

Trade Liberalization, Technology and Skill Upgrading

Evidence from Argentina

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Introduction

- ▶ During the last 25 years the skill premium has increased in several countries
- ▶ Coincidence of rising skill premium and relative employment of skilled workers
 - ▶ Outwards shift in the relative demand for skill
- ▶ Most research focused on two possible causes:
 - ▶ Trade or skilled biased technical change
- ▶ An open question remains on the effects of trade on technology adoption and its indirect effects on skill upgrading through that channel

Empirical Evidence: H-O Trade vs. Technology

- ▶ Empirical evidence is hard to reconcile with H-O trade theory:
 - ▶ The skill premium increased both in developed and developing countries
 - ▶ The increase in the relative demand for skill is not driven by reallocation of labor towards skill intensive industries
 - ▶ Instead, skill intensity increased within most industries [Berman Bound and Griliches (1994), Goldberg and Pavcnik (2004)]
- ▶ All these findings are consistent with the adoption of skill-biased technologies in all countries and industries
 - ▶ In addition, both in the U.S and OECD countries, industries with faster adoption of IT had faster increase in skill intensity [Autor Katz and Krueger (1998), Machin and Van Reenen (1998)]

Trade Induced Technical Change?

- ▶ Several theoretical papers have noted that if technology adoption is endogenous the empirical findings cited above can be reconciled with trade being the ultimate cause of the increase in the relative demand for skill, through its effects on technology adoption.
 - ▶ Trade can affect the skill-bias of R&D: [Acemoglu (2002), Thoenig and Verdier (2005)]
 - ▶ Expanded export opportunities can induce firms to adopt new technologies [Yeaple(2005)]
- ▶ In Bustos (2005, 2007) I build on Yeaple (2005) and Melitz (2003) and present model where
 - ▶ Bilateral trade liberalization reallocates market shares towards the most productive firms inducing them to adopt skill-biased new technologies
- ▶ I test the model in the context of a regional trade liberalization episode, MERCOSUR

Model: Melitz (2003) + Technology Choice

- ▶ Fixed exporting costs:
 - ▶ only the most productive firms enter export markets
- ▶ Fixed technology adoption costs:
 - ▶ only the most productive firms (exporters) adopt new technologies
- ▶ Reduction in variable trade costs:
 - ▶ more firms enter the export market
 - ▶ more firms adopt new technology
 - ▶ heterogeneity is crucial for this result: if all firms export variable trade costs have no impact on technology adoption

Test of Model's predictions: Context and Data

- ▶ Context: MERCOSUR
 - ▶ Brazil's Tariffs for Argentinean products fall from an average of 29% in 1991 to zero in 1995.
 - ▶ Exports to Brazil quadruple while exports to the rest of the world increase only 60%
 - ▶ The college wage premium increased 7 p.p. per year in the industrial sector (Galeani and Sanguinetti, 2003)
- ▶ Data:
 - ▶ Survey of Innovation and Technological Behavior of Argentinean Firms, panel of 1380 firms for 1992-1996.
- ▶ Findings on Skill Upgrading 1992-1996
 - ▶ The employment of college/highschool+primary school increased 17%
 - ▶ Most of the increase occurred within industries, moreover within firms
 - ▶ Skill upgrading both within production labor and within non-production labor

Test of Model's predictions: Causality?

- ▶ Exporters vs. non Exporters
 - ▶ New entrants in the export market and continuing exporters upgrade technology and skill faster than non exporters in the same industry.
- ▶ Effect of the reduction in Brazil's tariffs:
 - ▶ I find that firms in industries with bigger reductions in Brazil's tariffs are more likely to
 - ▶ enter the export market
 - ▶ upgrade technology
 - ▶ increase skill intensity
- ▶ The effects of tariff reductions are strongest in the upper-middle range of the firm size distribution.

How much skill upgrading can MERCOSUR explain?

- ▶ The employment share of college graduates on firms above median size was 18.5% in 1992 (in prim. school equiv)
- ▶ It increased on average 2 pp. in the period 1992-1996
- ▶ The coefficient estimates imply that the average reduction in Brazil's tariffs (24 pp) increased skill intensity by 1 p.p in firms above median size.
- ▶ Thus, it can explain 50% of skill upgrading within big firms.

Related Literature I

- ▶ Empirics:

- ▶ U.S.- OECD: Lawrence and Slaughter (1993); Berman Bound and Griliches (1994); Autor Katz and Krueger (1998), Machin and Van Reenen (1998)
- ▶ Latin America: Pavcnik et al (2004); Verhoogen (2008)

- ▶ Theory:

- ▶ Acemoglu (1998, 2003), Yeaple (2005), Thoening and Verdier (2005)

Related Literature II

- ▶ Only the most productive firms export and trade liberalization reallocates market shares towards the most productive firms
 - ▶ Empirics: Clerides, Llach and Tybout (1998); Bernard and Jensen (1999); Aw, Chung and Roberts (2000), Pavcnik (2002)
 - ▶ Theory: Melitz (2003); Bernard, Eaton, Jensen and Kortum (2003)
- ▶ Trade liberalization can have a positive impact on firm productivity
 - ▶ Unilateral trade liberalization: Pavcnik (2002)
 - ▶ Reduction in trading partner's tariffs: Trefler (2004)
- ▶ Trade liberalization can induce firms to adopt new technologies, export channel:
 - ▶ Theory: Yeaple (2005), Bustos(2007)
 - ▶ Empirics: Bustos(2007), Lileeva and Trefler (2007)
- ▶ Dynamic models of innovation and export decisions:
 - ▶ Atkenson and Burstein (2007), Melitz and Constantini (2007), Aw, Roberts and Xu (2009)