The Economics of International Migrations:
A task-based approach to the effects of immigration

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Lecture 6

Immigration and Specialization in Productive Tasks

- Framing the Productive impact of Immigrants in a skill-based (task-based) economy. Consistent with Ottaviano and Peri (2008), Autor Levy and Murnane (2002) and providing more micro-foundations.

- We first apply it to less educated

- Then we look at highly educated immigrants and their impact on creation of new ideas (in the receiving country) and diffusion of them internationally

- Finally we look at migrants as generating a network of knowledge diffusion, particularly important to reduce some fixed costs of trade.

What we know so far

- What is the Effect of Immigrants on wages of workers in the host country?
  - No average wage effect, very small relative wage effect

- What in particular on wages of Less Educated?
  - High school dropouts and high school graduates are similar, in that they may substitute productive tasks for each other
  - At the same time immigrants and natives are not identical in that they may perform different productive tasks.

- As a consequence:
  - between 0 and +1% effect on the real wages of less educated in the long-run
  - No evidence of displacement effect on employment

Contribution of this paper

- Intuitive theory/explanation for why immigrants are different from natives in production within an education Group. Data

- Key Point: Immigrants and native-born workers <u>differ</u> from each other in skills and performed productive tasks. Even among workers with low education:
  - Immigrants specialize in manual/physical tasks.
  - US natives specialize in language/communication intensive tasks.

- This limit their wage competition and increases their productive complementarities. These specialization effects will differ across states as states received very different amounts of immigrants

Percentage of foreign-born in Employment
US States, Highest and Lowest 1960-2004

Percentage of foreign-born in Employment: 1960-2005
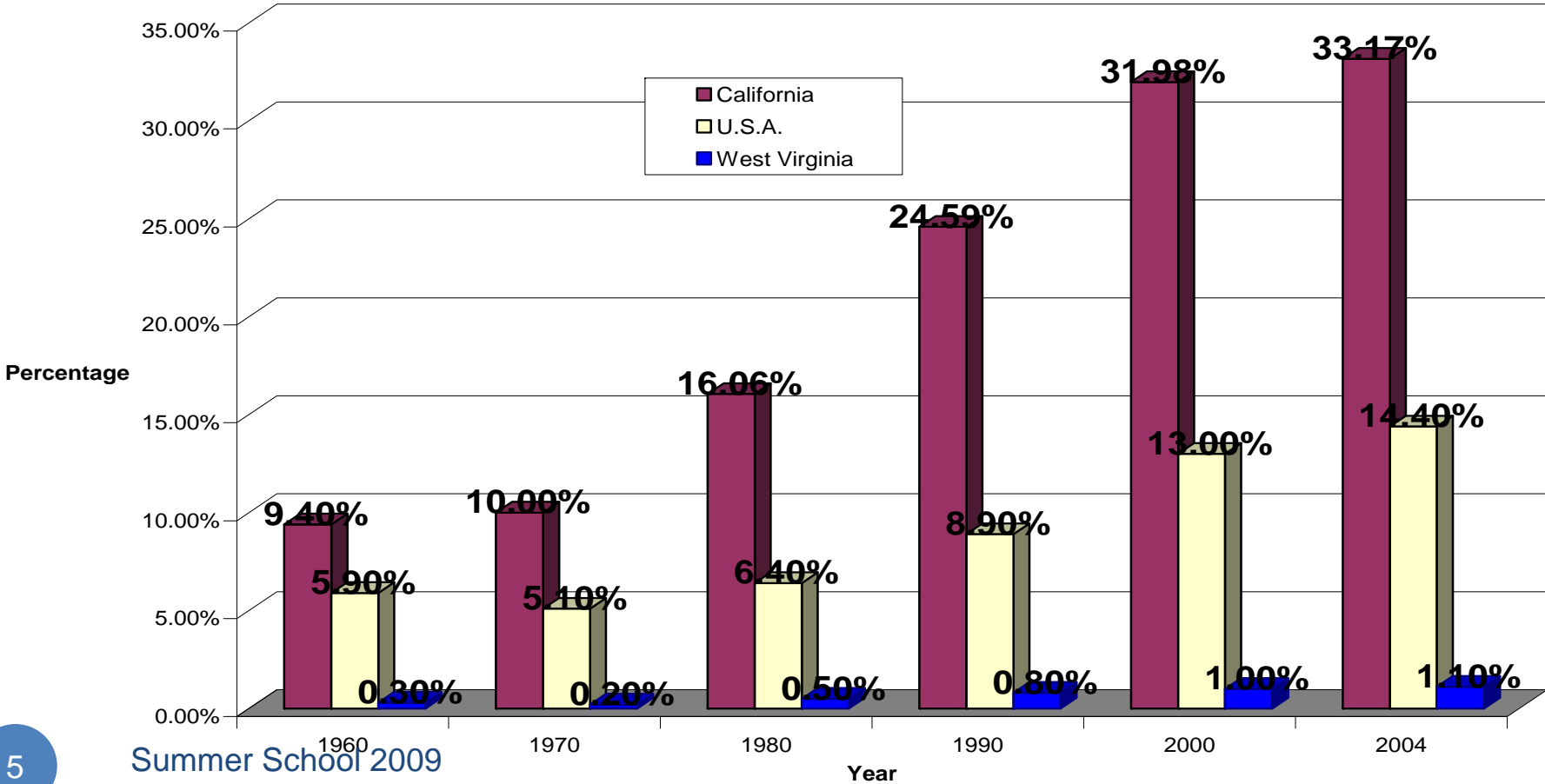
A simple model of Demand and Supply of Tasks

- US states: open economies, each produce the same perfectly tradable final good.

