Part IID: Labor Market Equilibrium

David A. Díaz

UNC Chapel Hill

Motivation

- How are wages, employment levels determined?
  - Interaction of labor supply and labor demand
- How can we measure the value of social welfare that results from the allocation of resources?
- Is this allocation of resources efficient?
- How do different policies (e.g., immigration, the minimum wage) affect the well-being of workers and firms?

Labor Market Equilibrium

- Wages (w^*) and the quantity of labor employed (E^*) are determined by the interaction of labor supply and demand.
- Labor demand: $\uparrow w \Rightarrow \uparrow (w/r) \Rightarrow \downarrow E$
  - Labor demand slopes downward
- Labor supply: $\uparrow w \Rightarrow \uparrow LFPR$
  - Some ambiguity regarding hours worked (income vs. subst. effects)
  - On the whole, still believe labor supply slopes upward: $\uparrow w \Rightarrow \uparrow LFPR \Rightarrow \uparrow E$

Labor Market Equilibrium

- Once the competitive wage is determined, each firm hires workers up to the point where $VMP_E = w^*$
- The total number of workers hired by all firms equals the equilibrium employment level E^*
- Recall that the framework of a perfectly competitive labor market, there is no unemployment
  - At w^*, the number of persons who want to work equals the number of workers firms want to hire
  - Those individuals not working do not want to work at the going wage rate, so they are out of the labor force

Efficiency

- The labor demand curve gives the VMP_E
- Profits accruing to firms, or **producer surplus**, is given by the area below the demand curve and above w^*
- The supply curve gives the wage required to induce additional workers into the labor market.
- **Worker surplus** is the difference between w^* and the value of the worker's time outside the labor market
- This is given by the area below w^* and above the supply curve.

Efficiency

- The **total gains from trade** are given by the sum of producer surplus and worker surplus
- Is the allocation of resources under a competitive labor market efficient?
  - I.e., is total surplus maximized at E^*?
- What if firms decided to hire $E_1 < E^*$ workers?
- What if firms decided to hire $E_2 > E^*$ workers?
- In a competitive labor market with no externalities, total surplus is maximized *in the absence of regulation*

Regulation 1: The Minimum Wage

- Binding minimum wage:
  - $\uparrow w, \downarrow E$
  - Leads to a surplus of labor: $E_S > E_D$
- How does this affect PS, WS, and TS?
- Who are the "winners" and "losers?"

Regulation 2: Wage Subsidies

- Consider a wage subsidy for firms: Government pays X dollars to firms per worker hired
- Effect on labor market?
  - Increases wage received by workers
  - Decreases wage paid by firms
  - Increases employment
- Effect on PS, WS, and TS?

Equilibrium Across Labor Markets

- A real economy typically consists of more than one single labor market (e.g., region, industry, etc.)
- Application: Regional wage convergence

Regional Wage Convergence

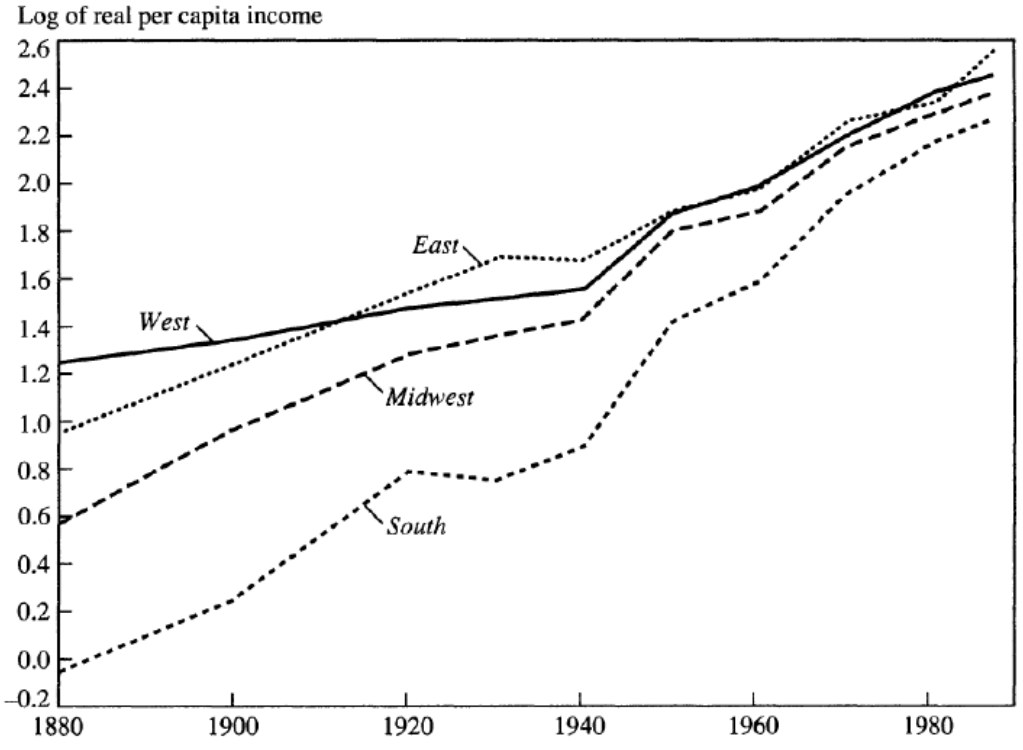
- Framework: Two geographically isolated regions (e.g., North & South) with perfectly inelastic short-run labor supply
- Workers have identical skillsets
- One of the two regions (say, the South) initially has lower wages
- Can this wage differential persist in the long-run?

