

ESTIMATING WHO BENEFITS FROM PRODUCTIVITY GROWTH: LOCAL AND DISTANT EFFECTS OF CITY TFP SHOCKS ON WAGES, RENTS, AND INEQUALITY

Hornbeck & Moretti (2020)

Economía Urbana: Néstor Rodríguez





MOTIVACIÓN

- Se ha estudiado en la literatura económica que las diferencias en productividad entre países son una fuente importante de la diferencia en calidad de vida.
 - Aumentos en el consumo y los ingresos dependen principalmente del crecimiento en la productividad en muchos modelos macroeconómicos (i.e. Solow 1956)
- Pero poco se ha hablado que aún entre los países más ricos hay una diferencia grande entre las regiones y las ciudades.
- Poco se conoce de quién se beneficia finalmente de un aumento en la productividad.

PREGUNTA DE INVESTIGACIÓN

¿Cuáles son los efectos del crecimiento de la productividad (TFP) en una ciudad sobre los salarios, las rentas y la desigualdad?

En específico, poder conocer los efectos:

- Directos: En la misma ciudad
- Indirectos: En el resto de localidades.

CONTRIBUCIÓN

- El análisis no se limita sólo a los efectos directos del “shock” en productividad del sector manufacturero en una ciudad sobre ingresos y costos de renta de vivienda locales
- También cuantifican el efecto indirecto que tendría ese shock en otras ciudades a través de la movilidad laboral.
 - Empíricamente, estos efectos probarán ser importantes y cambiarán las conclusiones que saldrían de un estudio que solo se concentra en los efectos directos.

PRINCIPALES RESULTADOS (I)

- En cuanto efectos directos, un aumento de 1% de la productividad en el sector manufacturero de 1980 a 1990 está asociado con:
 - Un incremento de los ingresos de los trabajadores locales en el largo plazo (1980-2010) de 1.5%.
 - Empleo local crece 4%
 - El costo de la renta de casas aumenta 1.5% y el valor de los hogares crece 2.5%.
 - El poder de compra (“purchasing power”) de los trabajadores creció 0.6%.
 - Si el trabajador tenía casa propia, esto crece entre 1.1% y 1.6%
- También encuentran que quien se beneficia de este aumento dependería del nivel de habilidades del trabajador o de su nivel de ingresos.
 - En general, el resultado es consistente con una reducción de la desigualdad.

PRINCIPALES RESULTADOS (II)

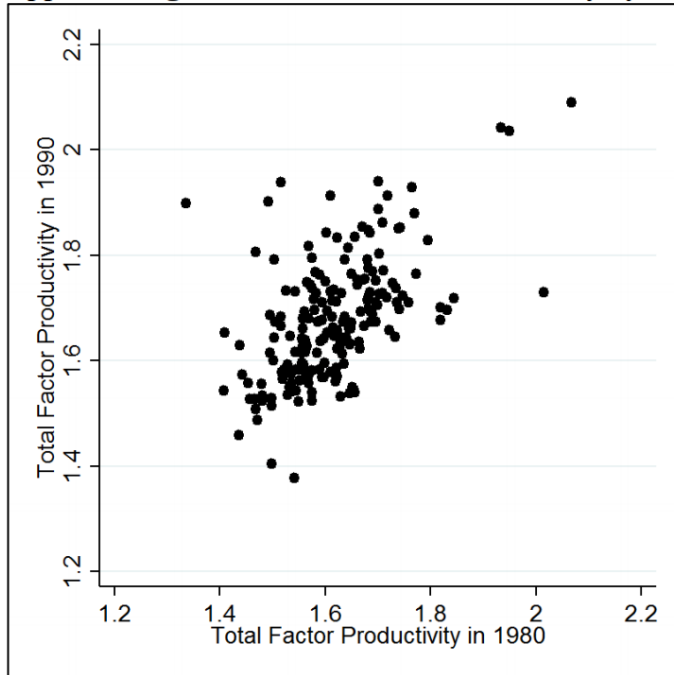
- En cuanto efectos indirectos:
 - 38% del aumento combinado, efecto directo e indirecto, en el poder de compra para el trabajador promedio ocurre fuera de la ciudad afectada por el choque en productividad.
 - Los efectos indirectos benefician más que proporcionalmente a los trabajadores con más educación y con mejores habilidades, que son los que tienen mayor movilidad. Lo que compensa por la reducción en desigualdad que se había mencionado antes.
- Finalmente, la suma de los dos efectos muestra que el trabajador promedio se benefició en términos reales del incremento en productividad en la manufactura.
 - Incrementos de ingresos en la productividad local de 1980 a 1990 llevaron a incrementos en el poder de compra de alrededor de 0.5-0.6% por año entre 1980 a 2000 para el trabajador promedio.

DATOS

- Se recopilan datos para 193 areas metropolitanas (MSAs)
- Usan datos de fuentes locales del mercado de Trabajo y del Censo Poblacional de US para el mercado inmobiliario (casas). Para cada MSA agregan datos a nivel individual y de hogares de los años de 1980, 1990 y 2000
- Los datos de la productividad total por factores (TFP) del sector manufacturero del censo de manufacturas de US. Para obtener el promedio a nivel de cada ciudad adoptaron un modelo econométrico (Greenstone, Hornbeck and Moretti, 2010)

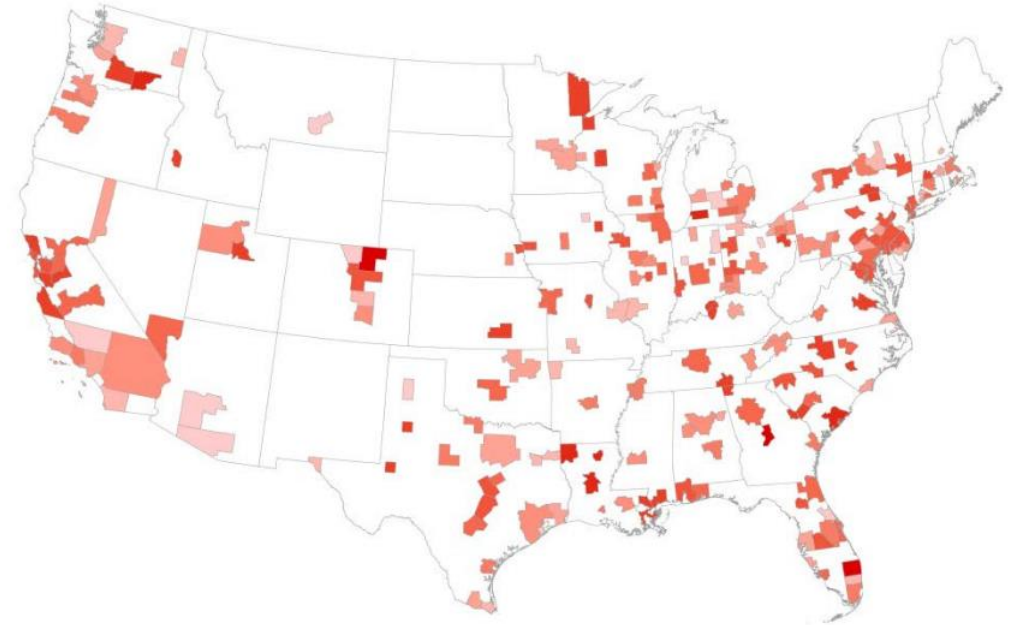
CARACTERÍSTICAS DE LOS CAMBIOS DE LAS TFP EN LAS CIUDADES

Appendix Figure 1. Total Factor Productivity by City, 1980 and 1990



Notes: For each city (MSA), the figure plots TFP in 1990 against TFP in 1980. The estimated coefficient is 0.610, with a standard error 0.099, and an R-squared of 0.298.