- 2 non-tradable intermediate services, Y_L produced by less educated, L and Y_H produced by more educated workers, H. They are combined in a final Consumption Good.

$$Y = \left[\beta Y_L^{\frac{\sigma-1}{\sigma}} + (1-\beta) Y_H^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}$$

- Each type of workers perform production tasks to produce the intermediate good
  - Less educated: Manual and Communication
  - More educated: Analytical/Managerial

$$Y_L = \left[\beta_L M^{\frac{\theta_L-1}{\theta_L}} + (1-\beta_L) C^{\frac{\theta_L-1}{\theta_L}} \right]^{\frac{\theta_L}{\theta_L-1}} \qquad Y_H = H$$

Relative demand of tasks for the aggregate economy

$$\frac{C}{M} = \left(\frac{1 - \beta_L}{\beta_L} \right)^{\theta_L} \left(\frac{w_C}{w_M} \right)^{-\theta_L}$$

- Positively depending on relative task productivity
- Negatively depending on relative task compensation

Supply of tasks among less educated

Less educated workers are heterogeneous: Domestic (D) or Foreign-Born (F)
Each of them splits one unit of labor endowment in Communication and Manual tasks. Calling l_j the share of labor supplied in manual tasks, by individual j The effective units of Communication and Manual tasks supplied are

$$c_j = (1 - l_j)^\delta \, \zeta_j$$
$$m_j = (l_j)^\delta \, \mu_j$$

Where m and z are the effectiveness in performing manual and communication services and $\delta < 1$
Comparative advanta $\left(\dfrac{\zeta_D}{\mu_D} \right) > \left(\dfrac{\zeta_F}{\mu_F} \right)$

Labor income:
$$w_D = (l_D)^\delta \mu_D w_M + (1 - l_D)^\delta \zeta_D w_C.$$

$$w_F = (1 - d) \left[(l_F)^\delta \mu_F w_M + (1 - l_F)^\delta \zeta_F w_C \right]$$

Supply of tasks among less educated

- By maximizing wage income with respect to the choice of l_j we obtain the relative supply of each type j:

$$\frac{c_j}{m_j} = \left(\frac{w_C}{w_M}\right)^{\frac{\delta}{1-\delta}} \left(\frac{\zeta_j}{\mu_j}\right)^{\frac{1}{1-\delta}}$$

$$\frac{l_j}{1-l_j} = \left(\frac{\zeta_j w_C}{\mu_j w_M}\right)^{\frac{1}{\delta-1}}$$

- Each allocation corresponds to an occupation in a continuum. The choice of occupation fully reveals relative productivity. We measure effective supply of skill by occupation.
- At any relative wage level immigrant supply relatively less c/m (i.e they are in occupations with low c/m)

Aggregate Task supply

- Relative task supply

$$\frac{C}{M} = \frac{C_F + C_D}{M_F + M_D} = \phi(f) \cdot \frac{C_F}{M_F} + (1 - \phi(f)) \cdot \frac{C_D}{M_D}$$

$$M_j = L_j m_j$$

$$C_j = L_j c_j$$

$$f = L_F / (L_F + L_D)$$

$$\phi'(f) > 0; \phi(0) = 0 \text{ and } \phi(1) = 1$$

Equilibrium effect of share of immigrants (*f*) on:

$$\frac{w_C^*}{w_M^*} = \left(\frac{1-\beta_L}{\beta_L}\right)^{\frac{(1-\delta)\theta_L}{(1-\delta)\theta_L+\delta}} \left[\frac{\zeta}{\mu}\left(\underset{-}{f}, \frac{\zeta_F}{\mu_F}\right)\right]^{-\frac{1}{(1-\delta)\theta_L+\delta}}$$

Relative wages (positive)

$$\frac{C^*}{M^*} = \left(\frac{1-\beta_L}{\beta_L}\right)^{\frac{\delta\theta_L}{(1-\delta)\theta_L+\delta}} \left[\frac{\zeta}{\mu}\left(\underset{-}{f}, \frac{\zeta_F}{\mu_F}\right)\right]^{\frac{\theta_L}{(1-\delta)\theta_L+\delta}}$$
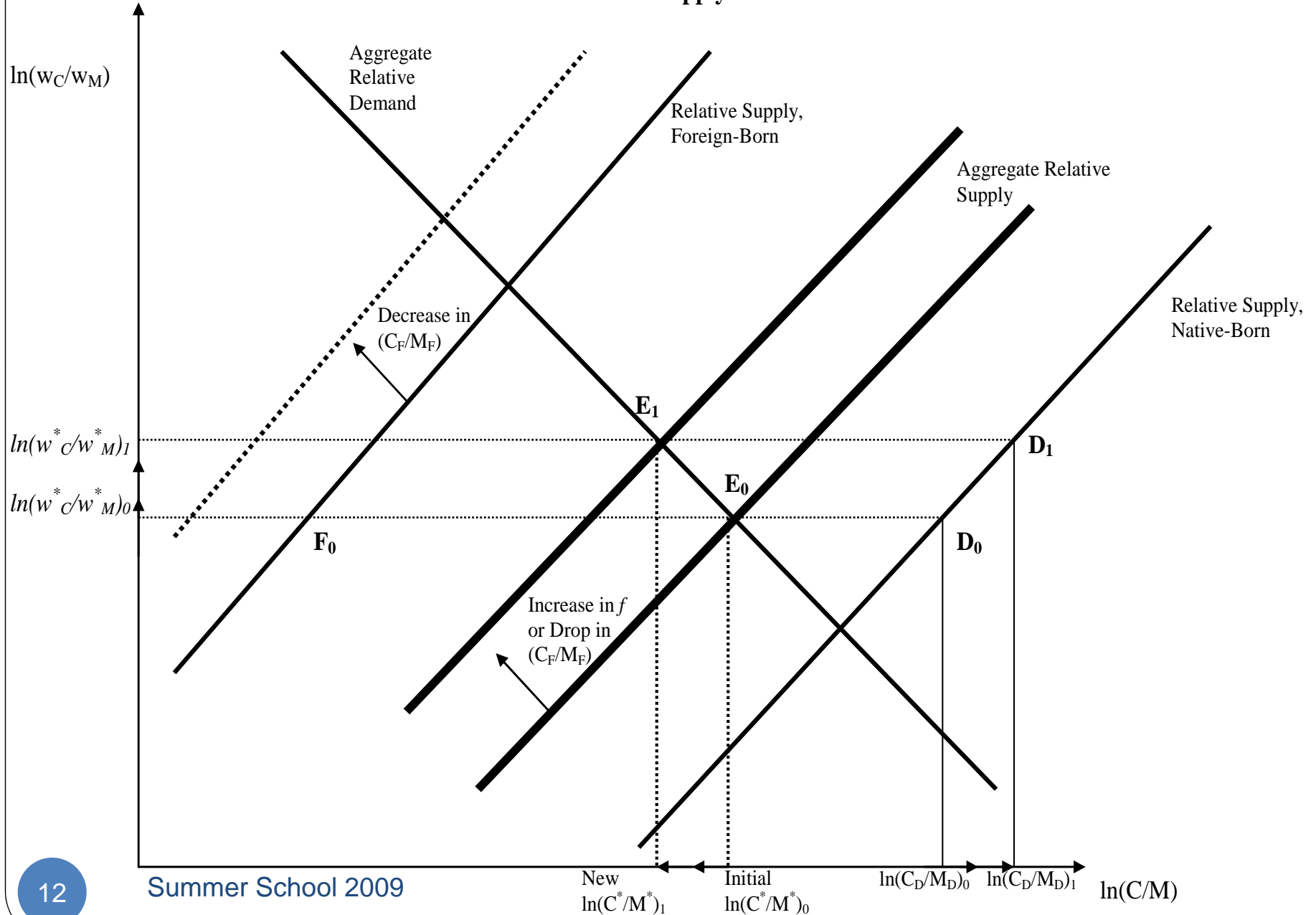
Relative task quantity (positive)

