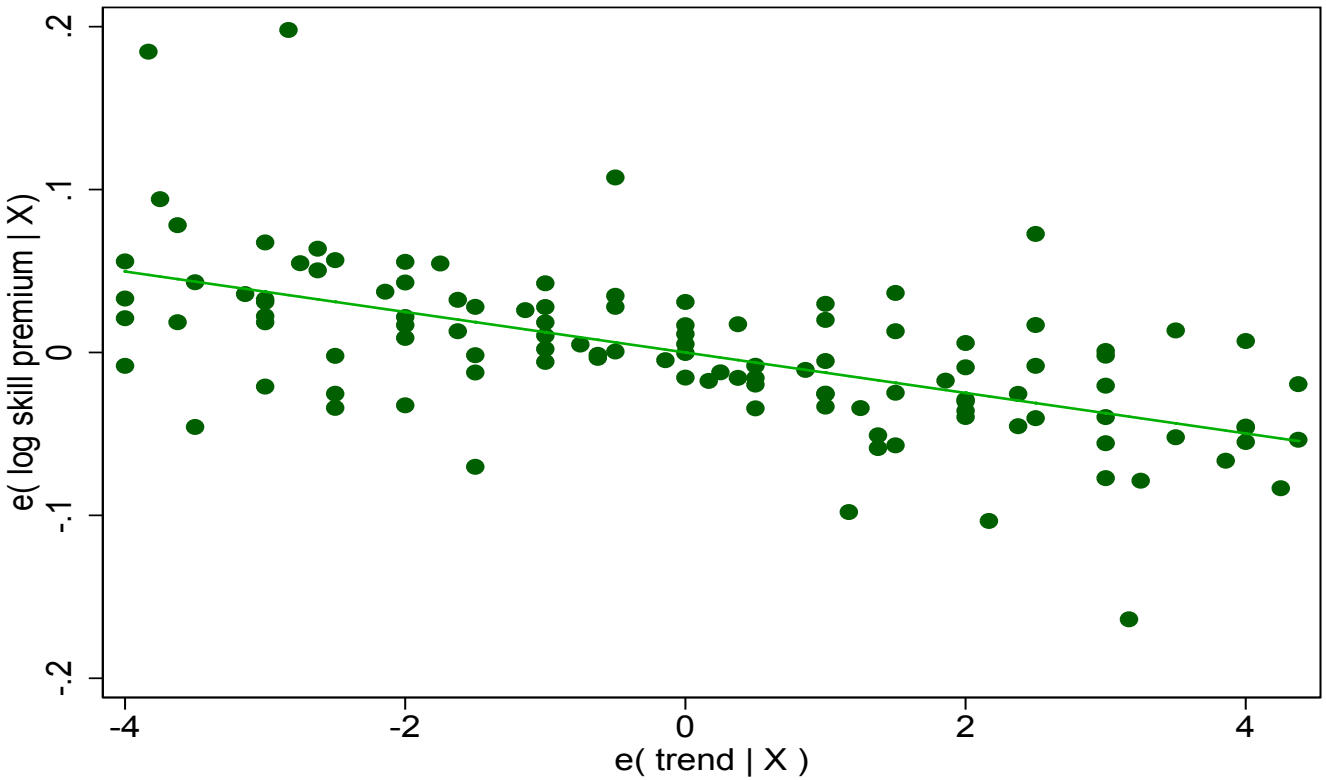
Motivation

- Income inequality falling in developing world since early 2000s
- Partly driven by declining wage skill premia