Regional Wage Convergence

- Workers in the South observe the wage differential and can move to the North in the long-run
  - Supply of workers in the South decreases
  - Supply of workers in the North increases
- Implication: The free exit & entry of workers will eventually lead to a single equilibrium wage w^*
- If firms could freely enter and exit labor markets, the same result would hold

Regional Wage Convergence

Figure 5. Personal Income of U.S. Regions, 1880–1988



Sources: Authors' own calculations using Bureau of Economic Analysis (1984), Easterlin (1960a, 1960b), and *Survey of Current Business*, various issues. The data are plotted for 1880, 1900, 1920, every ten-year interval that follows, and 1988.

- From Barro & Sala-I-Martin (1991)

Readings

- Borjas 4.1-4.2

Motivation

- How does migration affect the welfare of
  - Native workers?
  - Migrant workers?
  - Native firms?
- Depends greatly on the skill composition of natives and migrants.

Motivation

- The share of workers who are foreign born is higher than their population share because immigrants are more likely to be of working age
- Between 1996 and 2011, immigrants accounted for 51 percent of labor force growth

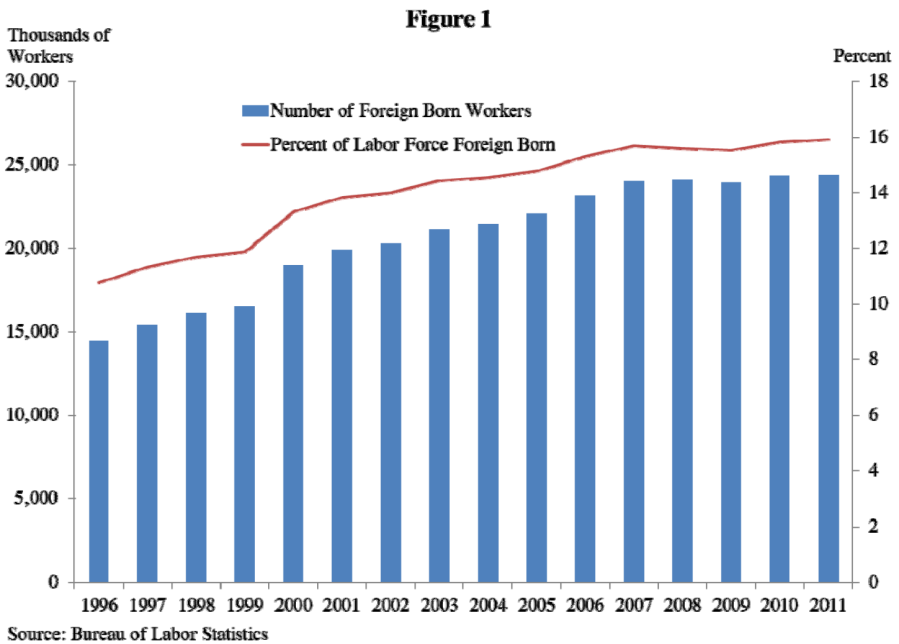


Figure: US Foreign Born Workers, 1996-2011 (Orrenius & Zavodny, 2013)

Immigration Trends

- Large-scale immigration in other developed countries has increased in recent years