$$\frac{C_D^*}{M_D^*} = \left(\frac{1-\beta_L}{\beta_L}\right)^{\frac{\delta\theta_L}{(1-\delta)\theta_L+\delta}} \left(\frac{\zeta_D}{\mu_D}\right)^{\frac{1}{1-\delta}} \left[\frac{\zeta}{\mu}\left(\underset{-}{f}, \frac{\zeta_F}{\mu_F}\right)\right]^{-\frac{1}{(1-\delta)\theta_L+\delta}\frac{\delta}{1-\delta}}$$

Relative task quantity supplied by natives (negative)

Figure 1
Relative Communication/Manual Task Supply and Demand

$ln(w_C/w_M)$

Aggregate Relative Demand

Relative Supply, Foreign-Born

Aggregate Relative Supply

Decrease in (C_F/M_F)

Relative Supply, Native-Born

E_1

$ln(w^*_C/w^*_M)_1$

D_1

E_0

$ln(w^*_C/w^*_M)_0$

D_0

F_0

Increase in f or Drop in (C_F/M_F)

New $ln(C^*/M^*)_1$

Initial $ln(C^*/M^*)_0$

$ln(C_D/M_D)_0$ $ln(C_D/M_D)_1$

$ln(C/M)$

Testable Equilibrium Implications of immigration on native workers

- Foreign-born workers supply relatively more manual versus communication tasks than domestic workers.

- A higher share of foreign-born workers induces higher supply of communication relative to manual tasks by native workers

- A higher share of foreign-born induces lower overall supply of communication relative to manual tasks and a higher compensation paid to communication relative to manual tasks ,

Log linearizing the equilibrium conditions and the relative demand:

$$\ln\left(\frac{C_D}{M_D}\right)_{st} = \gamma \cdot f_{st} + \alpha_s^D + \tau_t^D + \varepsilon_{st}^D$$

$\gamma > 0$

$$\ln\left(\frac{C}{M}\right)_{st} = \gamma_{TOT} \cdot f_{st} + \alpha_s^{TOT} + \tau_t^{TOT} + \varepsilon_{st}^{TOT}$$

$\gamma_{TOT} < 0$

$$\ln\left(\frac{w_C}{w_M}\right)_{st} = -\frac{1}{\theta_L} \cdot \ln\left(\frac{C}{M}\right)_{st} + \alpha_s^w + \tau_t^w + \varepsilon_{st}^w$$

$\theta_L > 0$

The parameters an be estimated if changes in the share of less educated immigrants are exogenous

Data

- On individual characteristics, wage, schooling, race, gender, occupation they are from Census IPUMS 1960-2000.

- Measures of skills: US Department of Labor's O*NET abilities survey. This dataset assigns numerical values to describe the importance of 52 distinct employee abilities (which we refer to as "tasks" or "skills") within each SOC (standard occupation classification) occupation. Then we attach them to individual over time using homogenized occupation codes

- We use all the variables in the O*NET abilities dataset – standardize each of them between 0 and 1 using its percentile value in 2000. Then we aggregate them in different ways to construct a summary measure for manual and communication skills.

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Skill Variables and Datasets

Type of Skill	Definition	Skill Sub-Type	O*NET Variables
Manual (or Physical) Skills	**Basic Definition:** Movement and Strength	Limb-Hand-Fingers Dexterity	Arm-Hand Steadiness; Manual Dexterity; Finger Dexterity; Control Precision; Multilimb Coordination; Response Orientation; Rate Control; Reaction Time; Wrist-Finger Speed; Speed of Limb Movement
		Body Coordination-Flexibility	Extent Flexibility; Dynamic Flexibility; Gross Body Coordination ; Gross Body Equilibrium.
		Strength	Static Strength; Explosive Strength; Dynamic Strength; Trunk Strength; Stamina.
	Extended definition: Includes sensory-perceptions skills	General Perception	Perceptual Speed; Spatial Orientation; Visualization; Selective Attention; Time Sharing.
		Visual Perception	Near Vision; Far Vision; Visual Color Discrimination; Night Vision; Peripheral Vision; Depth Perception; Glare Sensitivity.
		Hearing Perception	Hearing Sensitivity; Auditory Attention; Sound Localization.
Communication (or Language) Skills	**Basic Definition:** Oral and Written	Oral	Oral Comprehension; Oral Expression
		Written	Written Comprehension; Written Expression
	Extended Definition: Includes Cognitive-Analytical-Vocal	Cognitive-Analytical	Fluency of Ideas; Originality; Problem Sensitivity; Category Flexibility; Mathematical Reasoning; Number Facility; Deductive Reasoning; Inductive Reasoning; Information Ordering; Memorization; Speed of Closure; Flexibility of Closure
		Vocal	Speech Recognition; Speech Clarity

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O*NET Variables

- Index measures the intensity of use of the skill in the occupation

- Values rescaled between 0 and 1, standardize them so that median occupation has 0.5 task intensity in 2000 and the score correspond to the percentile of the distribution in 2000 (ranking all workers from lowest to highest task content).

- Average for each individual depending on the definition:

- Aggregate the individual measures (supply) by weighting each individual by the number of hours worked. This produces the average supply.

