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# Exchange Rates and Wages in an Integrated World

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# Overview of the talk

- Two effects of exchange rate on labor force
  - Sectoral Demand
  - Aggregate Supply
- Related literature
- Theoretical framework (not discussed but in the paper)
- Empirical evidence
  - Sending countries
  - Receiving countries
- Robustness (not discussed but in the paper)
- Conclusions



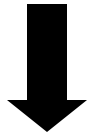
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# Question

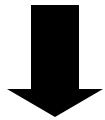
- Do exchange rates affect labor markets through the labor supply?
    - Standard channel through labor demand
      - Sectoral changes
      - Price level changes
    - We explore the effect on labor supply
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# Exchange Rate and Labor Demand

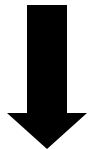
Devaluation



Competitiveness of export sectors



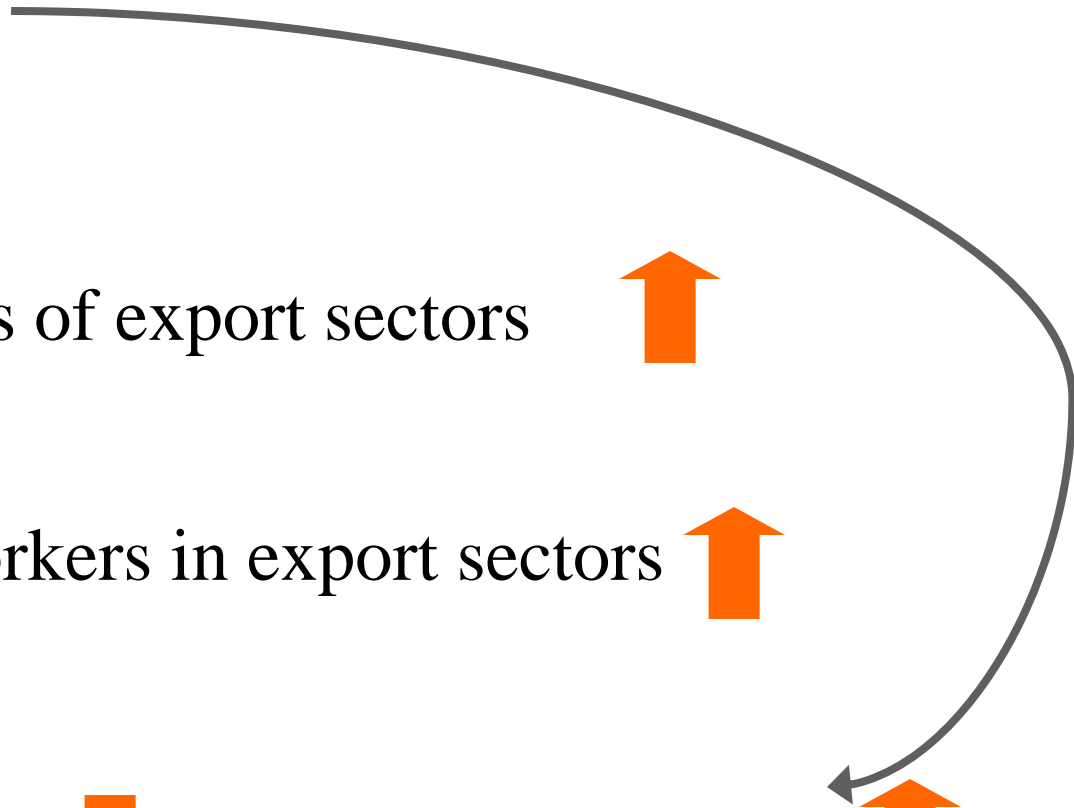
Demand for workers in export sectors



Real wages



Prices



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# Literature – exchange rate pass-through

- **Pass through of exchange rates to wages** (Campa and Goldberg, 2001; Goldberg and Tracy, 2003 etc.)
    - Try to identify the **labor demand channel**
    - Individual level or industry level data
    - Identification based on differential effects on industries based on exports/imports; skill, occupation, etc.
    - Focus on the United States or G7 countries
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# Exchange Rate and Labor Supply

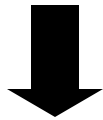
Devaluation



Emigration or threat of emigration



Labor Supply



Real wages



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# How plausible is this channel?