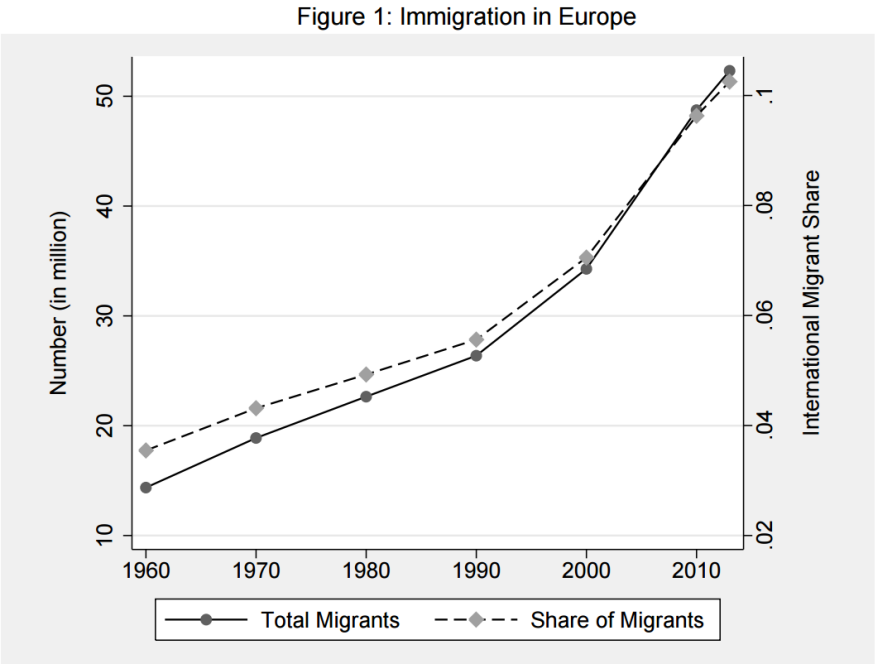
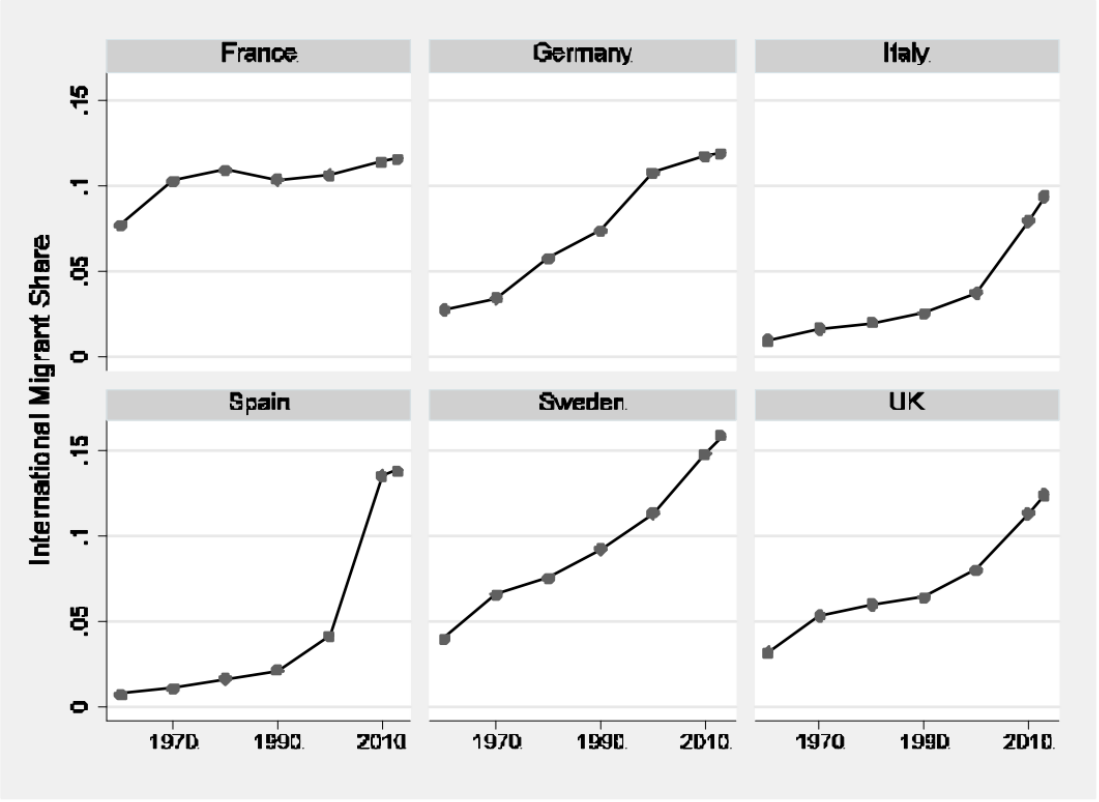


Figure: European Immigration, 1980-2012 (de la Rica, et al., 2013)

Immigration Trends

Figure 3: Immigrant Stock in Selected Countries



Note: This figure show the share of international migrants in the 6 main immigrant-receiving countries. Data source: United Nations (2009) for 1960 to 1980, and United Nations (2013) for 1990 to 2013.