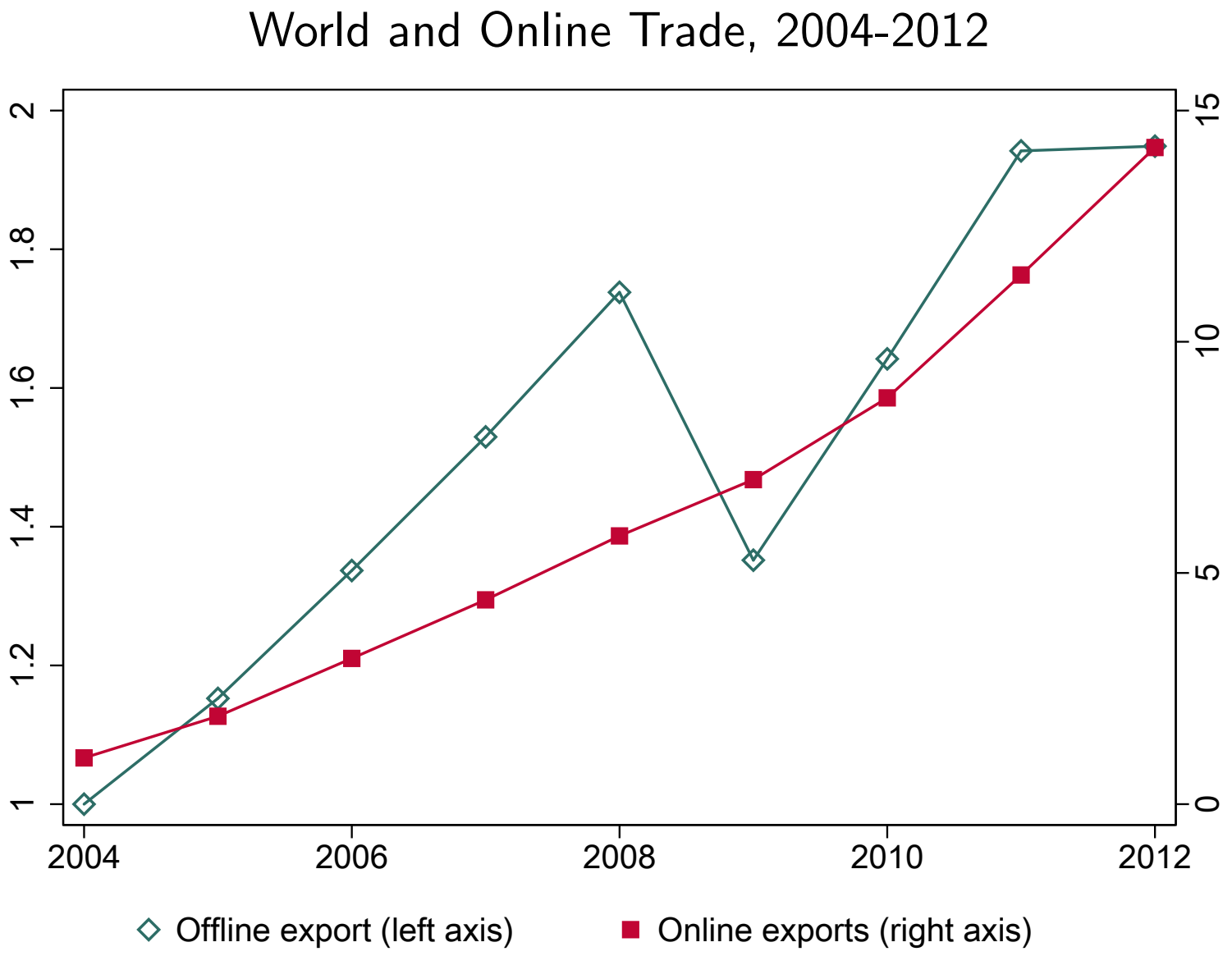
Evolution of wage skill premimum, 2004-2012



Technology, trade or factor supplies?

- Technology
  - Krueger (1993), Berman et al. (1994), Feenstra and Hanson (1999), Autor et al. (1998), Goldin and Katz (2007), Ackerman et al. (2015)
- Trade
  - Goldberg and Pavcnik (2007) Gasparini et al. 2011, Autor, et al. (2013), Autor et al. (2014)
- Factor supply
  - Katz and Murphy (1992) and Card and Lemieux (2001)

"Combining" trade and technology



Can online trade help explain the fall in skill premia?