Table 1
Occupations, Relative Task Intensity, and
Changes in the Foreign-Born Share of Less-Educated Employment

Occupation	Communication Intensity Index	Manual Intensity Index	C/M Percentile	Change in Foreign-Born Share of Less-Educated Employment 1970-2000 (Percentage Points)
Four Occupations with Highest Communication/Manual Values				
Financial managers	0.83	0.23	0.999	+5.7
Managers of properties and real estate	0.74	0.21	0.997	+1.8
Editors and reporters	0.87	0.27	0.991	+12.2
Operations and systems researchers and analysts	0.64	0.20	0.990	+4.1
Five Occupations with Average Communication/Manual Values				
Cashiers	0.38	0.73	0.562	+12.0
Cooks, variously defined	0.32	0.67	0.530	+19.9
Hairdressers and cosmetologists	0.30	0.62	0.498	+17.0
Repairers of industrial electrical equipment	0.36	0.77	0.490	+9.5
Kitchen workers	0.28	0.62	0.489	+2.8
Four Occupations with Lowest Communication/Manual Values				
Vehicle washers and equipment cleaners	0.04	0.72	0.021	+20.6
Furniture and wood finishers	0.01	0.72	0.021	+13.4
Roofers and slaters	0.01	0.64	0.020	+26.4
Drywall installers	0.00	0.72	0.006	+24.2

Figure 2
Communication/Manual Intensity of Natives, recent and old Immigrants, U.S. 1970-2000
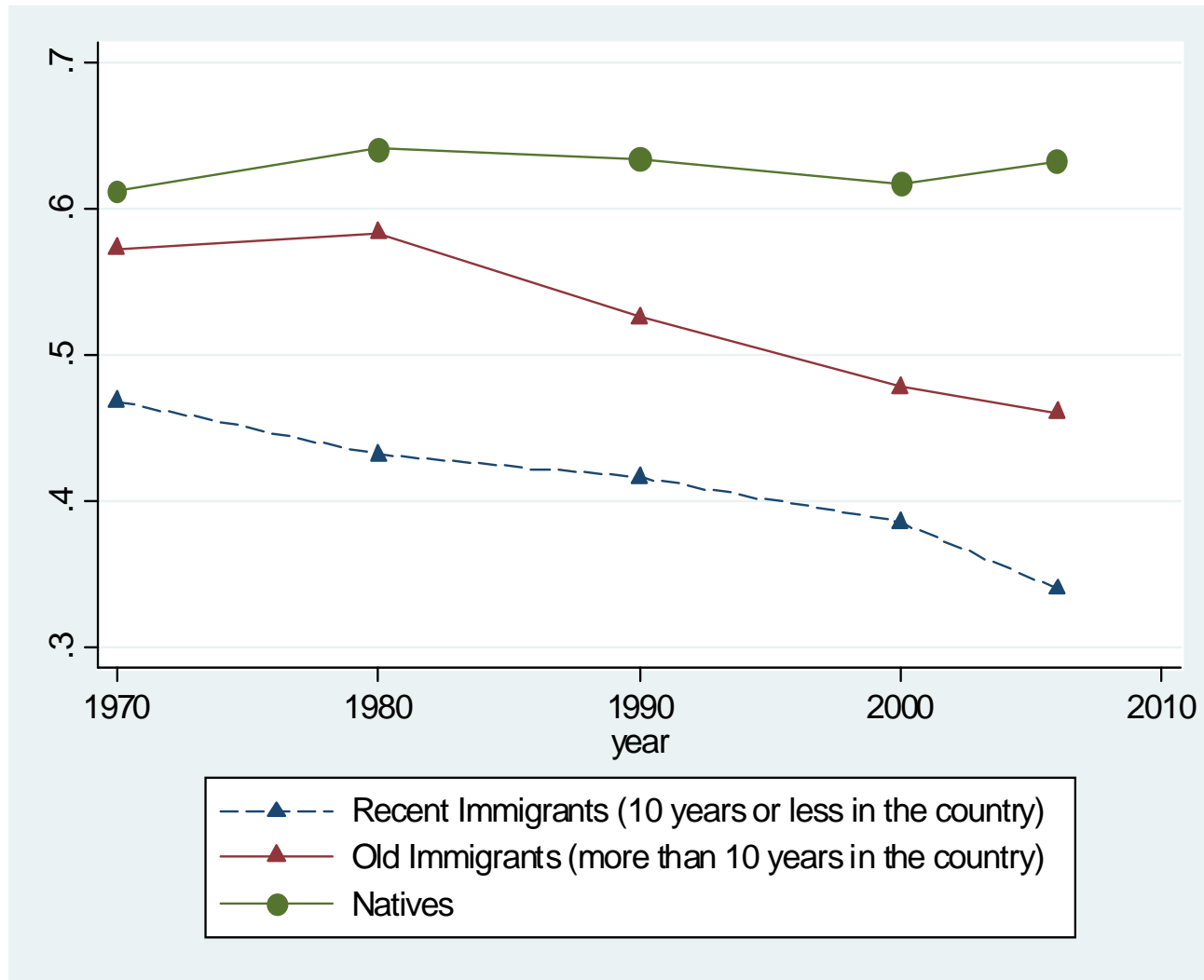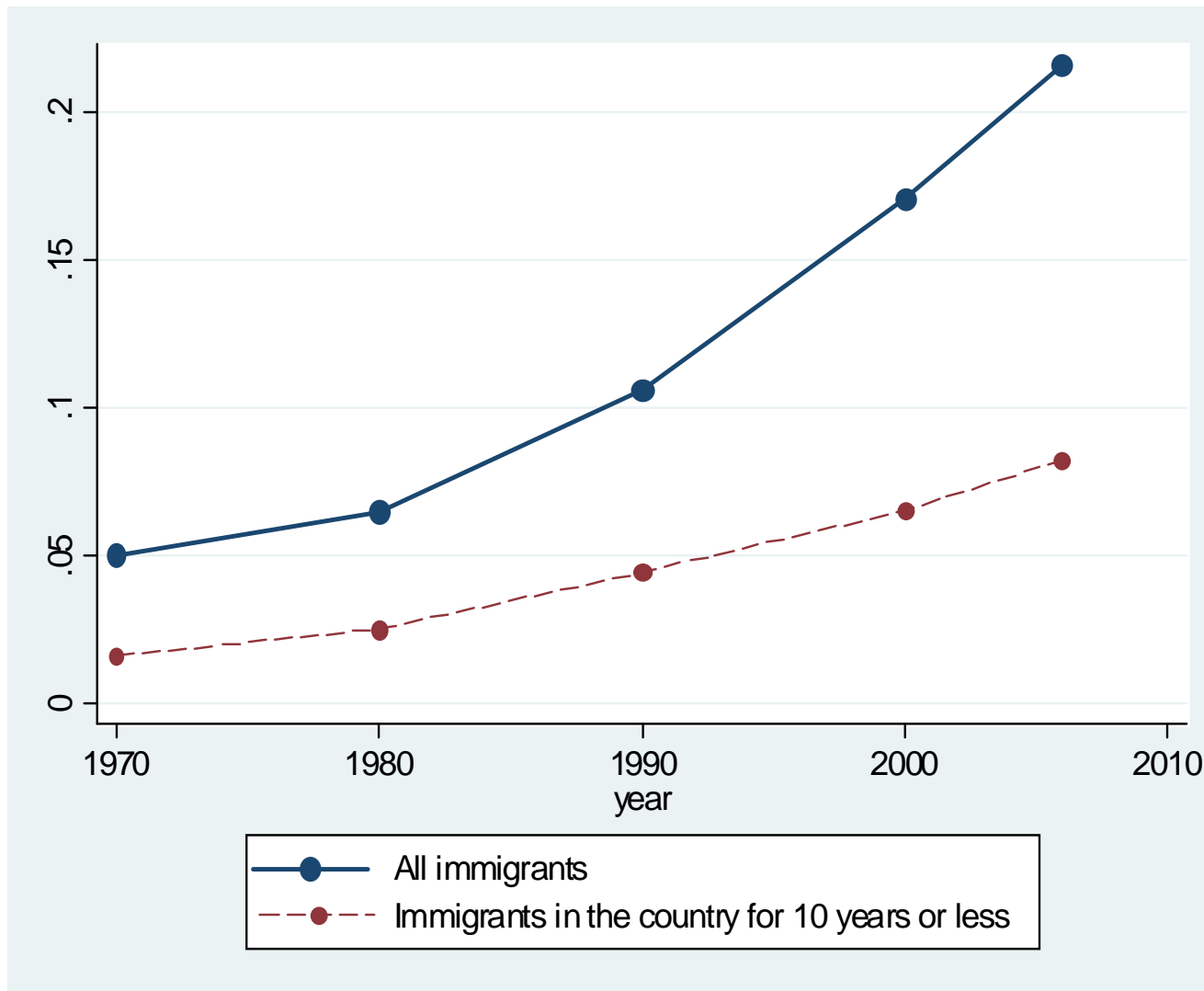Workers with a High School Degree or Less Education

