Trade Boomers: the Effects of the Commodities-for-Manufactures Boom on Birth Outcomes in Brazil

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The China Shock in Brazil

The increased economic openness and reform of China $\implies$ one of the big economic trends of last 30 years.

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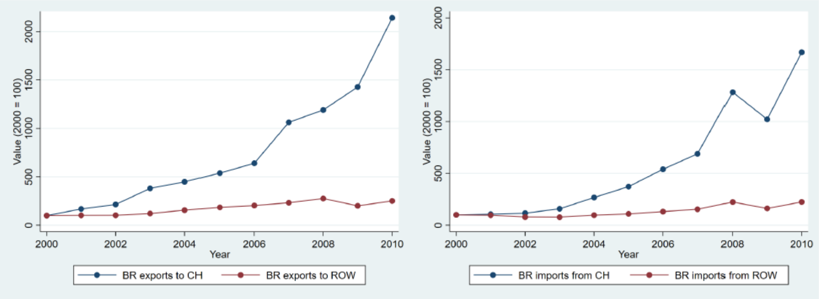
- **As in U.S., E.U.:** Chinese imports placed competitive pressure on Brazilian manufacturing in certain industries.
- **Less like U.S., E.U.:** Brazil benefitted from increased export demand in resource-based goods China needed.

The China Shock in Brazil

Massive growth in Brazilian exports to China and Brazilian imports from China:



Motivation

Massive trade shocks are known to affect public health outcomes in ways that are often ex ante ambiguous:

- Trade openness have been associated with greater life expectancy and lower infant mortality in the long-term.
- Trade may have reduced workplace accidents, sickness and improved safety through occupation reallocation.
- On the other hand, export demand growth may increase higher pollution, and increase injury rates for workers.
- ''Deaths of despair'' induced by Chinese imports.

This Paper

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What we do:

- Leverage local labour market level variation in exposure to 2000-2010 Brazil-China import and export growth to determine how Brazilian birth outcomes have been affected.
- Utilize initial gender composition of industries to further identify the effect of gender-specific trade shocks.
- Explore a number of underlying mechanisms that can explain these effects.

Preview of results

What we find:

- Import and export shocks **both** increase birth weight of babies in affected LLMs.
- Positive export shocks lower infant mortality rates.
- Import shocks are strongly associated with lower fertility/birth rates.
- Birth weight increases and mortality rate decreases are primarily driven by “male" trade shocks.

Preview of results

Mechanisms:

- We find evidence that income effects can explain improvements in child health outcomes due to positive export shocks.
- Economic uncertainty due to greater import competition induces greater selectivity at birth, which can plausibly explain improved health outcomes due to negative shocks.
- No evidence that provision/useage of healthcare, household composition are driving results.
- Explore pollution as a mechanism using satellite-derived data.
- Federal assistance programs respond minimally to trade shocks.

Literature

Regional exposure to trade shocks and regional outcomes:

- Autor, Dorn, Hanson (2013), McCaig (2011)

Most related is work by Costa, Garred, Pessoa (2016):

- Use same setting (Brazil, 2000-2010) as our paper.
- Show that import competition from China reduced wages, but export demand from commodities increased wages.

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- Show that import competition from China reduced wages, but export demand from commodities increased wages.

Prior literature on trade and health:

- Imports: Pierce and Schott (2018), Lai, Lu, and Ng (2018)
- Exports: Bombardini and Li (2018), Hummels et al (2016)
- Trade openness: Olper, Curzi, Swinnen (2018), Herzer (2016), Owen and Wu (2007)

Literature on gender-specific shocks: Page, Schaller, Simon (2017), Lindo, Schaller, Hansen (2018), Autor, Dorn, Hanson (AER: Insights, forthcoming), Shenhav (2018)

Data

1. Birth and death records
   - National System of Information on Live Births and Brazilian Health Informatics Department, respectively
   - Detailed, contains information like healthcare useage, education of mother, birth weight, gestation period.
2. Trade data
   - CEPII's BACI: derived from UN Comtrade dataset, importer-product (HS6)-exporter-year level, in '000s of 2010 USD
3. Brazilian Census
   - Censuses from 2000, 2010
   - used to construct employment weights and other variables
4. Municipal expenditures
   - Expenditures by category (i.e. health, education) for each municipality from Ministry of Finance
5. Pollution data
   - PM2.5 concentrations derived from NASA satellite data