Panel C. Change in TFP from 1980 to 1990



ESPECIFICACIÓN DEL MODELO (I)

- Usan un modelo simple de equilibrio espacial (Rosen-Roback) (Appendix B) del mercado laboral e inmobiliario que es útil para entender cómo el choque en la TFP afecta el empleo, los salarios y los costos de vivienda.
- Hacen regresiones del cambio en cada ciudad "c" de las variables de interés "Yc" explicado por cambios en el promedio de el factor de productividad "Ac". α_r es un vector de efectos fijos de region. Consideran tres variantes en el tiempo:
- Mediano-plazo $\ln(Y_{c,1990}) - \ln(Y_{c,1980}) = \pi^M (\ln \hat{A}_{c,1990} - \ln \hat{A}_{c,1980}) + \alpha_r + \varepsilon_c,$
- Largo plazo: $\ln(Y_{c,2000}) - \ln(Y_{c,1980}) = \pi^L (\ln \hat{A}_{c,1990} - \ln \hat{A}_{c,1980}) + \alpha_r + \varepsilon_c.$
- Más largo plazo: $\ln(Y_{c,2010}) - \ln(Y_{c,1980}) = \pi^{LL} (\ln \hat{A}_{c,1990} - \ln \hat{A}_{c,1980}) + \alpha_r + \varepsilon_c.$

ESPECIFICACIÓN DEL MODELO(II)

- Los autores estiman las ecuaciones anteriores con diferentes variantes y especificaciones. Por ejemplo, algunas especificaciones exploran como el impacto del choque en la TFP varía según las habilidades del trabajador o el nivel del ingreso.
- No obstante enfrentan algunos problemas:
 - El crecimiento local de la TFP de 1980 a 1990 podría estar correlacionada con el crecimiento registrado en la década siguiente 1990-2000. Por lo que podría necesitar controlar por esta persistencia en el crecimiento. Sin embargo, prefieren centrarse solo en el impacto de largo plazo reducido por el crecimiento de 1980-1990.
 - Los “spillovers” de la aglomeración hacia otros sectores no manufactureros.
 - Crecimiento local de la TFP podría reflejar choques de la economía regional que impactan los resultados.

ESPECIFICACIÓN DEL MODELO - VARIABLES INSTRUMENTALES (I)

- Los autores mencionan que una estimación “OLS” de las ecuaciones estaría afectada con un “bias” por dos razones:
 - 1) Cambios en la TFP a nivel ciudad podrían estar correlacionados con cambios en factores no observables, tales como amenidades de producción y consumo, que afectan empleo, ingresos o costos de vivienda. Podrían ser positivas o negativas.
 - 2) La TFP está estimada con error y las principales especificaciones empíricas están en primeras diferencias, lo que amplificaría el “bias” del error de medición.
- Por lo tanto, los autores proponen cuatro alternativas de variables instrumentales para cambios en la TFP, por separado y en conjunto.

ESPECIFICACIÓN DEL MODELO - VARIABLES INSTRUMENTALES (II)

- Las cuatro propuestas son:
 - 1) Instrumento “base”: Usa cambios en la TFP a nivel nacional por industria para predecir el cambio en la ciudad ajustando por la concentración inicial de cada industria en la ciudad.
 - 2) Choque tecnológico: Es medido utilizando la actividad en patentes a nivel nacional.
 - 3) Choque en las exportaciones: Medir el cambio en la exposición a mercados de exportación según el nivel industrial.
 - 4) Precio de acciones: Basado en los retornos del mercado de acciones de capital. La valuación de los mercados de capital podría capturar una variedad de factores incluyendo mejoras en la tecnología y aumentos en la demanda por los bienes de las empresas.

¿Cumplen relevancia y exclusión?

ESTIMACIÓN DE EFECTOS DIRECTOS (I)

- El empleo en la ciudad responde sustancialmente al crecimiento local de la TFP
- Para los ingresos anuales de los trabajadores, un crecimiento de la TFP en 1% está asociado con un incremento del 0.91% de esos ingresos en el mediano plazo.
- Para el poder de compra:
 - Quienes rentan ven menores beneficios
 - Quienes tienen casa, su beneficio dependerá de cómo se calcula el incremento de la “plusvalía”.

Table 2. Direct Effect of Local TFP Growth on Local Employment, Earnings, and Housing Costs (Baseline IV)

	Medium-run Effect: Change from 1980 to 1990 (1)	Long-run Effect: Change from 1980 to 2000 (2)	Longer-run Effect: Change from 1980 to 2010 (3)
Panel A. Log Employment	2.38*** (0.80)	4.16*** (1.26)	4.03*** (1.52)
Panel B. Log Earnings	0.91*** (0.32)	1.45*** (0.47)	1.46*** (0.50)
Panel C. Log Cost of Rent	0.98** (0.43)	1.47*** (0.46)	1.09** (0.48)
Panel D. Log Home Value	1.74** (0.72)	2.46*** (0.78)	3.05*** (0.98)
Panel E. Log Purchasing Power			
Renters	0.36** (0.18)	0.62** (0.26)	0.85*** (0.30)
Homeowners (Case A)	0.68*** (0.24)	1.11*** (0.37)	1.21*** (0.41)
Homeowners (Case B)	1.01*** (0.35)	1.60*** (0.51)	1.57*** (0.54)
First Stage Coefficient	0.80*** (0.17)	0.80*** (0.17)	0.80*** (0.17)
Instrument F-statistic	23.64	23.64	23.64

Notes: Columns 1 to 3 report estimates from equations 8, 9, and 10 in the text, respectively. Entries are the estimated coefficient on the change in city TFP from 1980 to 1990. In Column 1, the dependent variables are in changes from 1980 to 1990. In Columns 2 and 3, the dependent variables are in changes from 1980 to 2000 (Column 2) and in changes from 1980 to 2010 (Column 3). In each column, we instrument for changes in city TFP using the predicted change in TFP, based on our baseline instrument. The corresponding first-stage estimate is reported in the row at the bottom of the Table, with the associated F-statistic on the excluded instrument. In all specifications, the sample is our balanced sample of 193 MSAs. Robust standard errors are reported in parentheses. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