What we have in mind:

- Costs of exporting and firm size
  - Trade over online platforms reduces trade costs by 60% (Lendle et al., 2016)
  - This allows smaller firms to export (Lendle et al., 2013)
  - Smaller firms are more unskilled-intensive (Brown and Medoff, 1989 or Hamermesh, 1980)

Rest of the talk

- Empirical strategy
- Data
- Results
- Conclusion

Empirical strategy

$$
\begin{aligned}
\ln(\textit{wage gap})_{c,t} \quad = \quad & \beta_1 \ln(\textit{online exports}_{c,t} / \textit{GDP}_{c,t}) \\
& + \beta_2 \ln(\textit{exports}_{c,t} / \textit{GDP}_{c,t}) \\
& + \beta_3 \ln(\textit{skilled} / \textit{unskilled})_{c,t} \\
& + \beta_4 \ln(\textit{internet users})_{c,t} + \delta_c + \eta_t + \epsilon_{c,t}
\end{aligned}
$$

Problems

- We do not observe online trade, but a proxy: eBay flows
- Online and overall trade can be endogeneous
- Solution: IV with time-varying distances as in Freyer (2009), and foreign demand shocks

$$
\begin{aligned}
\ln(\textit{online exp}_{x,m,t}/\textit{GDP}_{x,t}) &= \sum_t \beta_t^d \ln(\textit{distance})_{x,m} + \beta_{x,m} + \beta_{x,t} + \epsilon_{x,m,t} \\
\ln(\textit{online exp}_{x,m,t}/\textit{GDP}_{x,t}) &= \eta \ln(\textit{online demand})_{m,t} + \beta'_{x,m} + \beta'_{x,t} + \epsilon'_{x,m,t} \\
\ln(\textit{online exp}_{x,m,t}/\textit{GDP}_{x,t}) &= \lambda \ln(1 + \textit{tariff}_{\textit{manuf}})_{m,t} + \beta''_{x,m} + \beta''_{x,t} + \epsilon''_{x,m,t}
\end{aligned}
$$

$$
\begin{aligned}
\ln(\textit{exports}_{x,m,t}/\textit{GDP}_{x,t}) &= \sum_t \alpha_t^d \ln(\textit{distance})_{x,m} + \alpha_{x,m} + \alpha_{x,t} + \mu_{x,m,t} \\
\ln(\textit{exports}_{x,m,t}/\textit{GDP}_{x,t}) &= \theta \ln(\textit{GDP})_{m,t} + \alpha'_{x,m} + \alpha'_{x,t} + \mu'_{x,m,t} \\
\ln(\textit{exports}_{x,m,t}/\textit{GDP}_{x,t}) &= \psi \ln(1 + \textit{tariff})_{m,t} + \alpha''_{x,m} + \alpha''_{x,t} + \mu''_{x,m,t}
\end{aligned}
$$

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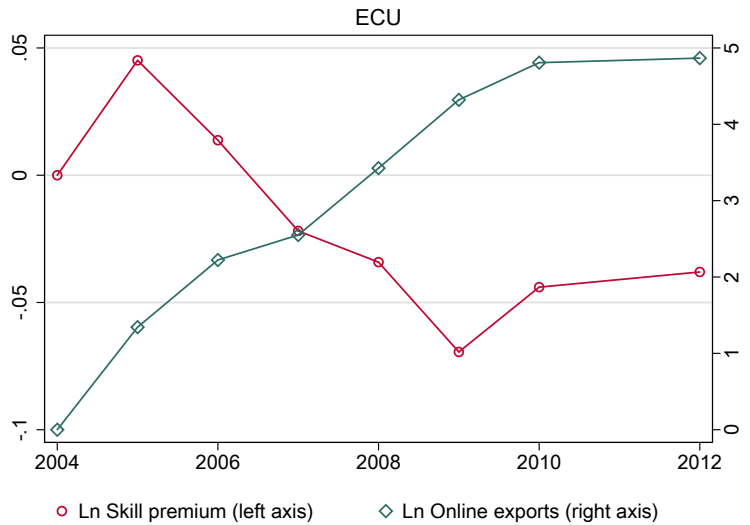
Data: Wage gap