Regional Level Trade Shocks

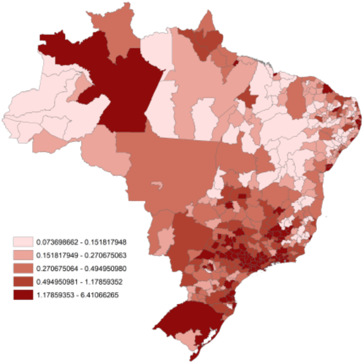
We construct import and export shocks at the microregion (m) level, as in Costa, Garred, Pessoa (2016):

$$IS_m = \sum_j \underbrace{\frac{L_{mj,2000}}{L_{m,2000}}}_{\text{emp. share of ind. j in m}} * \underbrace{\frac{\Delta I_j}{L_{BR,j,2000}}}_{\text{change in imports per worker of j}}$$

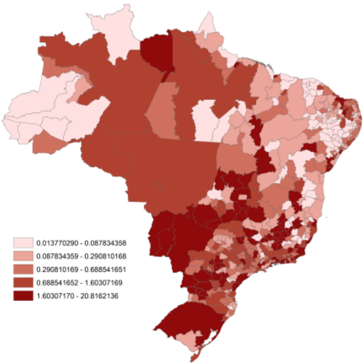
$$XD_m = \sum_j \frac{L_{mj,2000}}{L_{m,2000}} * \frac{\Delta X_j}{L_{BR,j,2000}}$$

Intuitively: Utilize cross-industry variation in growth in exports and imports, combined with cross-microregion variation in initial (2000) industrial composition.

Δ imports per worker



Δ exports per worker



Note: units are in thousands of 2010 USD per worker, for trade exposure measures.

Identification: Our Instrument

We employ a variant of the Autor, Dorn, Hanson (2013) type IV as used in Costa, Garred, Pessoa (2016). Steps for import IV:

1. Using sample of all countries other than Brazil, estimate the following regression at country (i)-sector (j) level, where LHS is import growth and RHS is series of fixed effects (FE):

$$\frac{\tilde{I}_{ij}}{\tilde{I}_{ij,2000}} = \alpha_j + \psi_{china,j} + \upsilon_{ij}$$

2. $\psi_{china,j}$ is FE that represents deviation in sectoral import growth from industry mean; higher values means this is a sector that China is growing more in between 2000-2010.
3. We use these FEs for each sector (j) to help predict sector level import growth, and aggregate at microregion level:

$$ivIS_m = \sum_j \frac{L_{mj,2000}}{L_{m,2000}} * \underbrace{\frac{I_{j,2000} * \hat{\psi}_{china,j}}{L_{Bj,2000}}}_{\text{predicted import growth per worker}}$$

We construct export IV, and gender-specific IVs in same manner.

more

Specification

Using the assembled data, RHS variables, and IVs, we estimate the following specifications:

$$\Delta BW_m = \beta_0 + \beta_1 IS_m + \beta_2 XD_m + X'_m \beta_3 + \epsilon_m$$

- ΔBW_m is the change in average birth weight in microregion m
- X_m is a vector of start-of-period controls:
  - state fixed effects
  - 2000 emp. shares in mfg., agric., mining., and informal emp
  - cubic in 2000 income per capita
  - share living in rural areas
  - size of working age population

Standard errors are clustered at the mesoregion (1 mesoregion = several microregions) level, as in Costa, Garred, Pessoa (2016). Observations are weighted by 2000 working age population.

Gender-specific shocks

Gender-specific shocks may be masked by using aggregate measures of trade shocks

- Page, Schaller, Simon (2017) show that changes in labour market conditions for men and women have opposing effects on child health.
- Men and women value types of expenditures differently, and gender-specific shocks could impact within-household bargaining power as well as local public policies (Miller, 2008)
- Women receiving shocks have additional impacts, ceteris paribus, since prenatal stress and exposure to work environments may affect birth outcomes (Hummels, Munch, Xiang (2016)).
- Prior studies (i.e. Pierce and Schott (2018)) show that import shocks affect men disproportionately, even for non-economic outcomes.