Figure: Source: de la Rica, et al. (2013)

Migrants and the Labor Market

- Case 1: Perfect substitutes
- Immigrants and natives have the same types of skills
- Short-run: Increases supply of labor, driving down native workers wage

Migrants and the Labor Market

- Consider the case of perfect substitutes if labor is supplied inelastically
- Effect of M immigrants on employment and wages?
  - $E^* \uparrow$
  - $w^* \downarrow$
- Effect on surplus?
  - $\downarrow$ Native WS
  - $\uparrow$ Native FS
  - $\uparrow$ Total surplus
- Increase in national income accruing to natives is called the **immigration surplus**

Migrants and the Labor Market

- Immigration surplus arises because the wage rate equals the productivity of the *last* immigrant hired
- Essentially, immigrants contribute at least as much as they are paid
- What factors impact the size of the surplus?
  - Number of immigrants
  - Elasticity of labor demand curve

Migrants and the Labor Market

- Long-run: Labor demand shifts too
  - Labor demand is derived from demand for output
  - Increased population of wage-earners raises demand for output
  - Raised demand for output raises labor demand $\Rightarrow$ pushes native wages back up (could rise up to native wage prior to immigration)

Migrants and the Labor Market

- Case 2: Complementary Inputs
- Migration of high-skill individuals may generate human capital externalities or spillovers

Migrants and the Labor Market

- In the case of complements, the VMP_E of native workers increases $\rightarrow$ labor demand shifts right
- Assume spillover effect is greater than labor supply effect $\rightarrow$ labor demand increases more than labor supply
- Effect on employment and wages?
  - $\uparrow E^*$
  - $\uparrow w^*$
- Effect on surplus?
  - $\uparrow$ Native WS
  - $\uparrow$ Native FS

Migrants and the Labor Market

- Skill distributions of recent US immigrants vary widely.
- In some cases, skill distributions of immigrants vary widely between groups from similar regions or even same country.
- Hence, both cases have important implications.

Readings

- Borjas 4.5; 8.7-8.8

Non-Competitive Labor Markets

- So far, we've looked at the characteristics of labor market equilibrium in competitive markets
- Competitive markets require:
  - Large number of firms
  - Large number of workers
  - Homogeneous workers and firms
  - No search frictions between jobs
- Firms are price takers $\Rightarrow$ individual firms face a perfectly elastic labor supply curve

Monopsony

- A market is referred to as a **monopsony** if there are many sellers, but only one buyer
- In this case, the market supply curve is the same as the individual firm's supply
  - Monopsony faces an upward sloping labor supply curve

Perfectly Discriminating Monopsony

- A perfectly discriminating monopsonist can hire different workers at different prices
- Thus, the labor supply curve gives the marginal cost of hiring each worker
- Monopsonist cannot influence prices in the output market
- Revenue from hiring an additional worker: VMP_E
- Thus, labor demand curve for monopsonist is given by the VMP_E curve

Perfectly Discriminating Monopsony

- Firms, regardless of market structure, hire until $MB = MC$ of hiring the last worker
- Market equilibrium will occur where supply equals demand $\Rightarrow$ Perfectly discriminating monopsonist hires the same amount of workers as would be hired in a perfectly competitive labor market
- The wage where supply and demand meet is **not** the competitive wage, but the wage that the monopsonist pays the last worker hired
- Welfare implications?

Non-Discriminatory Monopsonist

- In the non-discriminatory case, the monopsonist must pay workers the same wage
- If the firm wishes to hire an additional worker, it must raise the wage for **all** workers
- Implication: $MC > w$
  - Perfectly competitive market: $MC = w$
  - Perfectly discriminating monopsonist: $MC_i = w_i$ (for each worker i)
- Optimal hiring rule: $VMP_E = MC_E$ (like always)

Non-Discriminatory Monopsonist

- As the monopsonist hires more workers, the wages rises:
  - MC_E curve is upward sloping
  - MC_E rises faster than the wage
  - MC_E curve lies above the supply curve
- Relative to competitive labor markets, monopsonistic markets result in
  - lower wages
  - lower worker surplus & higher producer surplus
  - Deadweight loss
- Underemployment in monopsonistic markets $\Rightarrow$ allocation of resources is inefficient