Legend:
- Recent Immigrants (10 years or less in the country)
- Old Immigrants (more than 10 years in the country)
- Natives

**Figure 3**
Share of hours supplied by Foreign-Born among workers with high school degree or less 1970-2006

Legend:
— All immigrants
--- Immigrants in the country for 10 years or less

Empirical analysis and State-Aggregates

- Consider each state as a labor Market.

    - Calculate the relative provision of C/M by state for less educated as follows:
    - 1) Run an individual regression each year with task intensity measured regressed on individual characteristics (age, education, race, gender) the residuals are the "cleaned" individual task supply
    - 2) Aggregate them weighting for hours worked times personal weight in a state.
    - 3) Do this for each state and year 1960, 70, 80, 90,2000.

- Analyze how relative C/M provision of <u>domestic workers</u> depends on share of immigrants.

- Analyze how <u>total supply of C/M and elative compensation to C/M</u> depends on share of immigrants.

Figure 3
Share of Immigrants and the Relative C/M Supply of Natives, Less Educated
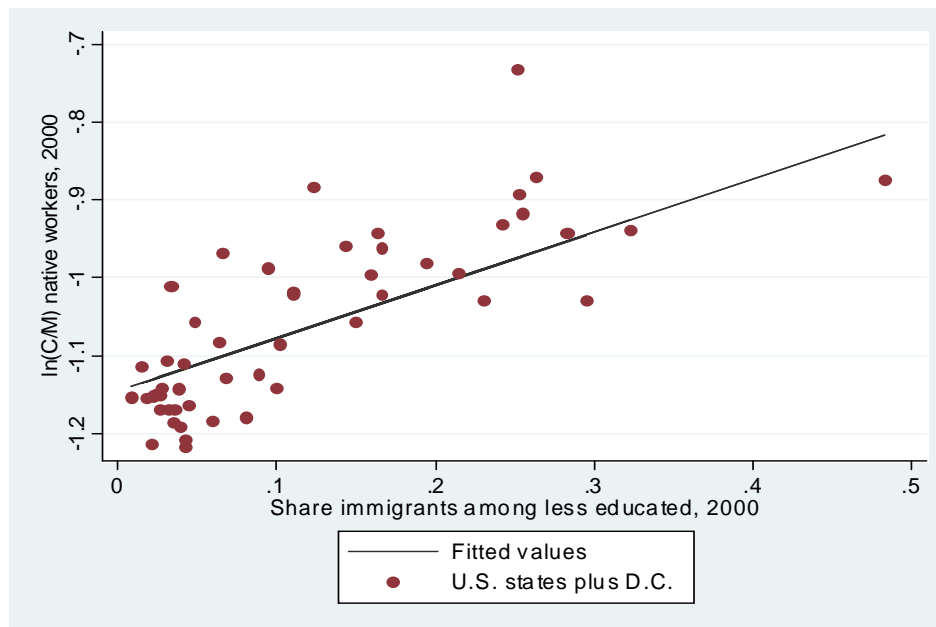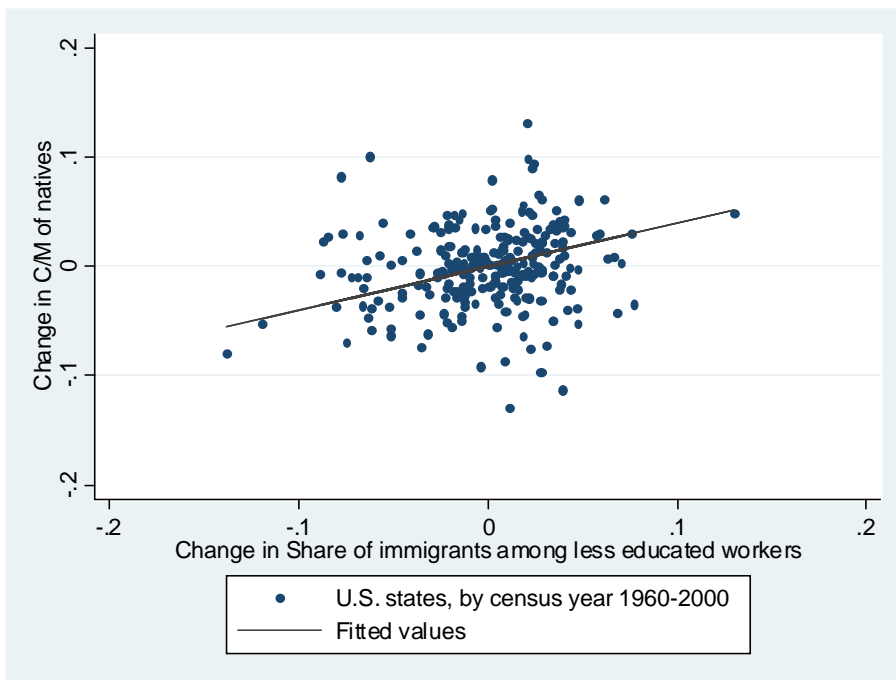
Note: The fitted lines are from a weighted least square regression (weights equal to employment of less educated in the state): Panel A: slope=0.40 standard error=0.04; Panel B: slope=0.68 standard error=0.10