Gender-specific Shocks

To capture gender-specific impact of import shocks, we use gender-specific import shocks leveraging initial industry gender composition:

$$IS_m^{male} = \sum_j \underbrace{\frac{L^{male}_{BR,j,2000}}{L_{BR,j,2000}}}_{\text{male emp. share in j}} \underbrace{\frac{L_{mj,2000}}{L_{m,2000}}}_{\text{emp. share of ind. j in m}} * \underbrace{\frac{\Delta I_j}{L_{BR,j,2000}}}_{\text{change in imports per worker of j}}$$

$$IS_m^{female} = \sum_j \underbrace{\frac{L^{female}_{BR,j,2000}}{L_{BR,j,2000}}}_{\text{female emp. share in j}} \underbrace{\frac{L_{mj,2000}}{L_{m,2000}}}_{\text{emp. share of ind. j in m}} * \underbrace{\frac{\Delta I_j}{L_{BR,j,2000}}}_{\text{change in imports per worker of j}}$$

We also construct similar measures for export demand.

Results

Birth outcomes

Dep. Var.:	(1) Δ births per 1000 women aged 18-39	(2) Δ prop. babies below 1500g	(3) Δ prop. babies below 2500g	(4) Δ avg. birth weight (g)	(5) Δ infant mortality rate (per 1000 births)
2000 means(SDs)	105.4(21.2)	0.0081(0.0032)	0.069(0.015)	3230(75)	22.7(8.29)
IS_m	-2.771**	0.000183	-0.000987	6.367**	-0.506
	(1.409)	(0.000248)	(0.000675)	(2.880)	(0.382)
XD_m	-0.552*	-9.78e-05***	-0.000261*	1.127***	-0.181**
	(0.313)	(2.87e-05)	(0.000136)	(0.436)	(0.0840)
IS_m^{male}	-1.795	-0.000248	-0.00481***	19.12***	-1.511*
	(1.804)	(0.000580)	(0.00170)	(6.743)	(0.805)
IS_m^{female}	-3.775	0.000845	0.00671**	-20.37	1.502
	(4.946)	(0.000862)	(0.00341)	(13.75)	(1.579)
XD_m^{male}	-0.481	-0.000158***	-0.000425**	2.791***	-0.318*
	(0.507)	(5.38e-05)	(0.000208)	(0.844)	(0.172)
XD_m^{female}	-1.645	0.000876	0.00328	-26.62***	2.088
	(4.050)	(0.000584)	(0.00264)	(10.19)	(2.015)
Observations	409	409	409	409	409

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Birth outcomes: interpretation

- A one SD increase (1.046) in IS_m:
  - 2.9 $\downarrow$ in birth rate, 6.7 $\uparrow$ in avg. birth weight, 0.53 $\downarrow$ in mort. rate
- A one SD increase (3.243) in XD_m:
  - 1.8 $\downarrow$ in birth rate, 3.9 $\uparrow$ in avg. birth weight, 0.63 $\downarrow$ in mort. rate

Birth outcomes: interpretation

- A one SD increase (1.046) in IS_m:
  - 2.9 $\downarrow$ in birth rate, 6.7 $\uparrow$ in avg. birth weight, 0.53 $\downarrow$ in mort. rate
- A one SD increase (3.243) in XD_m:
  - 1.8 $\downarrow$ in birth rate, 3.9 $\uparrow$ in avg. birth weight, 0.63 $\downarrow$ in mort. rate
- A one SD increase (0.805) in IS_m^{male}:
  - 1.44 $\downarrow$ in birth rate, 15.39 $\uparrow$ in avg. birth weight, 1.2 $\downarrow$ in mort. rate
- A one SD increase (0.302) in IS_m^{female}:
  - 1.14 $\downarrow$ in birth rate, 6.15 $\downarrow$ in avg. birth weight, 0.45 $\uparrow$ in mort. rate
- A one SD increase (3.045) in XD_m^{male}:
  - 1.46 $\downarrow$ in birth rate, 8.5 $\uparrow$ in avg. birth weight, 0.97 $\downarrow$ in mort. rate
- A one SD increase (0.250) in XD_m^{female}:
  - 0.41 $\downarrow$ in birth rate, 6.7 $\downarrow$ in avg. birth rate, 0.52 $\uparrow$ in mort. rate