Monopsony & The Minimum Wage

- Ambiguous effect on employment, depends on level of minimum wage:
  - If $w_M < \bar{w} < VMP_M$, leads to:
    - Increase in employment, wages and worker surplus
    - Decrease in firm surplus
    - Increase in total surplus
  - If $\bar{w} > VMP_M$, leads to:
    - Increase in wages
    - Decrease in employment and firm surplus
    - Could increase or decrease worker surplus
    - Decrease in total surplus
- To reach the competitive market equilibrium and maximize total surplus, the government would impose a minimum wage where supply = demand

Readings

- Borjas 4.8

LMDCs

- The term "developing" country is broadly used to refer to low and middle-income countries classified by Gross National Income (GNI) per capita
- A lot of heterogeneity across "developing" countries in regards to their institutions, labor markets, etc.
  - Certain characteristics still prominent across many different LMDCs
- For many households in developing countries, time endowment is their primary asset
- Labor markets are critical to welfare of developing country households

Motivation

	Extreme poverty headcount (% living below US$ 1.90 a day at 2011 PPP)	Share of population (%)	Share of extremely poor population (%)
Low	47.2	8.3	30.1
Lower middle	18.7	39.4	56.3
Upper middle	5.4	32.8	13.6
High	0.0	19.5	0.0
World	12.7	100.0	100.0

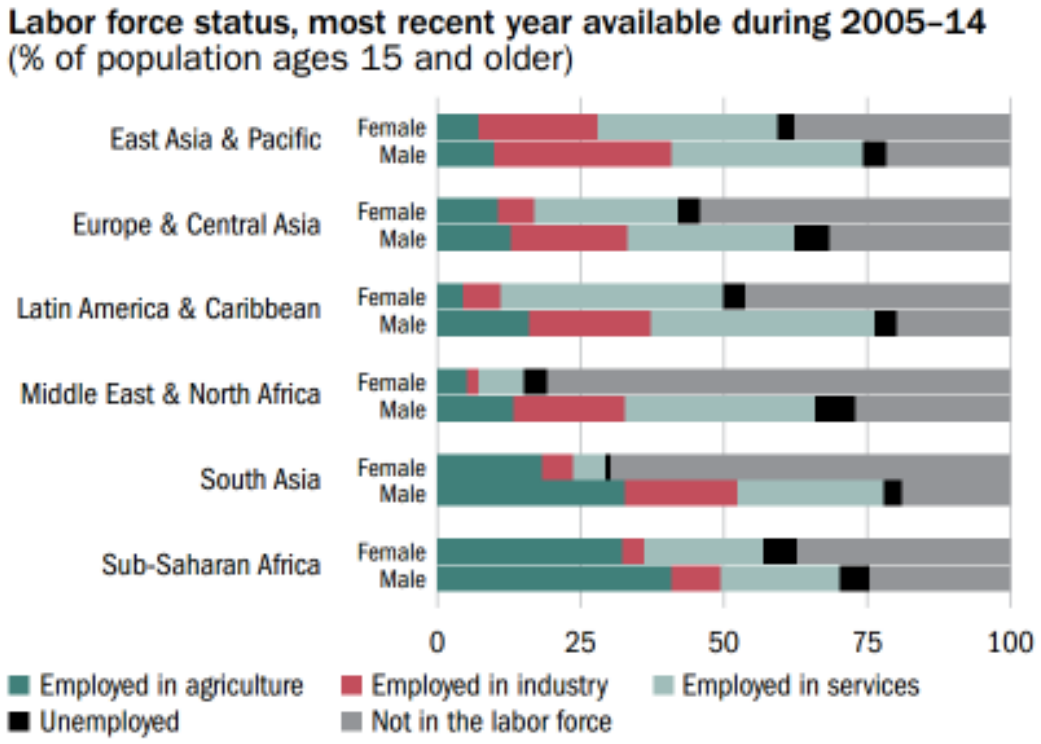
Source: World Development Indicators and PovcalNet, accessed on December 8, 2015.