<u>First Test:</u> A higher foreign-born share (s) of less-educated workers in an economy induces higher provision of communication relative to manual tasks among less-educated native workers

$$\ln\left(\frac{C_D}{M_D}\right)_{st} = \gamma \cdot f_{st} + \alpha_s^D + \tau_t^D + \varepsilon_{st}^D \qquad \gamma > 0$$

$$\ln(c_D)_{st} = \gamma_C \cdot f_{st} + \alpha_s^D + \tau_t^D + \varepsilon_{st}^D \qquad \gamma_C > 0$$

$$\ln(m_D)_{st} = \gamma_M \cdot f_{st} + \alpha_s^D + \tau_t^D + \varepsilon_{st}^D \qquad \gamma_M < 0$$

Table 2
Foreign-Born Workers and the Native Supply of Tasks
Workers with a High School Degree or Less

	Explanatory Variable: Foreign-Born Share of Workers with a High School Degree or Less					
	(1)	(2)	(3)	(4)	(5)	(6)
Communication Definition:	*Basic*	*Basic*	*Basic*	*Basic*	*Basic*	*Basic*
Manual Definition:	*Basic*	*Extended*	*Basic*	*Extended*	*Basic*	*Extended*
Method of Estimation	*WLS*		*2SLS using Imputed Mexican Share, Geographic Variables as Instruments*		*2SLS using Imputed Mexican Share, Geographic Variables as Instruments*	
Additional Controls:	*State and Year Fixed Effects*		*State and Year Fixed Effects*		*State and Year Fixed Effects, Computer Use, Sector-Driven C/M*	
Dependent Variables:						
Ln(C_D/M_D) γ	0.34** (0.05)	0.31** (0.04)	0.37** (0.05)	0.33** (0.04)	0.51** (0.04)	0.44** (0.04)
Ln(c_D) γ^C	0.31** (0.03)	0.31** (0.04)	0.33** (0.05)	0.33** (0.04)	0.43** (0.04)	0.43** (0.04)
Ln(m_D) γ^M	-0.03 (0.02)	0.00 (0.02)	-0.04** (0.02)	0.00 (0.02)	-0.08** (0.03)	-0.01 (0.04)
First Stage						
Joint F-Test of the Instruments (p-value)	NA	NA	18.9 (0.00)	18.9 (0.00)	6.90 (0.00)	6.90 (0.00)
Test of Over-Identifying Restrictions	NA	NA	12.5	13.2	10.2	10.4
Probability (χ^2 > test) under the Null of Instrument Exogeneity	NA	NA	0.14	0.11	0.25	0.24
Number of Observations	255	255	255	255	255	255

Omitted Variable Bias

- Omitted variables (demand shocks) affected the demand for interactive tasks and attracted immigrants at different rates across states.

- This may generate spurious correlation between specialization of natives and immigrants inflow. In fact a demand shock (technology) is likely to increase relative demand of communication tasks and attract immigrants; in that case OLS would under-estimate the absolute value of the shock.

- Solution:
  - IV
  - Controlling for Technological-Demand Factors

Instruments: Mexican Immigrants' Supply Shock

- We Instrument the share of less educated immigrants with the imputed share of Mexican (based on 1960 distribution by state and national trends).

    - Mexican were located unevenly across states in 1960

    - Immigration of less educated from Mexico boomed 1960-2000

    - States with large initial share of Mexican experienced larger supply-driven increase in less educated workers (enclave preference).

$$\widehat{MEX}_{s,t} = MEX_{s,1960} \frac{(1 + g_{MEX})_{1960-t}}{(1 + g_{US})_{s,1960-t}}$$

- Alternatively: use proximity to the Mexican Border (distance, distance squared and border dummy) interacted with decade dummies, as factor affecting inflow of immigrants but not demand.

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Second Test: A higher foreign-born share (s) of less-educated workers in an economy induces lower provision of communication relative to manual tasks overall in the state

$$\ln\left(\frac{C}{M}\right)_{st} = \gamma_{TOT} \cdot f_{st} + \alpha_s^D + \tau_t^D + \varepsilon_{st}^D \qquad \gamma_{\text{TOT}} < 0$$

$$\ln(c)_{st} = \gamma_C^{TOT} \cdot f_{st} + \alpha_s^D + \tau_t^D + \varepsilon_{st}^D \qquad \gamma_{\text{C}} < 0$$

$$\ln(m)_{st} = \gamma_M^{TOT} \cdot f_{st} + \alpha_s^D + \tau_t^D + \varepsilon_{st}^D \qquad \gamma_{\text{M}} > 0$$

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Table 3
Foreign-Born Workers, Aggregate Supply of Tasks and Communication-Manual Wage Elasticity
Workers with a High School Degree or Less

Panel A
Explanatory Variable: Foreign-Born Share of Workers with a High School Degree or Less

		(1)	(2)	(3)	(4)
Communication Definition:		*Basic*	*Basic*	*Basic*	*Basic*
Manual Definition:		*Basic*	*Extended*	*Basic*	*Extended*
Method of Estimation:		*WLS*		*2SLS using Imputed Mexican Share and, Geographic Variables as Instruments*	
Additional Controls		*State and Year Fixed Effects*		*State and Year Fixed Effects*	
Dependent Variables:					
Ln(C/M)	γ_{TOT}	-0.18**	-0.13**	-0.15**	-0.11**
		(0.04)	(0.03)	(0.04)	(0.03)
Ln(c)	γ^{C}_{TOT}	-0.12**	-0.12**	-0.10**	-0.09**
		(0.03)	(0.03)	(0.03)	(0.03)
Ln(m)	γ^{M}_{TOT}	0.06**	0.01	0.05**	0.02
		(0.02)	(0.02)	(0.02)	(0.02)
First Stage					
Joint F-Test of the Instruments (p-value)		NA	NA	18.9 (0.00)	18.9 (0.00)