ESTIMACIÓN DE EFECTOS DIRECTOS (II)

Table 3. Direct Effect of Local TFP Growth on Local Employment, Earnings, and Housing Costs (Additional IVs)

	Medium-run Effect: Change from 1980 to 1990				Long-run Effect: Change from 1980 to 2000				Longer-run Effect: Change from 1980 to 2010			
	Baseline IV	Patent IV	Export IV	3 IVs Combined	Baseline IV	Patent IV	Export IV	3 IVs Combined	Baseline IV	Patent IV	Export IV	3 IVs Combined
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A. Log Employment	2.38*** (0.80)	0.66 (0.82)	3.94*** (1.44)	1.88*** (0.63)	4.16*** (1.26)	1.71 (1.46)	5.89*** (2.25)	3.50*** (0.96)	4.03*** (1.52)	1.31 (1.64)	5.31** (2.58)	3.36*** (1.15)
P-value of over-id test				0.18				0.32				0.45
Panel B. Log Earnings	0.91*** (0.32)	1.11** (0.53)	1.53*** (0.56)	0.88*** (0.28)	1.45*** (0.47)	2.08* (1.14)	2.27*** (0.81)	1.48*** (0.45)	1.46*** (0.50)	2.22* (1.33)	1.85** (0.72)	1.57*** (0.52)
P-value of over-id test				0.23				0.25				0.61
Panel C. Log Cost of Rent	0.98** (0.43)	2.13** (1.03)	1.72*** (0.57)	1.12*** (0.41)	1.47*** (0.46)	1.90* (1.05)	2.13*** (0.68)	1.49*** (0.45)	1.09** (0.48)	2.54* (1.35)	1.47** (0.70)	1.33*** (0.50)
P-value of over-id test				0.09				0.30				0.29
Panel D. Log Home Value	1.74** (0.72)	3.73** (1.87)	2.98*** (0.90)	2.00*** (0.71)	2.46*** (0.78)	2.86* (1.49)	3.55*** (0.95)	2.42*** (0.74)	3.05*** (0.98)	4.33* (2.29)	3.81*** (1.24)	3.21*** (1.00)
P-value of over-id test				0.13				0.33				0.59
Panel E. Log Purchasing Power												
Renters	0.36** (0.18)	-0.09 (0.22)	0.57* (0.31)	0.25* (0.14)	0.62** (0.26)	1.02 (0.63)	1.08** (0.46)	0.65*** (0.24)	0.85*** (0.30)	0.79 (0.77)	1.02** (0.40)	0.82*** (0.31)
P-value of over-id test				0.29				0.30				0.85
Homeowners (Case A)	0.68*** (0.24)	0.62* (0.33)	1.13** (0.44)	0.62*** (0.20)	1.11*** (0.37)	1.64* (0.92)	1.78*** (0.66)	1.14*** (0.36)	1.21*** (0.41)	1.63 (1.07)	1.51*** (0.58)	1.26*** (0.42)
P-value of over-id test				0.38				0.26				0.72
Homeowners (Case B)	1.01*** (0.35)	1.32** (0.63)	1.70*** (0.61)	0.99*** (0.31)	1.60*** (0.51)	2.27* (1.24)	2.49*** (0.88)	1.63*** (0.49)	1.57*** (0.54)	2.47* (1.45)	1.99** (0.78)	1.70*** (0.56)
P-value of over-id test				0.20				0.25				0.57
First Stage Coefficient	0.80*** (0.17)	0.016** (0.007)	0.008** (0.003)		0.80*** (0.17)	0.016** (0.007)	0.008** (0.003)		0.80*** (0.17)	0.016** (0.007)	0.008** (0.003)	
Instrument F-statistic	23.64	5.86	6.31	9.48	23.64	5.86	6.31	9.48	23.64	5.86	6.31	9.48

Notes: The estimates correspond to those in Table 2, using alternative instrumental variables. Columns 1, 5, and 9 correspond to columns 1, 2, and 3 in Table 2, as a basis for comparison. Columns 2, 6, and 10 use an instrument based on patenting activity. Columns 3, 7, and 11 use an instrument based on increased exposure to export markets. Columns 4, 8, and 12 use the baseline IV in combination with the patent IV and exports IV, and below each estimate we report the p-value of the over-identification test (Hansen J statistic). Robust standard errors are reported in parentheses. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

ESTIMACIÓN DE EFECTOS INDIRECTOS (I)

- Proponen una metodología que usa los resultados encontrados para los efectos directos, algunos supuestos sobre la elasticidad de la demanda laboral y algunos patrones de la movilidad laboral.

Paso 1 – Cambio en trabajadores en la ciudad local

- Intentan estimar cuantos trabajadores llegan a una ciudad "c" durante 1980 a 2000.
- Esto es producto del cambio en la TFP en ese periodo multiplicado por el impacto estimado en empleo en el largo plazo, y finalmente multiplicado por el empleo original en 1980.

Paso 2 – Calculo de perdida de trabajadores en el resto de ciudades

- Se intenta estimar cuantos trabajadores abandonan las ciudades "o" para irse a "c".
- El supuesto asumido es que el flujo de trabajadores replican la proporción de flujos movilidad observada entre 1975 y 1980.

Paso 3 – Calcular el cambio en costos de vivienda y los ingresos

- Para el mercado de vivienda, calculan la caída de hogares en "o", basados en la salida de trabajadores, y entonces calculando el cambio en costos basado en elasticidades de la oferta de casas.
- Para los ingresos, hacen un análisis similar pero basándose en la elasticidad de la demanda laboral.

ESTIMACIÓN DE EFECTOS INDIRECTOS (II)

- Los autores se centran en tres ejemplos para mostrar sus resultados: Houston, San Jose y Cincinnati.
- Aunque los efectos en otras ciudades (columna 2) parecen pequeños, son sustanciales cuando se suman todas las ciudades (192)
- Ejemplo Houston:
 - Un aumento de 86, 031 trabajadores durante este periodo estuvo asociado con una perdida de 291 empleos en otras ciudades en promedio.