Figure: Extreme Poverty by Classification, 2015 (Fantom & Serajuddin, 2016)

LMDC Characteristics

- Fields (2011) proposes that LMDCS are characterized by
  1. Low, but rising, unemployment
  2. Very low total earnings, but high number of work hours
  3. A great deal of variation in earnings over time
  4. A large gender gap in earnings and security

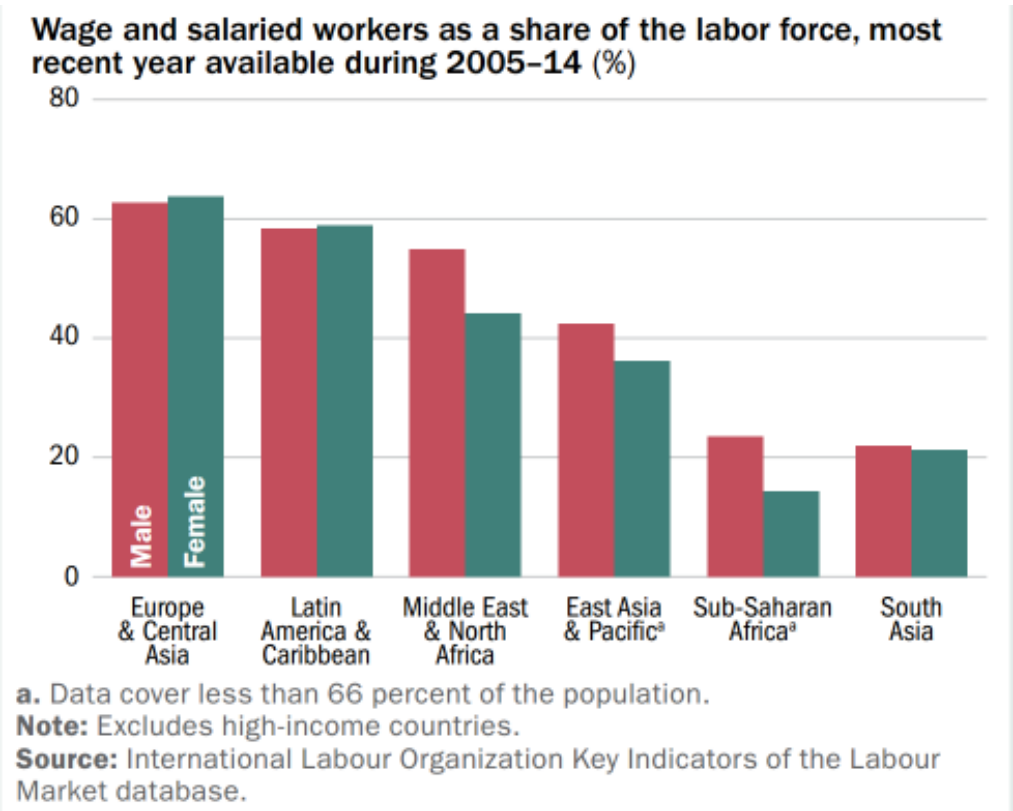
LMDC Characteristics



Note: Excludes high-income countries.
Source: International Labour Organization Key Indicators of the Labour Market database.