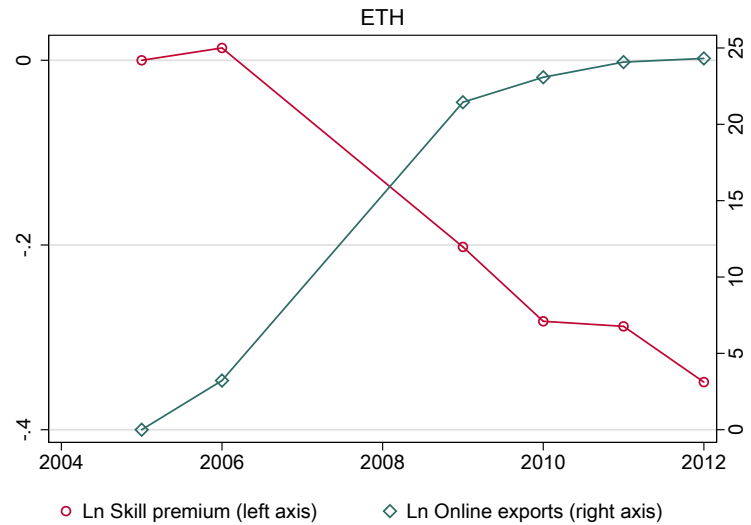
- Methodology developed by Cruz and Milet (2017)
- Use I2D2 database
- 2004-2012 time span to match online data
- Skilled workers $\geq$ secondary education
- 32 countries for which sufficient data is available to estimate Mincer equations based on gender, experience and education.
- For 22 countries we have online data during the same period

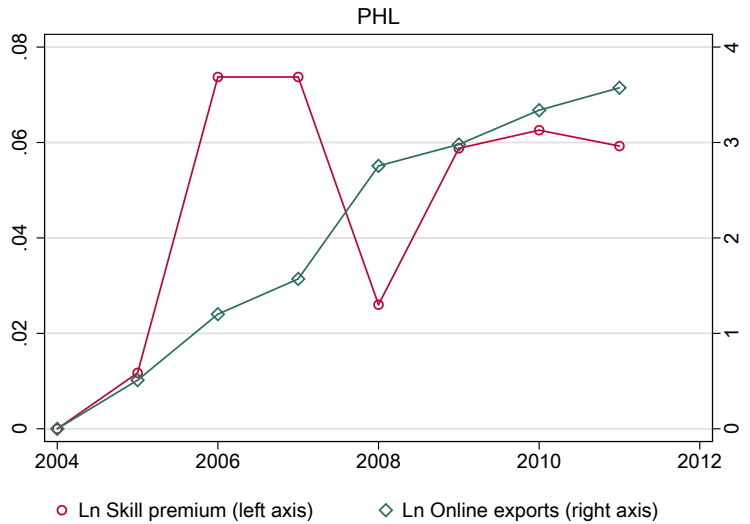
Data: Trade flows

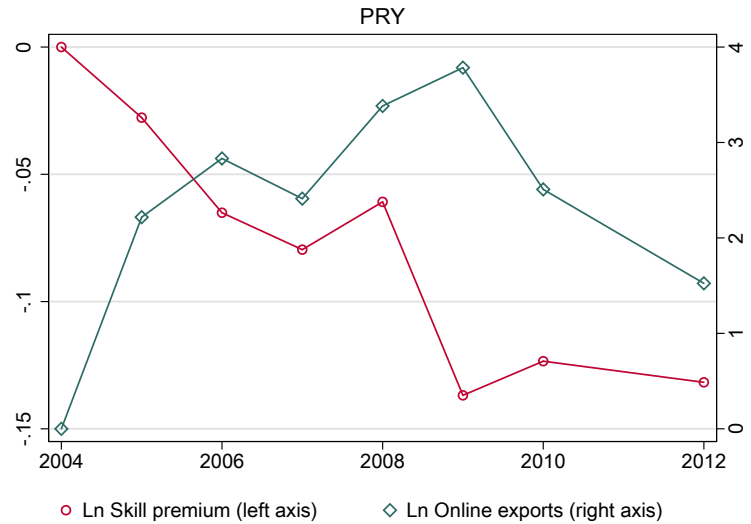
- Online trade
  - eBay trade flows borrowed from Lendle et al. (2016)
  - Provided bilaterally for 2004-2012 for 220 countries
  - Cross border trade is 20 percent of total eBay sales
- GDP, FDI and internet users from WDI.
- Distance from Mayer and Zignago, 2011.