Table 7. Long-Run Direct And Indirect Effects of TFP Growth in Three Cities

	Direct Effects on Indicated City (1)	Indirect Effects on Average Other City:			
		Baseline (2)	Robustness		
			(3)	(4)	(5)
Panel A. Houston TFP Growth					
Employment	86,031 (27,371)	-291 (93)	-291 (93)	-291 (93)	-291 (93)
Earnings	1,490 (488)	8.9 (2.8)	9.9 (3.1)	8.3 (2.6)	8.0 (2.5)
Rent	501 (160)	-8.4 (2.6)	-12.4 (3.9)	-7.4 (2.3)	-8.4 (2.6)
Panel B. San Jose TFP Growth					
Employment	361,765 (151,101)	-1,413 (590)	-1,413 (590)	-1,413 (590)	-1,413 (590)
Earnings	11,756 (4251)	51.1 (20.1)	47.0 (19.5)	42.4 (17.4)	48.1 (18.9)
Rent	3,957 (1395)	-78.5 (30.7)	-57.7 (23.9)	-45.1 (18.5)	-78.5 (30.7)
Panel C. Cincinnati TFP Growth					
Employment	26,002 (8,199)	-84 (27)	-84 (27)	-84 (27)	-84 (27)
Earnings	1,115 (364)	2.3 (0.7)	2.8 (0.9)	2.3 (0.7)	1.9 (0.6)
Rent	375 (119)	-1.9 (0.6)	-3.5 (1.1)	-2.0 (0.6)	-1.9 (0.6)

Notes: All monetary values are in 2017 dollars. Column 1 reports the direct effects of 1980 to 1990 TFP growth in Houston (panel A), San Jose (Panel B) and Cincinnati (Panel C) on 1980 to 2000 changes in employment, earnings, and rent in that same city. Column 2 reports indirect effects of 1980 to 1990 TFP growth in Houston (panel A), San Jose (Panel B), and Cincinnati (Panel C) on 1980 to 2000 changes in employment, earnings, and rent in the average other city, under our baseline assumption on migration flows that is based on measured migrant flows from 1975 to 1980. Columns 3 and 4 report indirect effects under alternative assumptions on migration flows: in Column 3, that migration flows from other sample cities are proportion to their population sizes; in Column 4, that migration flows are based on predicted migration flows only (taking the predicted values from regressing 1975-1980 migrant flows on log origin city size, log destination city size, log geographic distance, and log economic distance). Column 5 reports indirect effects for our baseline assumption on migration flows, but it allows the elasticity of labor demand to vary across cities according to their industry shares. Robust standard errors are reported in parantheses.

ESTIMACIÓN DEL EFECTO TOTAL (DIRECTO+INDIRECTO)

Table 8. Long-Run Direct Effects, Indirect Effects, and Combined Effects of Local TFP Growth

	Long-run Direct Effects on:				Long-run Indirect Effects on:				Total Effect	Total % Effect	Annual Total % Effect	Robustness:	
	Earnings	Housing	Non-Tradables	Purchasing Power	Earnings	Housing	Non-Tradables	Purchasing Power				Annual Total	% Effect
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Panel A. Renters													
	3,823	1,286	900	1,636	931	-1,059	-741	2,731	4,367	11.3%	0.56%	0.61%	0.49%
	(1,368)	(449)	(314)	(605)	(395)	(451)	(316)	(1,162)	(1,320)	(3.4%)	(0.17%)	(0.20%)	(0.15%)
Panel B. Homeowners													
Case A	5,008	-	1,180	3,828	1,343	-	-959	2,302	6,130	11.4%	0.57%	0.59%	0.56%
	(1,807)		(415)	(1,392)	(569)		(406)	(975)	(1,711)	(3.2%)	(0.16%)	(0.17%)	(0.16%)
Case B	5,008	1,685	1,180	5,514	1,343	-1,370	-959	932	6,445	12.0%	0.60%	0.60%	0.61%
	(1,807)	(593)	(415)	(1,985)	(569)	(580)	(406)	(395)	(2,028)	(3.8%)	(0.19%)	(0.19%)	(0.19%)

Notes: Entries are the average per-worker direct effects, indirect effects, and combined total effects of 1980 to 1990 TFP growth on 1980 to 2000 changes in outcomes in 2017 dollars. Columns 1 to 3 report direct effects of TFP growth on earnings, housing costs, and the cost of non-housing non-tradable goods. Column 4 reports the direct effect on purchasing power. The effect on purchasing power for renters (Panel A) is defined as Column 1 - Column 2 - Column 3. For homeowners (Panel B), the effect on purchasing power in Case A is defined as Column 1 - Column 3; in Case B, it is defined as Column 1 + Column 2 - Column 3. Columns 5 to 7 report indirect effects of TFP growth on earnings, housing costs, and the cost of non-housing non-tradable goods. Column 8 reports the indirect effect on purchasing power. Column 9 reports the total effect, defined as the sum of the direct effect and indirect effect. Column 10 expresses the total effect as a percent increase relative to 1980 average earnings (in 2017 dollars). Column 11 expresses these numbers in annual terms, dividing column 10 by 20. Columns 12 and 13 report robustness to alternative assumptions on mobility: in Column 12, that migration flows from other sample cities are proportion to their population sizes; in Column 13, that migration flows are based on predicted migration flows only (taking the predicted values from regressing 1975-1980 migrant flows on log origin city size, log destination city size, log geographic distance, and log economic distance). Robust standard errors are reported in parentheses.

- Calculan el efecto total (o combinado) sumando los efectos directos e indirectos del crecimiento de la TFP en cada ciudad. Y miden el efecto de cambios entre 1980 y 1990 en los cambios totales entre 1980 y el 2000.
- Las columnas 9-13 se centran el poder de compra de los trabajadores.

CONCLUSIÓN

- El trabajador promedio en US se benefició sustancialmente de un crecimiento en los ingresos por la productividad (TFP) en la manufactura.
- El poder de compra creció alrededor de 0.5-0.6% por año entre 1980 y el 2000 debido al crecimiento en la productividad de la manufactura local entre 1980 y 1990.
- Crecimiento local de la productividad reduce la desigualdad, pero los efectos indirectos son lo suficientemente grandes para alterar esta incidencia.
- Los efectos indirectos en los ingresos de los trabajadores son sustancialmente más grandes en los trabajadores con mayor educación, que tienen mayor movilidad, lo que incrementa la desigualdad en otras ciudades.
- Las ganancias no dependen mucho de la educación o su situación inmobiliaria. Por lo que quién se beneficia del crecimiento de la productividad más bien depende de dónde vive el trabajador.