Mechanism 1: Income effects

If trade shocks have an effect on income, then birth outcomes might be affected:

- Higher income provides more household resources, improving housing, nutrition for pregnant women.
- Higher income could also, esp. for women, increase opportunity cost of household tasks and non-work activities.
- Evidence from trade also shows increased labour demand could increase stress, esp. if pregnant women are induced to work more
- Conversely: lower income could induce parents to have fewer children but spend more resources on care

Dep. Var.:	(1) Δ avg. male monthly income	(2) Δ avg. female monthly income	(3) Δ avg. male monthly income, prim. ind.	(4) Δ avg. female monthly income, prim. ind.	(5) Δ avg. male monthly income, manuf. ind.	(6) Δ avg. female monthly income, manuf. ind.
2000 means(SD)	1035(437)	732(266)	733(524)	367(354)	1016(363)	640(246)
IS_m	-6.540	-0.907	-33.58	-84.09**	-20.93***	10.66
	(5.358)	(3.448)	(41.86)	(38.03)	(7.643)	(7.062)
XD_m	5.970***	5.030***	15.09**	18.81***	7.505***	0.745
	(1.375)	(0.892)	(5.963)	(4.949)	(2.255)	(1.723)
IS_m^{male}	-15.63	-6.444	-53.12	-99.30*	-27.28	21.69
	(14.79)	(11.12)	(75.76)	(53.45)	(24.75)	(22.78)
IS_m^{female}	6.484	3.202	54.87	-16.68	-9.589	-14.42
	(25.06)	(22.31)	(118.2)	(161.8)	(42.98)	(33.10)
XD_m^{male}	3.381	0.763	23.57***	13.33*	5.624	-0.550
	(2.150)	(1.490)	(6.869)	(7.557)	(3.430)	(2.721)
XD_m^{female}	45.34	66.53***	-90.91	107.6	36.59	14.60
	(32.59)	(15.51)	(89.08)	(95.81)	(38.66)	(30.15)
Observations	409	409	409	409	409	409

Robust standard errors in parentheses.
Incomes are avg. monthly incomes, in 2010 Brazilian reals. 1 real approx. 0.60 USD.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Mechanism 2: Changes in Fertility Rates

Variables	(1) Average Birth Rates 10-14 Years	(2) Average Birth Rates 15-17 Years	(3) Average Birth Rates 15-19 Years	(4) Average Birth Rates 20-24 Years	(5) Average Birth Rates 25-29 Years	(6) Average Birth Rates 30-34 Years	(7) Average Birth Rates 35-39 Years	(8) Average Birth Rates 40-44 Years
IS_{mt}	-0.0528**	-0.171	-0.00156	-0.00274**	-0.00305***	-0.00233**	-0.00118**	-0.000588
	(0.0205)	(0.204)	(0.00111)	(0.00136)	(0.00114)	(0.00107)	(0.000565)	(0.000389)
XD_{mt}	-0.00496	0.0262	-0.000475	-0.000783*	-0.000537**	-0.000362**	-0.000212*	-9.52e-05
	(0.00359)	(0.0296)	(0.000338)	(0.000422)	(0.000227)	(0.000150)	(0.000110)	(5.92e-05)
Observations	412	412	409	409	409	409	409	409
R-squared	0.247	0.360	0.753	0.718	0.713	0.605	0.627	0.649
IS_{mt}^{male}	0.00401	0.0402	-0.00229	-0.00102	-0.00303	-0.00367	-0.00257*	-0.000353
	(0.0550)	(0.306)	(0.00175)	(0.00187)	(0.00217)	(0.00249)	(0.00135)	(0.000510)
IS_{mt}^{female}	-0.142	-0.548	0.000541	-0.00489	-0.00216	0.000934	0.00186	-0.000911
	(0.0876)	(0.756)	(0.00430)	(0.00486)	(0.00465)	(0.00455)	(0.00236)	(0.00144)
XD_{mt}^{male}	7.58e-05	-0.0980*	-0.000336	-0.000584	-0.000415	-0.000367	-0.000132	-0.000186**
	(0.00587)	(0.0519)	(0.000562)	(0.000707)	(0.000404)	(0.000264)	(0.000204)	(8.00e-05)
XD_{mt}^{female}	-0.0897	1.728**	-0.00205	-0.00387	-0.00206	0.000282	-0.000841	0.00116*
	(0.0692)	(0.785)	(0.00574)	(0.00508)	(0.00394)	(0.00256)	(0.00152)	(0.000692)
Observations	412	412	409	409	409	409	409	409
R-squared	0.267	0.384	0.749	0.722	0.710	0.590	0.615	0.651