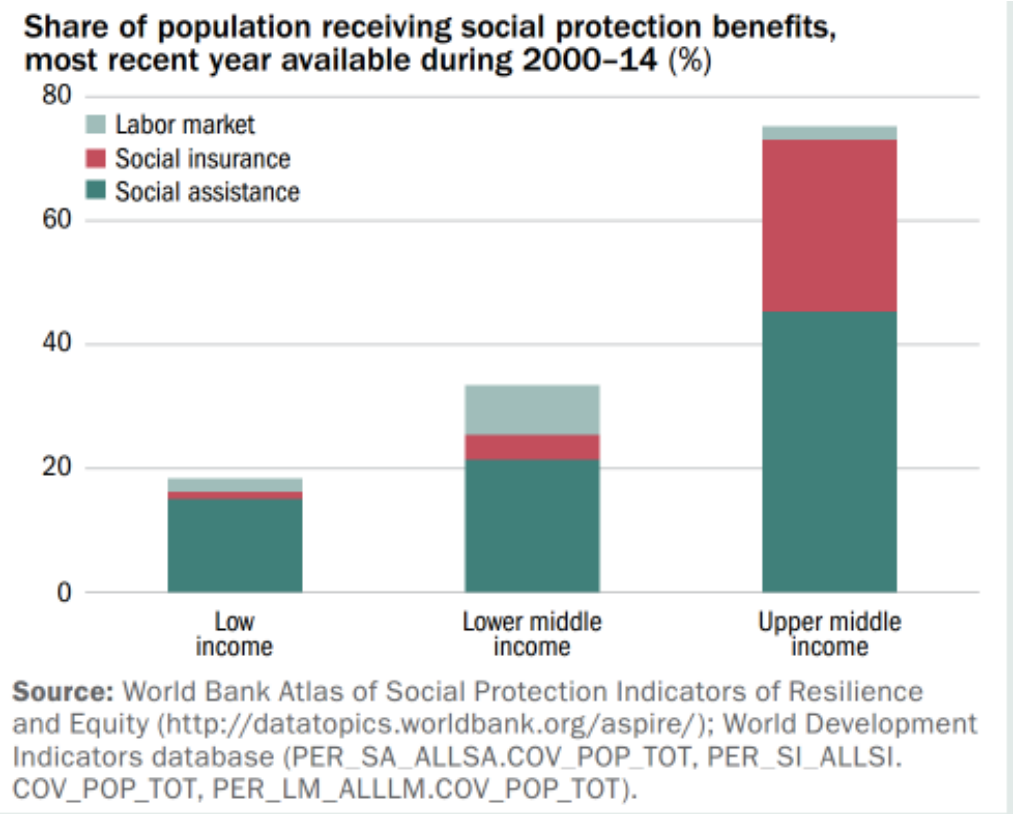
LMDC Characteristics

- Fields (2011), cont.
  5. Large degree of employment in agriculture and informal services
  6. Large degree of self-employment and unpaid home production



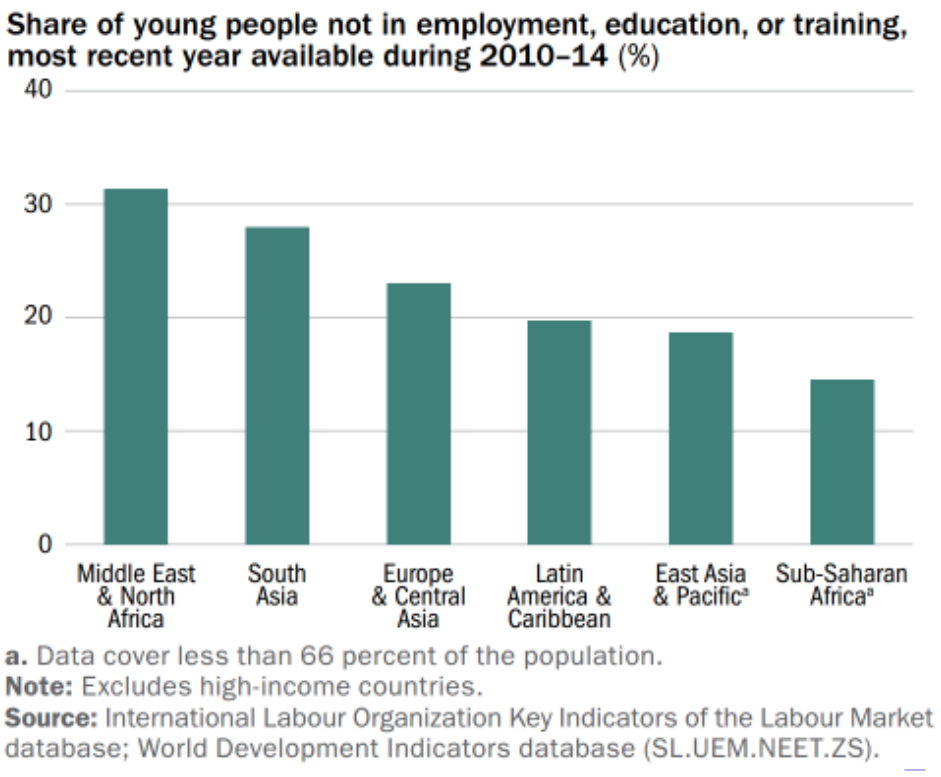
LMDC Characteristics

- Fields (2011), cont.
  7. "Excess demand" for wage employment vs self-employment, formal employment vs informal employment, and public employment vs private employment
  8. Very few social protections in place



LMDC Characteristics

- Fields (2011), cont.
  9. Labor markets are often "segmented" or "dual markets"
  10. "What developing countries have is an employment problem...rather than an unemployment problem"
- Recent trend: Rise in persistent youth unemployment in middle-income countries



LMDC Characteristics

- Campbell & Ahmed (2012) distinguish between "traditional" and "modern" labor markets

The "Dual Economy" is divided into a "traditional" and a "modern" economy	
The "traditional" Economy	**The "Modern" Economy**
is relatively more ...	
informal	Formal
Vulnerable in employment status	Likely to have a higher share of wage-earners
Rural	Urban
Likely to be less productive	Likely to more productive
Credit-insufficient	Access to credit
Likely to have a low capital-to-labour ratio	Likely to have a higher capital-to-labour ratio
Oriented to domestic, even local markets	Oriented to domestic and international markets
Sheltered from the impact of macroeconomic policies	Exposed to macroeconomic policies
Deficient in the quality of jobs	Deficient in the quantity of jobs
Likely to be less or un-protected	Likely to have at least de jure protection
Prone to greater earnings instability	Stable and predictable in earnings and income

Source: Adapted from D. Campbell, "Employment-Led Growth and Growth-Led Employment in the Recovery," in *The Global Crisis : Causes, Responses, and Challenges*, (Geneva : ILO, 2011), Chapter 8.