- So far, two sources of evidence:
    - Country studies
    - Anecdote from press
  - Our contribution is to add cross-country evidence
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# Literature – direct evidence on exchange rates, labor mobility and wages

- Evidence from Mexico/US border:
    - Exchange rate shocks and border apprehensions at the US-Mexico border (Hanson and Spilimbergo, 1999). A devaluation of the peso by 10 percent increases, ceteris paribus, border apprehensions by 6 to 8 percent.
  - Exchange rate shocks, return migration and remittances of households in Philippines (Yang, 2006; Yang, forthcoming)
  - Effect of emigration on wages in source countries. A 10 percent migration increases wages by 4 percent (Mishra, 2007; Aydemir and Borjas, 2007)
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# Anecdotal evidence: exchange rates and labor mobility

- **“Weak pound has Poles eyeing homeland”**

**(FT, May 25, 2008)**

“A survey by Britain's largest Polish-speaking radio station at the end of last year reported that almost 40 per cent of migrant Polish workers would seriously consider returning home if the exchange rate fell to four zlotys to the pound.”

- **“Poles go home to greener pastures” (FT, April 1, 2008)**

“The **zloty has also risen** sharply against both the pound and the euro”

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## Anecdotal evidence (contd.): exchange rates and labor mobility

- **“Exchange rate keeps Filipinos from working abroad” (FT, 16<sup>th</sup> November, 2007)**

“The monthly pay of most of the Middle East jobs is measly – US dollars 250 for hotel workers or dollars 300 for laborers. But, because of the weak US dollar, the peso value of their salaries has been eroded by 20-25 per cent since 2000 and that has had a big impact on one of the world's biggest exporters of labor”

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# Main Challenges

- Identification
  - How to measure integration?
  - Controlling for omitted variables
  - Data
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# Identification strategy (idea)

- We identify the effect of exchange rates on wages by exploiting variation across countries in the degree of integration between domestic and international labor markets.
  - Labor market integration defined in terms of costs of moving abroad in response to a shock.
  - More integrated the labor market is and easier it is for workers to move; a given exchange rate depreciation is associated with a larger increase in wages.
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# Identification