Mechanism 3: Changes in Household Composition

Why we might expect household composition to affect birth outcomes:

- Married households have more resources (income, family network) and allows for potential within-household specialization
- If marriage rates change with trade shocks, the types of these "marginal" matches formed may be of lower quality, affecting other household outcomes such as infant health

We analyze how trade shocks affect: 1) logged population, 2) share of women who are married, 3) share of women with children, and 4) share of mothers who are married.

	(1)	(2)	(3)	(4)
Dep. Var.:	Δ ln(pop.)	Δ share of women married	Δ share of women w/ children	Δ share of mothers married
2000 means(SD)	11.56(1.06)	0.49(0.09)	0.76(0.035)	0.60(0.11)
IS_m	0.00799	0.00210	-0.000681	0.00199
	(0.00543)	(0.00128)	(0.00150)	(0.00123)
XD_m	-0.00203*	-1.06e-05	0.000154	-9.13e-05
	(0.00121)	(0.000298)	(0.000233)	(0.000353)
IS_m^{male}	0.0246	0.00353	0.000391	0.00388
	(0.0160)	(0.00365)	(0.00182)	(0.00441)
IS_m^{female}	-0.0280	-0.00195	-0.00179	-0.00343
	(0.0234)	(0.00542)	(0.00541)	(0.00626)
XD_m^{male}	0.000228	-0.00104	0.000328	-0.00161**
	(0.00249)	(0.000820)	(0.000322)	(0.000795)
XD_m^{female}	-0.0394	0.0140	-0.00241	0.0205***
	(0.0439)	(0.00893)	(0.00554)	(0.00754)
Observations	409	409	409	409

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Other Mechanisms and Robustness

Mechanisms:

1. Provision and utilization of healthcare table
2. Pollution table
3. Changes in social assistance programs table

Robustness Tests:

1. Estimate results using IV constructed using only countries outside of Latin America. table
2. Estimate results by education of mother (low versus high). low educ. high educ.

Conclusion

- In this paper, we separately analyze the effects of two distinct trade shocks induced by China's trade patterns, on primary healthcare outcomes in Brazil.
- We find that both import and export growth led to higher birth weights for babies.
- Moreover, regions experiencing a positive export demand shock benefitted from lower infant mortality rates.

Conclusion

What could explain our results? Exports:

- Higher income from export demand, primarily driven by increases from male shocks

Imports:

- Increased economic uncertainty induces more selectivity in birth; households may be less likely to have children with fewer resources, improving outcomes for those children that are born through selection and concentration of household resources.

Appendices

IV Definitions

Export demand IV:

$$ivXD_m = \sum_j \frac{L_{mj,2000}}{L_{m,2000}} * \underbrace{\frac{X_{j,2000} * \hat{\delta}_{china,j}}{L_{Bj,2000}}}_{\text{predicted export growth per worker}}$$

Male-specific import exposure IV:

$$ivIS_m^{male} = \sum_j \underbrace{\frac{L_{BR,j,2000}^{male}}{L_{BR,j,2000}}}_{\text{male emp. share in j}} \frac{L_{mj,2000}}{L_{m,2000}} * \underbrace{\frac{I_{j,2000} * \hat{\psi}_{china,j}}{L_{Bj,2000}}}_{\text{predicted export growth per worker}}$$