LMDCs - Segmentation

- Informality is a predominant feature in developing countries
- Definitions vary, but generally it refers to either
  - Self-employment in informal enterprises and/or
  - paid employment from informal jobs (e.g., casual labor, unregistered employment)
- Usually "informal" economy consists of more labor-intensive jobs with lower earnings and non-existent (or non-compliant) labor regulations
- Informal economy employs a majority of workers and contributes a significant share of GDP in many developing countries (Campbell & Ahmed, 2012)

LMDCs - Segmentation

- Why are markets "segmented?" Possible explanations:
  1. "Exclusion view": Self-employed and workers in the informal sector would prefer the higher wages and benefits of the formal sector, but are excluded from participating due to labor market rigidities or other barriers
  2. Markets are not truly "segmented," but rather workers sort into different labor markets voluntarily due to comparative advantage considerations

LMDCs - Segmentation

- Empirical evidence: Arias & Khamis (2008)
- Analyze participation and earnings performances in the self-employed, informal, and formal sectors in Argentina
- Method: Marginal treatments effects
  - Addresses potential heterogeneity of "treatment" (formal employment) across individuals due to both observable and unobservable characteristics

LMDCs - Segmentation

- Result: Evidence for both comparative advantage and segmented market stories
  - No significant difference between earnings of formally employed and self-employed workers (after accounting for selection) - supports comparative advantage story
  - Significant earnings penalty for those employed in informal work, regardless of the propensity to select into formal employment - supports segmentation story

LMDCs - Earnings Variability

- Productivity shocks can have significant impacts on earnings
- These shocks may be especially prominent in developing nations and underdevelopment itself may exacerbate productivity risk for the poor
- Empirical evidence: Jayachandran (2006)
- Labor supply response to a wage drop:
  - Income effect: Workers supply more work
  - Substitution effect: Workers supply less work

LMDCs - Earnings Variability

- Income effect is likely to be stronger in developing countries due to
  - inability to save or borrow $\Rightarrow$ ability to use outside funds in order to smooth consumption is limited
  - greater poverty $\Rightarrow$ greater marginal utility of income
  - lower worker mobility $\Rightarrow$ workers unable to substitute towards other labor markets

LMDCs - Earnings Variability

- Implication: Inelastic labor supply implies that the poor are made worse off due to large wage fluctuations caused by productivity shocks
- Jayachandran (2006) analyzes data on Indian agricultural wages and crop yields between 1956 and 1987
  - Isolate exogenous changes in productivity by using local rainfall as an **instrumental variable**
- Results?

LMDCs - Women in the Labor Force

- Women's labor force participation is typically low in developing countries, but most do engage in household production
- Godin (1995): U-shaped pattern in women's labor force participation
  - Low economic development: High employment rates in agriculture and self-employment
  - As income rises, women leave labor market
  - With greater development (and increases in women's human), white-collar opportunities become available and draw women back into workforce

LMDCs - Women in the Labor Force

- Jensen (2012): Provided three years of recruiting services in randomly selected rural Indian villages in the business process outsourcing industry (BPO)
  - Key: Relatively new industry, so awareness of jobs was limited in rural areas
  - Thus, intervention identifies the effect of increasing labor market opportunities

LMDCs - Women in the Labor Force

- Results:
  - Labor market: Women aged 15-21 in "treatment" villages were more likely to work than those in control villages, both in BPO work and other paid work
  - Women also expressed greater interest in working throughout their lives, indicating a shift in aspirations
- Results on non-labor market outcomes?

Readings

- *Ahmed & Campbell (2012). The Labour Market in Developing Countries. Working Paper
- Arias & Khamis (2008). Comparative Advantage, Segmentation, and Informal Earnings: A Marginal Treatment Effects Approach. *IZA Discussion Paper 3916*
- *Fields, G. (2011). Labor Market Analysis for Developing Countries. *Labour Economics*
- Jayachandran, S. (2006). Selling Labor Low: Wage Responses to Productivity Shocks in Developing Countries. *Journal of Political Economy*
- *Jensen, R. (2012). Do Labor Market Opportunities Affect Young Women's Work and Family Decisions? Experimental Evidence from India. *The Quarterly Journal of Economics*