APÉNDICE

CARACTERÍSTICAS DE LOS DATOS PARA CIUDADES Y SU CAMBIO A TRAVÉS DEL TIEMPO

Appendix Table 1. City Characteristics in 1980 and Average Changes Over Time

MSA Characteristic:	City Mean in:	Log Change in City Mean from:	
	1980 (1)	1980 to 1990 (2)	1980 to 2000 (3)
Employment	174,361 [355,906]	0.105 [0.188]	0.300 [0.241]
Employment, College	31,725 [74,496]	0.321 [0.211]	0.668 [0.266]
Employment, Some College	36,297 [74,509]	0.557 [0.170]	0.492 [0.244]
Employment, High School or less	106,338 [209,462]	-0.193 [0.198]	0.081 [0.261]
Employment, Manufacturing Sector	57,906 [120,535]	-0.096 [0.237]	-0.061 [0.300]
Employment, Non-Manufacturing	116,455 [240,047]	0.211 [0.168]	0.467 [0.217]
Annual Earnings	45,824 [5,349]	0.083 [0.074]	0.186 [0.108]
Annual Earnings, College	65,848 [7,114]	0.145 [0.059]	0.277 [0.091]
Annual Earnings, Some College	46,093 [4,763]	0.036 [0.070]	0.112 [0.081]
Annual Earnings, High School or less	40,792 [4,850]	-0.032 [0.070]	0.017 [0.076]
Annual Housing Rent	9,730 [1,272]	0.153 [0.127]	0.154 [0.118]
Home Value	166,071 [51,886]	0.101 [0.269]	0.208 [0.190]
Number of Housing Units	137,291 [276,743]	0.063 [0.179]	0.259 [0.237]
Homeowners	117,700 [211,976]	0.075 [0.191]	0.335 [0.248]
Renters	56,660 [150,510]	0.176 [0.200]	0.288 [0.249]
Total Factor Productivity	1.649 [0.088]	0.053 [0.074]	0.110 [0.122]
Number of MSAs	193	193	193

Notes: Column 1 reports average city (MSA) characteristics in 1980. Column 2 reports the average change (in logs) in city characteristics from 1980 to 1990 and Column 3 reports the average change (in logs) from 1980 to 2000, weighted by city manufacturing output in 1980. Dollar values are reported in 2017 US dollars (CPI). Education groups are defined as: "College" includes workers who have completed 4 or more years of college, "Some College" includes workers who completed between 1 and 3 years of college, "High School or less" includes workers who completed 12 years of education or fewer.

ESPECIFICACIÓN DEL MODELO - VARIABLES INSTRUMENTALES

- Resaltan que las estimaciones a partir de los instrumentos son similares, a pesar de partir de diferentes fuentes de variación.

Table 1. Cities (MSAs) with the Largest and Smallest Predicted Changes in TFP

	Baseline IV (1)	Patent IV (2)	Export IV (3)	Stock Market IV (4)
Largest Values				
1.	Richmond, VA	Stamford, CT	Lexington, KY	Greenville, SC
2.	Atlantic City, NJ	Washington, DC	Fort Collins, CO	Charlotte, NC
3.	Raleigh-Durham, NC	Wilmington, DE	Binghamton, NY	Greensboro, NC
4.	Little Rock, AR	Kalamazoo, MI	Rochester, NY	Augusta, GA
5.	Greeley, CO	Saginaw, MI	Stamford, CT	Fayetteville, NC
6.	Columbia, MO	Albany, NY	San Jose, CA	Vineland, NJ
7.	Lubbock, TX	New Haven, CT	Raleigh-Durham, NC	El Paso, TX
8.	Greensboro, NC	Trenton, NJ	Austin, TX	New Bedford, MA
9.	Pensacola, FL	New York, NY	Boise City, ID	Anniston, AL
10.	Austin, TX	Pittsburgh, PA	Phoenix, AZ	McAllen, TX
Smallest Values				
1.	Bakersfield, CA	Billings, MT	Beaumont-Port Arthur, TX	Eugene-Springfield, OR
2.	Beaumont-Port Arthur, TX	Montgomery, AL	Corpus Christi, TX	Waterloo-Cedar Falls, IA
3.	Corpus Christi, TX	Mobile, AL	Billings, MT	Detroit, MI
4.	Billings, MT	Alexandria, LA	Bakersfield, CA	Peoria, IL
5.	Galveston-Texas City, TX	Augusta-Aiken, GA-SC	Galveston-Texas City, TX	Odessa, TX
6.	Baton Rouge, LA	Abilene, TX	Lafayette, LA	Mobile, AL
7.	Wichita, KS	Nashville, TN	Baton Rouge, LA	Rockford, IL
8.	Houston-Brazoria, TX	Fayetteville, AR	Houston-Brazoria, TX	Davenport, IA
9.	Lima, OH	McAllen-Edinburg, TX	Odessa, TX	Jackson, MI
10.	Odessa, TX	Galveston-Texas City, TX	Anchorage, AK	Beaumont-Port Arthur, TX

Notes: Entries are the sample cities (MSAs) with the largest and smallest predicted growth in TFP from 1980 to 1990 for each of the instrumental variables: the baseline instrument (Column 1), the intensity of patenting activity instrument (Column 2), the export exposure instrument (Column 3), and stock market return instrument (Column 4).

ESTIMACIÓN DE EFECTOS DIRECTOS

- Los autores corren un número importante de regresiones desde usar la cuarta variable instrumental (precios de acciones), especificar por habilidades del trabajador, correlación serial y espacial, entre otros. Éstas están en el apéndice.

Table 5. Direct Effect of Local TFP Growth, by Education Level

	Medium-run Effect: Change from 1980 to 1990 (2SLS)				Long-run Effect: Change from 1980 to 2000 (2SLS)			
	College	Some College	High School or less	Difference: (1) - (3)	College	Some College	High School or less	Difference: (5) - (7)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. Log Employment	2.79** (1.13)	2.60*** (0.73)	2.31*** (0.78)	0.48 (0.66)	5.82*** (1.88)	4.88*** (1.25)	3.23*** (1.15)	2.58*** (1.16)
Panel B. Log Earnings	0.60** (0.24)	0.67*** (0.26)	1.12*** (0.30)	-0.52*** (0.20)	0.87** (0.34)	1.06*** (0.33)	1.23*** (0.35)	-0.36 (0.29)
Panel C. Log Cost of Rent	0.55 (0.44)	1.02*** (0.38)	1.08** (0.47)	-0.53** (0.27)	1.01* (0.53)	1.50*** (0.40)	1.48*** (0.47)	-0.47 (0.39)
Panel D. Log Home Value	1.59*** (0.58)	1.69** (0.74)	1.99*** (0.77)	-0.40* (0.30)	1.83*** (0.59)	2.14*** (0.71)	2.54*** (0.77)	-0.70*** (0.31)
Panel E. Log Purchasing Power								
Renters	0.30 (0.22)	0.10 (0.13)	0.51*** (0.16)	-0.22 (0.25)	0.31 (0.20)	0.22 (0.15)	0.40** (0.18)	-0.09 (0.28)
Homeowners (Case A)	0.48** (0.20)	0.43** (0.18)	0.87*** (0.21)	-0.39** (0.21)	0.64** (0.25)	0.72*** (0.25)	0.89*** (0.26)	-0.25 (0.26)
Homeowners (Case B)	0.66** (0.27)	0.77*** (0.29)	1.23*** (0.34)	-0.57*** (0.20)	0.97** (0.38)	1.21*** (0.37)	1.38*** (0.39)	-0.40* (0.31)