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Dep. Var.:	(1) Δ birth rate	(2) Δ prop. babies below 1500g	(3) Δ prop. babies below 2500g	(4) Δ avg. birth weight
IS_m	-1.811	-9.04e-05	-0.00180*	5.968*
	(2.182)	(0.000402)	(0.00107)	(3.332)
XD_m	-1.428***	-2.11e-05	-0.000235	1.129**
	(0.489)	(7.03e-05)	(0.000435)	(0.443)
IS_m^{male}	-7.319*	-0.00183*	-0.0113***	16.82***
	(4.286)	(0.000944)	(0.00352)	(6.424)
IS_m^{female}	10.34	0.00332*	0.0170***	-17.53
	(9.303)	(0.00181)	(0.00661)	(14.87)
XD_m^{male}	-0.594	-5.58e-05	-0.00102	2.154**
	(0.952)	(0.000110)	(0.000696)	(0.859)
XD_m^{female}	-11.34	0.00104	0.0140**	-16.94*
	(7.248)	(0.000927)	(0.00590)	(10.06)
Observations	409	409	409	409

Robust standard errors in parentheses

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Dep. Var.:	(1) Δ birth rate	(2) Δ prop. babies below 1500g	(3) Δ prop. babies below 2500g	(4) Δ avg. birth weight
IS_m	-1.717***	-0.000210	-0.00254	6.603*
	(0.621)	(0.000394)	(0.00164)	(3.699)
XD_m	-0.310	-0.000191***	-0.00111***	1.381***
	(0.329)	(5.68e-05)	(0.000336)	(0.512)
IS_m^{male}	-1.652	-0.00214***	-0.0131***	15.19**
	(1.804)	(0.000776)	(0.00340)	(6.405)
IS_m^{female}	-1.554	0.00371*	0.0201*	-12.34
	(2.936)	(0.00200)	(0.0105)	(16.05)
XD_m^{male}	-0.486	-0.000253***	-0.000713	2.863***
	(0.506)	(9.61e-05)	(0.000543)	(0.914)
XD_m^{female}	2.208	0.00131	-0.00329	-22.45**
	(3.813)	(0.000998)	(0.00437)	(10.83)
Observations	409	409	409	409

Robust standard errors in parentheses

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

	(1)	(2)	(3)	(4)
Dep. Var.:	Δ prop. mothers w/ $\geq$ 4 prenatal doc. visits	Δ ln(tot. exp. pc)	Δ ln(health exp. pc)	Δ health exp. share
2000 means(SD)	0.82(0.13)	6.62(0.44)	4.96(0.52)	0.20(0.05)
IS_m	0.00471	0.00626	-0.00996	-0.00355
	(0.00305)	(0.0169)	(0.0276)	(0.00343)
XD_m	-0.000112	-0.00110	-0.00548	-0.00198**
	(0.000639)	(0.00292)	(0.00555)	(0.000864)
IS_m^{male}	-0.00364	0.00812	-0.0634	-0.0123
	(0.00501)	(0.0457)	(0.0778)	(0.0143)
IS_m^{female}	0.0192**	0.00671	0.107	0.0155
	(0.00902)	(0.0948)	(0.134)	(0.0274)
XD_m^{male}	-0.00121	0.00284	0.00165	-0.00110
	(0.00101)	(0.00786)	(0.00758)	(0.00158)
XD_m^{female}	0.0174	-0.0583	-0.0894	-0.0115
	(0.0110)	(0.0901)	(0.109)	(0.0227)
Observations	409	407	407	407

Robust standard errors in parentheses. Money-based variables converted to 2010 Brazilian reals.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

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	(0.00121)	(0.000298)	(0.000233)	(0.000353)
IS_m^{male}	0.0246	0.00353	0.000391	0.00388
	(0.0160)	(0.00365)	(0.00182)	(0.00441)
IS_m^{female}	-0.0280	-0.00195	-0.00179	-0.00343
	(0.0234)	(0.00542)	(0.00541)	(0.00626)
XD_m^{male}	0.000228	-0.00104	0.000328	-0.00161**
	(0.00249)	(0.000820)	(0.000322)	(0.000795)
XD_m^{female}	-0.0394	0.0140	-0.00241	0.0205***
	(0.0439)	(0.00893)	(0.00554)	(0.00754)
Observations	409	409	409	409