Devaluation



Emigration or threat of emigration



Integrated World

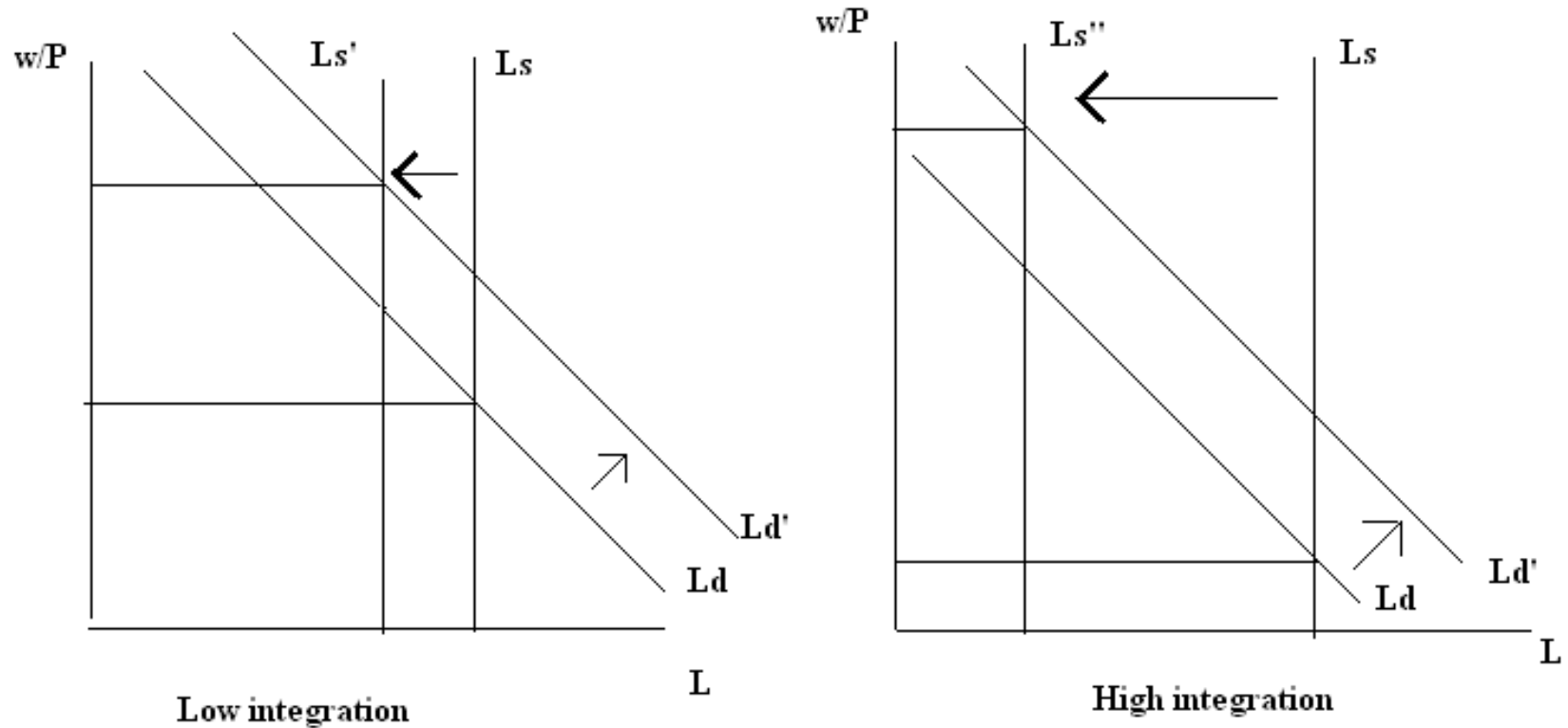
Labor Supply



Real wages



# Identification strategy (contd.)



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# How to measure integration?

- Costs of moving abroad
  - Larger networks imply lower costs of moving and finding jobs (Borjas, 1992; Munshi, 2003; Montgomery, 1991)
    - Lagged emigration rates as proxy for networks
  - Alternative measures of integration
    - Lagged remittances (as a share of GDP)
    - Lagged stock of emigrants
    - Common official language, common border and colonial linkage with the top 5 destination countries
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# Data – wages and migration

## ■ **Wages**

- Hourly manufacturing wages (local currency) – ILO Key Indicators of Labor Market
  - Wages and salaries / earnings
  - Wage earners (production workers), salaries employees (non-production) or both
  - Social security contributions (e.g. Chile, Colombia, Turkey etc.)
- IFS (Wage indices – wage rates or earnings per worker per specified time period)
- Freeman-Oostendorp – October ILO Inquiry
- Hourly wages of immigrants in the US – Census Population Survey (CPS) (migrants defined by country of birth)

## ■ **Migration**

- International Migration Statistics, OECD, 2006
  - Migrants to the OECD defined by nationality/birth
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# Econometric issues

- Estimation of model in levels following the theoretical framework
    - Panel unit root tests suggested by Pedroni (2001)
    - Past literature on migration and wages (Borjas, 2003; Hanson and Spilimbergo, 1999)
  
  - Endogeneity – correlation between emigration and unobserved component of wages
    - Reverse causality - migration increases with wage declines in source countries (Hanson and Spilimbergo, 1999; Hanson et al., 2001)
    - Omitted variables – labor demand shocks (e.g. technology) in the source country -- negatively correlated with emigration and positively correlated with wages
    - Omitted variables – positively correlated labor demand shocks between source and destination countries (e.g. good weather shocks in both Mexico and the US) that raise labor demand in the source country as well as increase the demand for emigrants.
      - Estimates are biased upwards.
      - Time effects
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- Control for wages in OECD countries

**Table 2. Effect of Exchange Rates on Wages-Interaction With Labor Market Integration**

Dependent variable: ln(real wage)						
	[1]	[2]	[3]	[4]	[5]	[6]
Ln real exchange rate <sub>t-1</sub>	0.307** (0.152)	0.142 (0.140)	0.275 (0.177)	0.34 (0.280)	0.207 (0.274)	0.19 (0.167)
<b>Ln real exchange rate<sub>t-1</sub> * Ln emigration rate<sub>t-1</sub></b>	<b>0.044*** (0.014)</b>	<b>0.044*** (0.016)</b>	<b>0.050** (0.020)</b>	<b>0.070*** (0.026)</b>	<b>0.093*** (0.035)</b>	<b>0.092*** (0.033)</b>
Ln emigration rate <sub>t-1</sub>	0.120*** (0.036)	0.137*** (0.037)	0.146*** (0.046)	0.187*** (0.054)	0.239*** (0.072)	0.234*** (0.068)
Ln (exports/GDP) <sub>t-1</sub>	0.029 (0.115)	-0.063 (0.097)	0.028 (0.165)	-0.035 (0.252)	0.142 (0.266)	0.156 (0.250)
Ln (imports/GDP) <sub>t-1</sub>	-0.421*** (0.106)	-0.288*** (0.094)	-0.350** (0.170)	-0.271 (0.228)	-0.341 (0.242)	-0.274 (0.251)
Dummy for crisis <sub>t-1</sub>		-0.15 (0.101)	-0.151 (0.127)	-0.007 (0.088)	0.024 (0.099)	0.051 (0.101)
Ln unemployment rate <sub>t-1</sub>			-0.086* (0.044)	-0.07 (0.071)	-0.086 (0.077)	-0.111 (0.067)
Ln tax wedge <sub>t-1</sub>				-0.294** (0.120)	-0.312** (0.129)	-0.332*** (0.12)
Ln (FDI/GDP) <sub>t-1</sub>					0.043 (0.028)	0.045 (0.028)
Ln average OECD wage <sub>t-1</sub>						0.085 (0.155)
Ln average OECD price <sub>t-1</sub>						0.334** (0.164)
Country fixed effects	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	N
Observations	740	710	574	419	393	393
Number of countries	66	66	58	47	44	44
R-squared	0.97	0.98	0.97	0.97	0.97	0.97

Notes. \* significant at 10%; \*\* significant at 5%, \*\*\* significant at 1%. Robust standard errors in parentheses. All variables refer to the origin country of migrants except wages and prices in OECD.