Notes: Columns 1 - 3 report estimates that correspond to those in column 1 of Table 2, but separately by skill group: completed 4 years of college or more (column 1), completed between 1 and 3 years of college (column 2), and completed 12 years of education or fewer (column 3). Column 4 reports the difference between column 1 and column 3. Columns 5 - 8 report analogous estimates for the long-run effect by skill-group, corresponding to the estimates in column 2 of Table 2. All entries are based on the baseline IV. Robust standard errors are reported in parentheses. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

ESTIMACIÓN DE EFECTOS DIRECTOS (I)

Table 4. Direct Effect of Local TFP Growth on Local Employment, Earnings, and Housing Costs (Additional IVs)

	Medium-run Effect: Change from 1980 to 1990				Long-run Effect: Change from 1980 to 2000				Longer-run Effect: Change from 1980 to 2010			
	Baseline IV	Stock IV	Both IVs	4 IVs Combined	Baseline IV	Stock IV	Both IVs	4 IVs Combined	Baseline IV	Stock IV	Both IVs	4 IVs Combined
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A. Log Employment	2.38*** (0.80)	2.20*** (0.78)	2.34*** (0.71)	1.90*** (0.57)	4.16*** (1.26)	2.92** (1.21)	3.91*** (1.11)	3.35*** (0.87)	4.03*** (1.52)	3.47* (1.81)	3.91*** (1.43)	3.32*** (1.10)
P-value of over-id test			0.85	0.32			0.42	0.47			0.75	0.66
Panel B. Log Earnings	0.91*** (0.32)	1.20*** (0.38)	0.97*** (0.30)	0.94*** (0.27)	1.45*** (0.47)	1.72*** (0.56)	1.50*** (0.44)	1.54*** (0.43)	1.46*** (0.50)	2.04*** (0.75)	1.58*** (0.50)	1.67*** (0.51)
P-value of over-id test			0.40	0.25			0.59	0.31			0.32	0.45
Panel C. Log Cost of Rent	0.98** (0.43)	1.75*** (0.56)	1.13*** (0.41)	1.26*** (0.40)	1.47*** (0.46)	2.25*** (0.69)	1.63*** (0.46)	1.63*** (0.45)	1.09** (0.48)	2.24** (0.93)	1.32*** (0.51)	1.52*** (0.53)
P-value of over-id test			0.09	0.10			0.16	0.16			0.09	0.20
Panel D. Log Home Value	1.74** (0.72)	3.03*** (1.07)	2.00*** (0.69)	2.22*** (0.69)	2.46*** (0.78)	2.45** (1.12)	2.46*** (0.78)	2.44*** (0.74)	3.05*** (0.98)	4.41*** (1.65)	3.32*** (1.00)	3.45*** (1.01)
P-value of over-id test			0.15	0.14			1.00	0.48			0.27	0.49
Panel E. Log Purchasing Power												
Renters	0.36** (0.18)	0.22 (0.20)	0.33** (0.17)	0.24* (0.14)	0.62** (0.26)	0.46 (0.30)	0.59** (0.25)	0.63*** (0.24)	0.85*** (0.30)	0.79* (0.41)	0.84*** (0.29)	0.81*** (0.29)
P-value of over-id test			0.47	0.47			0.56	0.48			0.50	0.96
Homeowners (Case A)	0.68*** (0.24)	0.80*** (0.28)	0.71*** (0.22)	0.65*** (0.19)	1.11*** (0.37)	1.20*** (0.43)	1.13*** (0.35)	1.17*** (0.34)	1.21*** (0.41)	1.53*** (0.58)	1.27*** (0.40)	1.32*** (0.41)
P-value of over-id test			0.66	0.43			0.82	0.38			0.27	0.67
Homeowners (Case B)	1.01*** (0.35)	1.38*** (0.43)	1.08*** (0.33)	1.07*** (0.30)	1.60*** (0.51)	1.94*** (0.62)	1.67*** (0.48)	1.71*** (0.47)	1.57*** (0.54)	2.27*** (0.83)	1.71*** (0.54)	1.82*** (0.56)
P-value of over-id test			0.34	0.21			0.53	0.29			0.88	0.40
First Stage Coefficient	0.80*** (0.17)	0.021*** (0.006)			0.80*** (0.17)	0.021*** (0.006)			0.80*** (0.17)	0.021*** (0.006)		
Instrument F-statistic	23.64	13.34	14.43	9.47	23.64	13.34	14.43	9.47	23.64	13.34	14.43	9.47

Notes: The estimates correspond to those in Table 3, using an additional instrument on its own or in combination with the other instruments from Table 3. Columns 2, 6, and 10 use an instrument based on stock market returns. Columns 3, 7, and 11 use the stock market IV and the baseline IV. Columns 4, 8, and 12 use all four instrumental variables in combination. Below each estimate using multiple instruments, we report the p-value of the over-identification test (Hansen J statistic). In the bottom row of the Table, we report the F-statistic on the excluded instruments. Robust standard errors are reported in parentheses. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

ESTIMACIÓN DE EFECTOS DIRECTOS (II)

Table 5. Direct Effect of Local TFP Growth, by Education Level

	Medium-run Effect: Change from 1980 to 1990 (2SLS)				Long-run Effect: Change from 1980 to 2000 (2SLS)			
	College	Some College	High School or less	Difference: (1) - (3)	College	Some College	High School or less	Difference: (5) - (7)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. Log Employment	2.79** (1.13)	2.60*** (0.73)	2.31*** (0.78)	0.48 (0.66)	5.82*** (1.88)	4.88*** (1.25)	3.23*** (1.15)	2.58*** (1.16)
Panel B. Log Earnings	0.60** (0.24)	0.67*** (0.26)	1.12*** (0.30)	-0.52*** (0.20)	0.87** (0.34)	1.06*** (0.33)	1.23*** (0.35)	-0.36 (0.29)
Panel C. Log Cost of Rent	0.55 (0.44)	1.02*** (0.38)	1.08** (0.47)	-0.53** (0.27)	1.01* (0.53)	1.50*** (0.40)	1.48*** (0.47)	-0.47 (0.39)
Panel D. Log Home Value	1.59*** (0.58)	1.69** (0.74)	1.99*** (0.77)	-0.40* (0.30)	1.83*** (0.59)	2.14*** (0.71)	2.54*** (0.77)	-0.70*** (0.31)
Panel E. Log Purchasing Power								
Renters	0.30 (0.22)	0.10 (0.13)	0.51*** (0.16)	-0.22 (0.25)	0.31 (0.20)	0.22 (0.15)	0.40** (0.18)	-0.09 (0.28)
Homeowners (Case A)	0.48** (0.20)	0.43** (0.18)	0.87*** (0.21)	-0.39** (0.21)	0.64** (0.25)	0.72*** (0.25)	0.89*** (0.26)	-0.25 (0.26)
Homeowners (Case B)	0.66** (0.27)	0.77*** (0.29)	1.23*** (0.34)	-0.57*** (0.20)	0.97** (0.38)	1.21*** (0.37)	1.38*** (0.39)	-0.40* (0.31)