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var.:	Δ avg. male monthly income	Δ avg. female monthly income	Δ avg. male monthly income, prim. ind.	Δ avg. female monthly income, prim. ind.	Δ avg. male monthly income, manuf. ind.	Δ avg. female monthly income, manuf. ind.
2000 means(SD)	1035(437)	732(266)	733(524)	367(354)	1016(363)	640(246)
IS_m	-6.540	-0.907	-33.58	-84.09**	-20.93***	10.66
	(5.358)	(3.448)	(41.86)	(38.03)	(7.643)	(7.062)
XD_m	5.970***	5.030***	15.09**	18.81***	7.505***	0.745
	(1.375)	(0.892)	(5.963)	(4.949)	(2.255)	(1.723)
IS_m^{male}	-15.63	-6.444	-53.12	-99.30*	-27.28	21.69
	(14.79)	(11.12)	(75.76)	(53.45)	(24.75)	(22.78)
IS_m^{female}	6.484	3.202	54.87	-16.68	-9.589	-14.42
	(25.06)	(22.31)	(118.2)	(161.8)	(42.98)	(33.10)
XD_m^{male}	3.381	0.763	23.57***	13.33*	5.624	-0.550
	(2.150)	(1.490)	(6.869)	(7.557)	(3.430)	(2.721)
XD_m^{female}	45.34	66.53***	-90.91	107.6	36.59	14.60
	(32.59)	(15.51)	(89.08)	(95.81)	(38.66)	(30.15)
Observations	409	409	409	409	409	409

Robust standard errors in parentheses.
Incomes are avg. monthly incomes, in 2010 Brazilian reals. 1 real approx. 0.60 USD.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

	(1)	(2)
Dep. Var.:	$\Delta PM2.5$	$\Delta ln(PM2.5)$
2000 means(SD)	4.79(3.43)	1.29(0.79)
IS_m	-0.0616	-0.0218
	(0.105)	(0.0139)
XD_m	-0.0178	-0.000885
	(0.0341)	(0.00720)
IS_m^{male}	-0.0411	-0.0357
	(0.172)	(0.0471)
IS_m^{female}	-0.0558	0.0202
	(0.337)	(0.0768)
XD_m^{male}	0.0401**	0.0124*
	(0.0191)	(0.00713)
XD_m^{female}	-0.835	-0.181
	(0.598)	(0.161)
Observations	409	409

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

	(1)	(2)
	Amount of Bolsa Familia Benefits	Number of Bolsa Familia Recepients
IS_{mt}	262,352	3,020
	(380,087)	(3,367)
XD_{mt}	-408,164***	-3,910***
	(82,511)	(680.5)
IS_{mt}^{male}	-302,345	1,284
	(739,135)	(7,520)
IS_{mt}^{female}	1.631e+06	9,014
	(1.482e+06)	(12,296)
XD_{mt}^{male}	-95,856	-345.4
	(103,192)	(943.7)
XD_{mt}^{female}	-4.575e+06***	-52,984***
	(1.171e+06)	(10,201)
Observations	410	410
R-squared	0.934	0.933

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Dep. Var.:	(1) Δ births per 1000 women aged 18-39	(2) Δ prop. babies below 1500g	(3) Δ prop. babies below 2500g	(4) Δ avg. birth weight	(5) Δ infant mortality rate (infant deaths per 1000 births)
IS_m	-2.772**	0.000183	-0.000985	6.358**	-0.505
	(1.410)	(0.000248)	(0.000676)	(2.880)	(0.383)
XD_m	-0.553*	-9.73e-05***	-0.000259*	1.113**	-0.179**
	(0.313)	(2.88e-05)	(0.000136)	(0.438)	(0.0839)
IS_m^{male}	-1.796	-0.000246	-0.00481***	19.15***	-1.507*
	(1.805)	(0.000581)	(0.00170)	(6.751)	(0.805)
IS_m^{female}	-3.774	0.000843	0.00672**	-20.41	1.497
	(4.947)	(0.000863)	(0.00341)	(13.75)	(1.579)
XD_m^{male}	-0.482	-0.000155***	-0.000428**	2.836***	-0.313*
	(0.506)	(5.40e-05)	(0.000207)	(0.840)	(0.171)
XD_m^{female}	-1.619	0.000837	0.00331	-27.28***	2.027
	(4.003)	(0.000590)	(0.00262)	(10.09)	(1.982)
Observations	409	409	409	409	409

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$