Prima facie evidence (selected countries)









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OLS results

	(1)	(2)	(3)	(4)
Ln online exports/GDP	-0.010***	-0.009***	-0.009***	-0.012***
	(0.002)	(0.002)	(0.002)	(0.003)
Ln total exports/GDP		-0.020	-0.018	-0.019
		(0.013)	(0.012)	(0.014)
Ln relative supply			-0.102**	-0.100***
			(0.046)	(0.033)
Internet user/Pop.				-0.303**
				(0.145)
Observations	131	131	131	131
R^2	0.34	0.35	0.40	0.43

IV First Stage

dep. var:	Ln (online exports/GDP)			Ln (total exports/GDP)		
	(1)	(2)	(3)	(4)	(5)	(6)
Ln distance – 2004	-0.080			-0.122***		
	(0.094)			(0.017)		
Ln distance – 2005	-0.350***			-0.122***		
	(0.076)			(0.015)		
Ln distance – 2006	-0.301***			-0.126***		
	(0.056)			(0.014)		
Ln distance – 2007	-0.317***			-0.125***		
	(0.053)			(0.016)		
Ln distance – 2008	-0.297***			-0.109***		
	(0.055)			(0.014)		
Ln distance – 2009	-0.160***			-0.104***		
	(0.044)			(0.017)		
Ln distance – 2010	-0.078**			-0.045***		
	(0.039)			(0.014)		
Ln distance – 2011	-0.014			-0.033***		
	(0.043)			(0.012)		
Ln demand (online)		0.204***				
		(0.019)				
Ln(1+ average manuf. tariff)			-0.406***			
			(0.093)			
Ln GDP					0.755***	
					(0.026)	
Ln(1+ average tariff)						-0.083***
						(0.025)
Observations	60,038	60,038	60,038	60,038	60,038	60,038
R^2	0.712	0.713	0.711	0.950	0.951	0.950

IV results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ln online exports/GDP	-0.012***	-0.012***	-0.012***	-0.012***	-0.011***	-0.012***	-0.012***
	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)
Ln total exports/GDP	-0.047***	-0.050***	-0.047***	-0.047***	-0.049***	-0.046***	-0.049***
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.017)	(0.018)
Ln relative supply	-0.095	-0.094	-0.095	-0.095	-0.095	-0.095	-0.094
	(0.077)	(0.077)	(0.077)	(0.077)	(0.077)	(0.077)	(0.077)
Internet user/Pop.	-0.339*	-0.342*	-0.337*	-0.343**	-0.338*	-0.348**	-0.349**
	(0.175)	(0.176)	(0.175)	(0.173)	(0.175)	(0.174)	(0.175)
Observations	131	131	131	131	131	131	131
R^2	0.40	0.39	0.40	0.40	0.39	0.40	0.39
F-test (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen (p-value)				0.386	0.549	0.066	0.179
Cragg-Donald (F-test)	64.851	65.112	64.111	33.682	33.442	32.451	22.142
IV-online trade	1	2	3	1+2	1+3	2+3	1+2+3
IV-total trade	1	2	3	1+2	1+3	2+3	1+2+3

The mechanism

- Low fixed cost for online exports
- Allows small firms to export
- Many empirical evidence show that, compare to large firms, small firms are:
  - less productive
  - less skill-intensive
- Allowing them to export increases the relative demand for **unskilled workers**.
- Which puts downward pressures on the skill premium and reduces the wage gap.