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# Magnitude of the estimated effect

- Pass-through from exchange rate to wages is large: 0.11 – 0.30
  - Campa and Goldberg (2001): elasticity of 0.06 for manufacturing wages in the US
  - The pass-through is higher, the more integrated a country is
    - For countries in 90<sup>th</sup> percentile or higher (e.g. El Salvador, Guyana, Jamaica), elasticity ranges from 0.21 to 0.46
    - For countries in the 10<sup>th</sup> percentile (Brazil, India, Indonesia), elasticity ranges from -0.16 to 0.14
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# Robustness checks

- Alternative measures of exchange rate
  - Alternative measures of labor market integration
  - Differential effects for developing countries
  - Migrants defined by foreign-born rather than nationality
  - Control for capital-intensity of exports and imports
  - Interact labor-demand determinants (exports and imports) with exchange rates.
  - Alternative data sources on wages (IFS and FO)
  - Skilled and unskilled wages
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# Effects of integration in receiving countries

- What happen to the wages of Mexican workers in the US if peso depreciates?

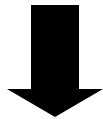
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# Exchange rate and labor supply in receiving countries with highly integrated countries

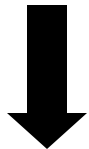
Depreciation of peso vis-à-vis dollar



Labor mobility from Mexico to US 



Labor Supply of Mexican workers in the US 



Wages of Mexican workers in the US 

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**Table 10 . Effect of Exchange Rates on US Immigrant Wages-Interactions**

Dependent variable: ln(real wage of immigrants in the US)				
	[1]	[2]	[3]	[4]
Ln real exchange rate <sub>t-1</sub>	0.376 (0.242)	0.361 (0.244)	0.914** (0.438)	0.751* (0.397)
Ln real exchange rate <sub>t-1</sub> * Ln emigration rate to the US <sub>t-1</sub>	-0.106** (0.048)	-0.111** (0.049)	-0.158* (0.099)	-0.098 (0.104)
Ln emigration rate to the US <sub>t-1</sub>	-0.226 (0.142)	-0.213 (0.144)	-0.603** (0.293)	-0.582* (0.311)
Ln (exports/GDP) <sub>t-1</sub>	-0.152* (0.089)	-0.144 (0.090)	-0.286 (0.220)	-0.206 (0.214)
Ln (imports/GDP) <sub>t-1</sub>	0.082 (0.141)	0.077 (0.141)	0.007 (0.303)	0.004 (0.317)
Dummy for crisis <sub>t-1</sub>		0.001 (0.136)	0.223 (0.178)	0.193 (0.186)
Ln unemployment rate <sub>t-1</sub>			-0.127 (0.151)	-0.149 (0.154)
Ln tax wedge <sub>t-1</sub>			-0.103 (0.332)	-0.031 (0.356)
Ln (FDI/GDP) <sub>t-1</sub>			-0.029 (0.063)	-0.037 (0.065)
Ln average US wage <sub>t-1</sub>				-1.561 (2.924)
Ln average US price <sub>t-1</sub>				2.192 (3.635)
Country fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	N
Observations	546	537	289	264
Number of countries	74	73	47	47
R-squared	0.32	0.32	0.34	0.36

Notes. \* significant at 10%; \*\* significant at 5%, \*\*\* significant at 1%. Robust standard errors in parentheses. All explanatory variables refer to the origin country of migrants except wages and prices in the US.

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# Conclusions

- How do exchange rates affect the real economy?
    - Explore new channel via labor supply
  - Framework of exchange rate adjustment which explicitly takes into account labor supply effects
  - New identification strategy --- use variation across countries in the degree of labor market integration
  - Main result is that the elasticity of wages wrt exchange rates significantly higher for countries more integrated in the world labor market.
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# Policy Implications

- Labor supply is not fixed but depends on macro conditions (in particular exchange rate)
  - Important implications for:
    - Speed of the adjustment process
    - Welfare effects
  - Relative wages matter
  - This will be even more relevant in the future as the world becomes more integrated
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