Notes: Columns 1 - 3 report estimates that correspond to those in column 1 of Table 2, but separately by skill group: completed 4 years of college or more (column 1), completed between 1 and 3 years of college (column 2), and completed 12 years of education or fewer (column 3). Column 4 reports the difference between column 1 and column 3. Columns 5 - 8 report analogous estimates for the long-run effect by skill-group, corresponding to the estimates in column 2 of Table 2. All entries are based on the baseline IV. Robust standard errors are reported in parentheses. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

ESTIMACIÓN DE EFECTOS DIRECTOS (III)

Table 6. Direct Effect of Local TFP Growth on Local Inequality

	Medium-run Effect: Change from 1980 to 1990 (1)	Long-run Effect: Change from 1980 to 2000 (2)
Panel A. 90/10 Centile Difference in Log Earnings	-0.632*** (0.225)	-0.998** (0.420)
Panel B. 90/50 Centile Difference in Log Earnings	-0.574*** (0.222)	-0.930*** (0.320)
Panel C. 50/10 Centile Difference in Log Earnings	-0.058 (0.236)	-0.068 (0.292)

Notes: Column 1 reports estimates analogous to those reported in Column 1 of Table 2 (and Column 2 reports estimates analogous to those reported in Column 2 of Table 2), but for MSA-level outcomes that correspond to earnings inequality: the difference between log earnings at the 90th centile and the 10th centile of the MSA's earnings distribution (Panel A), the difference between log earnings at the 90th centile and the 50th centile (Panel B), and the difference between log earnings at the 50th centile and the 10th centile (Panel C). All entries are based on the baseline IV. Robust standard errors are reported in parentheses. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

ESTIMACIÓN DE EFECTOS DIRECTOS (IV)

Appendix Table 4. Direct Effect of Local TFP Growth, Alternative Specifications

	Outcome Change from 1980 to 2000:					
	Long-run Effect: TFP Change from 1980 to 1990		Medium-Run Effect: TFP Change from 1980 to 2000	Long-run Effect: TFP Change from 1980 to 1990		
	Control: TFP Change from 1990 to 2000	Instrumented TFP Change from 1990 to 2000		Control: Instrumented TFP Change from 1980 to 1990 in Nearby MSAs		
	(1)	(2)	(3)	Within 500 Miles	Within 250 Miles	Within 100 Miles
Panel A. Log Employment	3.73*** (1.09)	4.36** (1.80)	1.79*** (0.61)	4.04*** (1.26)	4.53*** (1.70)	3.66*** (1.35)
Panel B. Log Earnings	1.31*** (0.40)	1.06* (0.60)	0.75*** (0.28)	1.36*** (0.43)	1.27** (0.55)	1.11** (0.48)
Panel C. Log Cost of Rent	1.39*** (0.42)	1.09 (0.68)	0.79** (0.32)	1.43*** (0.44)	1.14** (0.49)	1.04** (0.44)
Panel D. Log Home Value	2.21*** (0.70)	2.48** (1.17)	1.14** (0.47)	2.02*** (0.67)	1.92** (0.82)	1.95*** (0.71)
Panel E. Log Purchasing Power						
Renters	0.53** (0.22)	0.45 (0.30)	0.31** (0.13)	0.56** (0.24)	0.63** (0.32)	0.52* (0.28)
Homeowners (Case A)	0.99*** (0.32)	0.81* (0.46)	0.57*** (0.21)	1.03*** (0.35)	1.01** (0.45)	0.87** (0.39)
Homeowners (Case B)	1.45*** (0.44)	1.16* (0.66)	0.83*** (0.31)	1.51*** (0.47)	1.38** (0.59)	1.21** (0.52)
First Stage Coefficient (See Table Notes)	0.89*** (0.17)	0.76*** (0.19)	0.88*** (0.20)	0.85*** (0.19)	0.70*** (0.19)	0.84*** (0.19)
Instrument F-statistic	26.06	11.96	19.68	21.26	13.18	18.65

Notes: Column 1 reports estimates corresponding to those in Column 2 of Table 2, but controlling for the change in TFP from 1990 to 2000. Column 2 reports estimates from the same specification, but instrumenting for the change in TFP from 1990 to 2000 with the predicted change in TFP from 1990 to 2000 constructed as in our baseline instrument. Column 3 reports estimates from a long-difference specification, regressing changes in each outcome on changes in TFP from 1980 to 2000, and instrumenting using the predicted change in TFP from 1980 to 2000 constructed as in our baseline instrument. Columns 4, 5, and 6 report estimates corresponding to those in Column 2 of Table 2, but controlling for average changes in TFP from 1980 to 1990 in cities within 500 miles, 250 miles, or 100 miles. TFP changes in nearby cities are instrumented using the predicted change in TFP for those cities, constructed as in our baseline instrument. Robust standard errors are reported in parentheses. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

ESTIMACIÓN DE EFECTOS DIRECTOS (IV)

Appendix Table 5. Direct Effect of Local TFP Growth, Additional Control Variables

	Medium-run Effect: Change from 1980 to 1990				Long-run Effect: Change from 1980 to 2000			
	Control for 1980 MFG Share (1)	Controls for Broad Industry Shares (2)	Control for 1980 O&G Share (3)	Controls for Changes in Composition (4)	Control for 1980 MFG Share (5)	Controls for Broad Industry Shares (6)	Control for 1980 O&G Share (7)	Controls for Changes in Composition (8)
Panel A. Log Employment	2.30*** (0.74)	1.85** (0.77)	2.43** (1.04)	-	4.01*** (1.12)	3.61*** (1.17)	4.39*** (1.64)	-
Panel B. Log Earnings	0.87*** (0.29)	0.67** (0.26)	0.84** (0.40)	0.89*** (0.29)	1.39*** (0.40)	1.22*** (0.41)	1.44** (0.62)	1.12*** (0.32)
Panel C. Log Cost of Rent	0.95** (0.42)	0.46 (0.30)	0.51 (0.41)	1.17** (0.52)	1.43*** (0.43)	1.16*** (0.42)	1.15** (0.53)	1.61*** (0.49)
Panel D. Log Home Value	1.69** (0.70)	0.79 (0.56)	0.94 (0.75)	1.85** (0.74)	2.42*** (0.76)	1.70** (0.69)	1.53* (0.81)	2.49*** (0.81)
Panel E. Log Purchasing Power								
Renters	0.34** (0.15)	0.41** (0.17)	0.55** (0.25)	0.31* (0.17)	0.59*** (0.22)	0.57*** (0.22)	0.79** (0.36)	0.46*** (0.17)
Homeowners (Case A)	0.65*** (0.21)	0.56*** (0.22)	0.72** (0.33)	0.69*** (0.23)	1.06*** (0.32)	0.96*** (0.32)	1.17** (0.51)	0.95*** (0.26)
Homeowners (Case B)	0.97*** (0.32)	0.71** (0.29)	0.89** (0.44)	1.07*** (0.37)	1.53*** (0.44)	1.34*** (0.44)	1.55** (0.67)	1.44*** (0.39)
First Stage Coefficient (See Table Notes)	0.81*** (0.16)	0.86*** (0.19)	0.79*** (0.21)	0.81*** (0.16)	0.81*** (0.16)	0.86*** (0.19)	0.79*** (0.21)	0.81*** (0.16)
Instrument F-statistic	25.21	20.48	13.70	24.21	25.21	20.48	13.70	24.21