Test 3: A higher foreign-born share (s) of less-educated workers induces high compensation paid to communication relative to manual tasks

- How complementary are the two types of tasks?

$$\ln\left(\frac{w_C}{w_M}\right)_{st} = -\frac{1}{\theta_L} \cdot \ln\left(\frac{C}{M}\right)_{st} + \alpha_s^w + \tau_t^w + \varepsilon_{st}^w$$

Compensation for each task in each labor market is estimated from average occupational wages in occupation j and state s. As follows:

$$\tilde{w}_{jst} = (w_M)_{st} \cdot m_j + (w_C)_{st} \cdot c_j + \varepsilon_{jst}$$

We evaluate state-year specific returns to skills, w_M and w_C by running occupation-state wages on occupation-specific skill intensity allowing different coefficients by state.

Figure 5
Share of Less Immigrants and the Compensation of C relative to M Skills, less educated
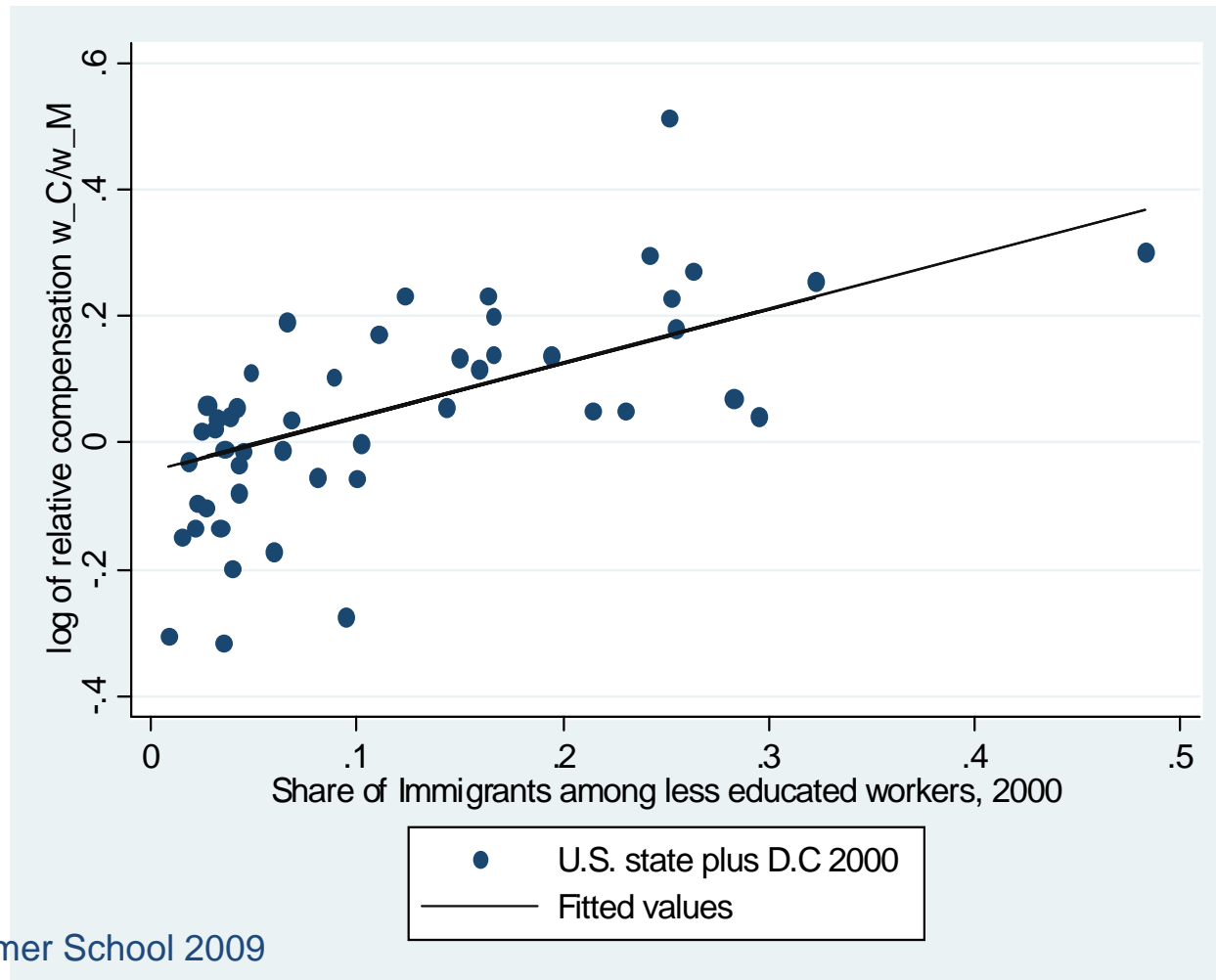
U.S. states in year 2000

Table 3
Foreign-Born Workers, Aggregate Supply of Tasks and Communication-Manual Wage Elasticity
Workers with a High School Degree or Less

	(1)	(2)	(3)	(4)
Communication Definition:	*Basic*	*Basic*	*Basic*	*Basic*
Manual Definition:	*Basic*	*Extended*	*Basic*	*Extended*
Method of Estimation:	*WLS*		*2SLS using Imputed Mexican Share and, Geographic Variables as Instruments*	
Additional Controls	*State and Year Fixed Effects*		*State and Year Fixed Effects*	
Panel B: **Explanatory Variable: Ln(C/M)** **Dependent Variable: Ln(w$_c$/w$_M$)**				
Estimated relative wage elasticity: **-1/θ$_L$**	-0.75* (0.37)	-0.70 (0.39)	-1.58** (0.26)	-1.36** (0.32)
Implied Elasticity of Substitution	1.33	1.42	0.63	0.73
First Stage				
Joint F-Test of the Instruments (p-values)	NA	NA	11.4 (0.00)	11.4 (0.00)
Number of Observations	255	255	255	255