A simple theoretical model

Consider two types of firms:

- "High-tech" firms: High fixed cost (F), uses skilled labor only
- "Low-tech" firms: Low fixed cost ($\delta F, \delta < 1$), uses unskilled labor only
- Monopolistic competition within each sector
- Preferences: CES within each sector, and CES across sectors

A simple theoretical model

Now, lower the fixed cost for the low-tech firms only.

- We can express the skill premium ω as a function of δ and the relative number of Low-tech firms:

$$\text{wage gap} = \delta^{\frac{1}{\epsilon-1}} \left(\frac{N_l}{N_h} \right)^{\frac{\sigma-\epsilon}{(\sigma-1)(\epsilon-1)}}$$

- Easy to see that the derivative of the wage gap with respect to the fixed cost faced by small firms δ is positive, and that the second cross-derivative with respect to the share of small firms N_l/N_h is also positive.

Testing the mechanism

- From I2D2 we get data on the size of firms workers are employed at
- Small firms $\leq$ 10 employees
- Group countries according to their share of workers in small firms (above/below the sample average)
- Instrument again
- Interact with the online exports variable

Skilled and unskilled workers in small and large firms

Country	(1) Employment share in small firms	(2) Skilled/total in small firms	(3) Skilled/total in large firms
ARG	29.52	48.61	78.22
BOL	52.42	44.15	71.07
BRA	60.96	39.71	.
CHL	26.13	46.98	72.47
CRI	73.96	21.06	.
ECU	49.13	8.768	19.06
ETH	59.69	20.13	38.67
GTM	53.92	16.25	34.99
HND	59.79	7.520	48.78
KHM	45.07	12.57	16.44
MEX	41.96	21.75	48.86
NIC	42.33	14.88	50.59
PAN	20.34	28.36	69.74
PER	44.00	53.58	85.46
PRY	43.38	39.10	70.39
RUS	14.61	14.33	19.94
SLV	33.73	4.96	16.10
URY	37.59	17.77	46.43
Average	45.20	25.39	49.20

IV results: the role of small firms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ln online exports/GDP	-0.010***	-0.010***	-0.010***	-0.010***	-0.011***	-0.011***	-0.010***
× small firms above median	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)
Ln online exports/GDP	-0.020	-0.027	-0.027	-0.026	-0.027	-0.029	-0.029*
× small firms below median	(0.042)	(0.022)	(0.021)	(0.020)	(0.019)	(0.019)	(0.016)
Ln total exports/GDP	-0.038	-0.033	-0.045	-0.039	-0.038	0.006	-0.038
× small firms above median	(0.031)	(0.074)	(0.097)	(0.030)	(0.030)	(0.039)	(0.031)
Ln total exports/GDP	-0.013	-0.009	-0.006	-0.006	-0.005	-0.004	-0.004
× small firms below median	(0.063)	(0.015)	(0.013)	(0.014)	(0.013)	(0.011)	(0.011)
Ln relative supply	-0.285**	-0.288**	-0.288**	-0.288**	-0.289**	-0.295**	-0.289**
	(0.136)	(0.129)	(0.128)	(0.132)	(0.132)	(0.132)	(0.131)
Internet user (%)	-0.321	-0.306	-0.336	-0.315	-0.327	-0.244	-0.300
	(0.283)	(0.302)	(0.329)	(0.277)	(0.279)	(0.278)	(0.280)
Observations	106	106	106	106	106	106	106
R^2	0.41	0.41	0.41	0.41	0.41	0.39	0.41
F-test (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen (p-value)				0.980	0.995	0.872	0.876
IV-online trade	1	2	3	1+2	1+3	2+3	1+2+3
IV-total trade	1	2	3	1+2	1+3	2+3	1+2+3

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Conclusion

- A 1% increase in the share of online exports reduces the skill premia by 0.01%
- A small but robust and statistically significant impact
- As online trade grows it may help reduce wage inequality
- Reducing barriers to online trade can therefore have desirable effects beyond economic efficiency
- This includes reductions in customs delays and more transparent customs taxation for online purchases
- Exporting promotion programs targeting small firms access to online platforms should also be evaluated