Notes: The estimates correspond to those in Table 2, with additional control variables. Columns 1 and 5 control for the city manufacturing employment share in 1980. Columns 2 and 6 control for the city employment share in 1980 in broad industry categories: Agriculture, Forestry, and Fishing; Mining; Construction and Manufacturing; Transportation and Public Utilities; Wholesale Trade and Retail Trade; and Finance, Insurance, and Real Estate and Services. Columns 3 and 7 control for the city employment share in 1980 in the oil and gas industry. Columns 4 and 8, in Panel B, are individual-level regressions that adjust annual earnings for worker composition by controlling for age, age squared, education (high school, some college, college), race, and gender (and cluster standard errors at the city level). Columns 4 and 8, in Panels C and D, are also individual-level regressions that adjust housing costs for physical characteristics by controlling for the number of rooms and number of bedrooms (dummy variables for each number), whether the home is part of a multi-unit structure, and the presence of a kitchen or plumbing (and cluster standard errors at the city level). Columns 4 and 8, Panel E, include both sets of individual-level controls. Robust standard errors are reported in parentheses. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

ESTIMACIÓN DE EFECTOS DIRECTOS (IV)

Appendix Table 8. Direct Effects of Local TFP Growth, by Sector

	Medium-run Effect: Change from 1980 to 1990		Long-run Effect: Change from 1980 to 2000	
	Manufacturing	Non-Manufacturing	Manufacturing	Non-Manufacturing
	(1)	(2)	(3)	(4)
Panel A. Log Employment	2.61*** (0.95)	2.17*** (0.70)	3.75*** (1.26)	4.13*** (1.17)
Panel B. Implied Multiplier		1.62*** (0.25)		2.21*** (0.32)
Panel C. Log Earnings	0.74** (0.30)	0.83*** (0.29)	0.88** (0.38)	1.45*** (0.46)

Notes: In Panel A, columns 1 and 2 report estimates that correspond to those in column 1 of Table 2, but separately for the manufacturing sector (column 1) and non-manufacturing sectors (column 2). Columns 3 and 4 report analogous estimates for the long-run effect by sector, corresponding to the estimates in column 2 of Table 2. Panel B reports the implied multiplier effect: the number of additional jobs in non-manufacturing sectors associated with a increase of one job in the manufacturing sector. Panel C reports estimated impacts on log earnings, as in Table 2, but separately for the manufacturing sector and non-manufacturing sector. Robust standard errors are reported in parentheses. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

ESTIMACIÓN DEL EFECTO TOTAL (DIRECTO+INDIRECTO) (II)

Table 9. Long-Run Direct Effects, Indirect Effects, and Combined Effects of Local TFP Growth by Worker Education Group

	Long-run Direct Effects on:				Long-run Indirect Effects on:				Total Effect	Total % Effect	Annual Total % Effect	Robustness:	
	Earnings	Housing	Non-Tradables	Purchasing Power	Earnings	Housing	Non-Tradables	Purchasing Power				Annual Total % Effect	Annual Total % Effect
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Panel A. Workers with College Education													
Renters	3,173 (1,311)	1,223 (692)	856 (485)	1,094 (136)	2,030 (509)	-1,445 (401)	-1,012 (281)	4,487 (822)	5,581 (830)	10.9% (1.6%)	0.55% (0.08%)	0.65% (0.20%)	0.48% (0.14%)
Homeowners													
Case A	4,514 (1,877)	-	1,219 (695)	3,294 (1,182)	3,542 (1,099)	-	-1,509 (416)	5,051 (1,149)	8,346 (1,624)	10.4% (2.0%)	0.52% (0.10%)	0.58% (0.19%)	0.53% (0.16%)
Case B	4,514 (1,877)	1,742 (993)	1,219 (695)	5,036 (2,175)	3,542 (1,099)	-2,156 (594)	-1,509 (416)	2,896 (1,305)	7,932 (2,504)	9.9% (3.1%)	0.49% (0.16%)	0.53% (0.16%)	0.53% (0.18%)
Panel B. Workers with High School Education or Less													
Renters	2,853 (884)	1,156 (408)	809 (286)	889 (192)	526 (245)	-948 (259)	-663 (181)	2,137 (638)	3,026 (669)	8.6% (1.9%)	0.43% (0.10%)	0.47% (0.10%)	0.38% (0.08%)
Homeowners													
Case A	3,558 (1,108)	-	1,010 (359)	2,548 (749)	692 (321)	-	-803 (218)	1,495 (502)	4,043 (912)	8.8% (2.0%)	0.44% (0.09%)	0.45% (0.10%)	0.44% (0.10%)
Case B	3,558 (1,108)	1,443 (513)	1,010 (359)	3,991 (1,262)	692 (321)	-1,146 (311)	-803 (218)	348 (152)	4,339 (1,280)	9.4% (2.8%)	0.47% (0.14%)	0.47% (0.14%)	0.48% (0.14%)
Panel C. Average Impacts by Worker Education													
Workers with College Education				3,204 (1,195)				4,134 (1,100)	7,338 (1,675)	10.4% (2.3%)	0.52% (0.12%)	0.59% (0.17%)	0.51% (0.15%)
Workers with High School Education				2,446 (724)				1,342 (412)	3,788 (904)	8.9% (2.1%)	0.45% (0.11%)	0.47% (0.11%)	0.43% (0.10%)

Notes: Panels A and B report estimates similar to Table 8, but separately by worker education group. Panel C reports average impacts for each worker education group, weighting by the fraction of renters or homeowners (for homeowners, we take the average of Case A and Case B). Robust standard errors are reported in parentheses.