Use variables predicting share of immigrants to instrument for relative C/M

Elasticity of Substitution implied: between 0.63 and 1.42

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Effects on real wages of natives of 1990-2000 immigration

- Using the estimated response in task supply (Table 2) and the average estimated elasticity of substitution (Table 3) between tasks plus wages w_M and w_C we can simulate the effect of immigration on wages of less educated US workers in each state

$$\frac{\Delta w_D}{w_D} = \underbrace{\frac{\Delta w_M}{w_M}\frac{w_M}{w_D}m_D + \frac{\Delta w_C}{w_C}\frac{w_C}{w_D}c_D}_{First\ Channel} + \underbrace{(\Delta m_D)\frac{w_M}{w_D} + (\Delta c_D)\frac{w_C}{w_D}}_{Second\ Channel}$$

Effect on compensation, weighted at domestic worker average

Shift in task supply, weighted at task compensation

Table 12
The Simulated Effects of Immigration on Native Wages and Task Compensation, 1990-2000

	(1) %Δ Highly-Educated due to Immigration	(2) %Δ Less-Educated due to Immigration	(3) %Δ in Wage Paid to Highly-Educated Workers	(4) %Δ in Manual Task Return	(5) %Δ in Communication Task Return	(6) %Δ in Wage of Less-Educated, Assuming Perfect Native-Immigrant Substitution	(7) %Δ in Wage of Less-Educated due to Task Complementarities and Specialization	(8) %Δ Change in Wage Paid to Less-Educated Natives
Selected States								
Arizona	8%	29%	3.2%	-14.2%	-1.3%	-8.2%	**2.5%**	**-5.7%**
California	12%	24%	1.5%	-8.4%	0.3%	-4.5%	**2.3%**	**-2.2%**
DC	6%	10%	0.5%	-3.3%	-0.4%	-2.0%	**1.9%**	**-0.1%**
Florida	14%	14%	-0.1%	-2.3%	2.8%	0.2%	**1.2%**	**1.4%**
Hawaii	7%	8%	0.1%	-3.4%	4.9%	-0.3%	**0.9%**	**0.6%**
Illinois	7%	12%	0.8%	-3.5%	0.7%	-1.8%	**1.3%**	**-0.5%**
Nevada	16%	34%	3.5%	-12.0%	1.4%	-5.8%	**2.2%**	**-3.6%**
New Jersey	13%	10%	-0.6%	-0.4%	3.7%	1.6%	**1.3%**	**2.9%**
New York	10%	13%	0.3%	-2.5%	1.1%	-0.7%	**1.6%**	**0.9%**
Texas	8%	22%	2.1%	-8.8%	0.0%	-4.8%	**1.8%**	**-3.0%**
United States	6%	9%	0.6%	-2.8%	1.2%	-1.2%	**0.9%**	**-0.3%**

Conclusions

- When native workers respond to incentives immigration pushes them to specialize in interactive tasks.

- This provides an opportunity for them to protect their wage and actually gain from immigration. Ultimately it is a "comparative advantage" and specialization story.

- The data shows this mechanism being significant and large among less educated, in states with large immigration

- This mechanism enhances the native-immigrants differences and reduces losses from immigration for natives. **On average this channel reduced wage losses of less educated from -1.2% to -0.3% nationally over the period 1990-2000.**

Overall Conclusions

- 1) International migrants follow economic incentives. Immigration laws are and important determinants of flows too.

- 2) International migrants increase total employment in the receiving country without crowding out natives

    They also stimulate investment in the short and long run

    They do not affect productivity

    3) Hence immigration does not hurt average wages in the receiving country, in the short run nor in the long-run, but they only increase the total size of the economy.

    4)Also, calculated correctly the distributional effects for the US are small. No harm to least educated workers

Overall Conclusions

- Immigrants have somewhat different skills from Natives. At low level of education they perform Manual tasks, and encourage specialization of natives in communication tasks. This is good because of complementarities

- At the highly educated level they specialize in science and engineering and contribute to technological innovation
  - Both in the short run and in the long run no crowding-out of native scientists is found
  - Possibly some crowding-in and a positive overall effect on innovation in the short and ling-run

- By helping diffusion of knowledge, information and trust immigrant networks also help establish new trade relations (by decreasing fixed trade costs)

Policy Implications 1: Manage the Phenomenon

- 1) Plan for immigrants, As the pressure for international migration increases receiving countries can regulate the flow.

- 2) A balanced admission of immigrants (college educated and no education) is beneficial to the economy, promotes specialization and productivity and is very good as poverty-reduction measure.

- 3) Admission of young immigrants would help the aging crisis. Admission of motivated less educated immigrants provides non tradable manual services at low cost. Admission of highly educated provide SE.

- 4) As immigrants are those who benefit the most one could devise and auction for visa, by type, to transfer some of their gains (to poor natives?). Poor natives, however do not seem to suffer much from immigration.

Policy Implications 2: Europe

- Brains are the most relevant input in innovation. Countries as Canada and Australia have shaped immigration policies to attract highly skilled. European countries are lagging behind

- To take advantage of the mobility kills of immigrants and of the efficiency gains from specialization flexibility and occupational mobility are needed. Rigid labor market would make it hard for outsiders to enter and for insiders to adjust by changing occupation .

- To reduce the aversion of public opinion may be useful to consider limited access of immigrants to welfare. This may relax immigration policies.

- Example: Gulf countries have very large flows of immigrants from India, Bangladesh and Pakistan because they allow a bare-bone access to labor market.
  - The result is political feasibility and very large benefits for immigrants (wages larger by 5,000 to 6,000 $ per year)

Policy Challenge:

- While economic factors seem mainly positive the debate is mostly on other factors.

- However:
  - Information in the policy debate is crucial.
  - One can begin with "limited free migration areas" such as Eastern-Western Europe (this was done for trade)
  - One should discuss access to labor markets without full access to welfare
  - Labor market flexibility

Conclusions: what else should we study?

- Need for better data on migration flows across countries
  - OECD dataset on flows (1995-2005), we constructed flows back from 1985. Stocks from national sources 1990-2000.
  - Check with national sources

- Need for complete data on migration laws, to evaluate their effects
  - Online database, and detailed analysis of immigration laws by type

- Need to study more the other effects of immigrants (fiscal effects, cultural fractionalization, what determines the opinion of natives)

- Skilled immigration: extend the analysis to their effect in Europe (I know of one paper: Niehbur 2006)