Are Incomes Converging on United States-Mexico Border?

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Why convergence matters

- Justification for NAFTA
- Indicator of success or failure of economic reforms
- Border region perhaps most intense area of integration, hence an indicator of the impacts of international economic integration
- Sign of development in Mexico

Why we expect convergence

- Freer movement of goods and services
- Technology transfer
- Integrated economies, more similar tastes and preferences

Convergence defined

(1) α *convergence*

Standard deviation or coefficient of variation falls over time

(2) β *convergence*

Low income areas grow more rapidly than high income ones

(3) *Conditional* β *convergence*

Poor and rich converge to different equilibrium level incomes, but conditional on some economic characteristic, absolute convergence would be attained.

Estimated equation

Following the work of Barro and Sala-i-Martin, (1991), a convergence equation can be defined as:

$$(1/T)\ln(Y_{rT}/Y_{r0}) = \beta_0 + [(1-e^{-\beta T})/T]\ln(Y_{r0}),$$

Sample

- United States: All counties touching the border (26)
- Mexico: All municipios touching the border (38)

Estimating average gross county product in the United States

The U.S. Bureau of Economic Analysis provides county compensation data. This must be adjusted to make it conceptually equivalent to gross product.

Assumption:

County compensation/County Product =

State compensation/State Product

Estimating average gross municipal product in Mexico

$Y_m = \lambda_m Y_s$:

- where $0 < \lambda_m < 1$,
- Y_m = municipal gross product
- Y_s = state gross product

Estimated municipal share of state income

- $\lambda_m = \sum_i (Y_{is}/Y_s)(e_{im}/e_{is})$
- i = sector, i=1 to 9
- e_{im} = employment in sector i in municipality m
- e_{is} = employment in sector i in state s

Example

- Suppose manufacturing generates 0.4 of gross Baja California product, and Tijuana has 0.5 of the state's workers employed in manufacturing.

- Then, 0.2 (=0.5*0.4) of total state product is allocated to Tijuana. Next calculate for each of the other eight sectors, add the totals to estimate λ_m, and multiply by state product to get Tijuana's municipal product.

Example (continued)

- Once gross municipal product is determined, divide by population to get per capita product.
- Still must convert to dollars in order to make comparable—conversion factors from the Penn World Tables are used to get purchasing power parity variables.

Gross product per capita, 1999 in order

SD	30,218	Cameron	14,946	Cananea	10,702	Ascension	8,591
Pima	24,709	Luna	14,826	Anahuac	10,306	Praxedis G. Guerrero	8,521
Terrell	22,907	Webb	14,770	Tecate	10,162	Ocampo	8,298
Brewster	21,048	Hudspeth	14,446	Ojinaga	10,099	Naco	8,141
Cochise	19,425	Hidlago	13,961	Nuevo Laredo	9,955	Camargo	7,940
Yuma	19,068	Acuna	13,923	Reynosa	9,814	Mier	7,843
Grant	18,289	Dimmit	13,385	Agua Prieta	9,804	Hidalgo	7,826
ElPaso	18,019	Zapata	13,077	Jimenez	9,534	Rio Bravo	7,818
Imperial	17,984	Juarez	12,404	Puerto Penasco	9,465	Gustavo Diaz Ordaz	7,798
Hidalgo	17,823	Tijuana	11,913	SLR Colorado	9,391	Valle Hermoso	7,719
DonaAna	17,805	Nava	11,893	Caborca	9,354	Manuel Benavides	7,699
Santa Cruz	17,047	Nogales	11,374	Guadalupe	9,328	Janos	7,672
Val Verde	16,669	Piedras Negras	11,345	Matamoros	9,257	Altar	7,519
Culberson	15,493	Maverick	11,331	Starr	8,988	Guerrero	7,465
Jeff Davis	15,211	Presidio	11,240	Miguel Aleman	8,852	Saric	6,435
Kinney	14,958	Mexicali	11,154	Guerrero	8,607	Santa Cruz	6,426

Sigma Convergence, combined sample

	SD	Mean	CV
1970	3,144	8,209	0.3830
1980	4,164	10,143	0.4105
1985	4,187	10,655	0.3930
1993	4,486	11,031	0.4067
1999	4,858	12,344	0.3936

Sigma convergence, separate samples

		SD	Mean	CV
Mexico	1970	1,853	6,629	0.2795
	1980	2,801	7,893	0.3549
	1985	1,884	8,156	0.2310
	1993	1,509	8,132	0.1856
	1999	1,703	9,272	0.1837
US	1970	3,237	10,520	0.3077
	1980	3,622	13,432	0.2697
	1985	3,946	14,307	0.2758
	1993	3,988	15,268	0.2612
	1999	4,460	16,832	0.2650

Beta convergence, 1970-1999

	1970-1999	1970-1999
Constant	0.1014***	0.2493***
	(4.280)	(10.85)
Beta	-0.0086***	-0.0200***
	(-4.162)	(-13.582)
Education		0.0442***
		(9.012)

Beta convergence: sub-periods

	1970-80	1980-85	1985-93	1993-99
Constant	0.029	0.3909***	0.0797	0.1203***
	(0.488)	(5.082)	(1.360)	(2.818)
Beta	-0.001	-0.0376***	-0.0080	-0.0105**
	(-0.160)	(-5.390)	(-1.336)	(-2.495)

Conditional beta convergence

	1970-80	1980-85	1985-93	1993-99
Constant	0.1477*	0.8103***	0.5845***	0.2068*
	(1.701)	(8.288)	(7.040)	(1.956)
Beta	-0.0141	-0.0746***	-0.0530***	-0.0196*
	(-1.622)	(-9.732)	(-8.647)	(-1.840)
Education	0.0372**	0.1118***	0.0987***	0.01528
	(2.007)	(5.635)	(7.154)	(0.882)

Summing up: The whole period, 1970-1999.

- Strong beta convergence overall, as well as within the Mexican sample alone and the United States sample alone.
- Absolute beta convergence about 1% per year.
- Conditional beta convergence about 2% per year.

Summing up: sub-periods.

- *1970-80*: No convergence overall, but convergence within U.S. sample.
- *1980-85*: Strong beta convergence overall, mostly due to convergence within Mexican sample.
- *1985-93*: No beta convergence, but strong conditional convergence, in U.S., Mexico, and overall.
- *1993-99*: Beta convergence overall, even though no convergence within either U.S. or Mexican samples.