

# Immigrants' Labor Supply and Exchange Rate Volatility

## Online Appendix

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*Are an immigrant's decisions affected in real time by her home country's economy? I examine this question by exploiting exchange rate variations as exogenous price shocks to immigrants' budget constraints. I find that in response to a 10% dollar appreciation, an immigrant decreases her earnings by 0.92%, mainly by reducing hours worked. The exchange rate effect is greater for recent immigrants, married immigrants with absent spouses, Mexicans close to the border, and immigrants from countries with higher remittance flows. A neo-classical interpretation of these findings suggests that the income effect exceeds the cross-substitution effect. Remittance targets offer an alternative explanation.*

This companion appendix contains two parts. Part *I* shows the details and the complete proof of the corollaries in Section *IV* of the paper. Part *II* provides supplementary empirical results.

### I. Theoretical Appendix

In this section, first I will use the conceptual framework presented in the paper and show that the exchange rate elasticity is a function of CRRA. Then I will discuss different interpretations of the empirical results, and in particular provide a detailed version of the claims in Section *V* of the paper.

As in the paper, I define the indirect utility of an agent as follows:

$$v(y, w) = \max_{c=z+y} u(c, z/w)$$

The household's intra-temporal optimization can be written as:

$$\max_T v(y - T, w) + \eta v(\hat{y} + ET, \hat{w})$$

where  $w$ ,  $y$ , and  $T$  are wage rate, non-labor income, and remittances, respectively. In the paper, I assumed  $y = \hat{y} = 0$ . Variables with a hat represent the same variables for his/her spouse in the home country. The first-order condition is:

$$v_y(y - T, w) = E\eta v_y(\hat{y} + ET, \hat{w})$$

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Differentiating with respect to  $E$ , we get:

$$v_{yy}(y - T, w) \frac{\partial T}{\partial E} + \eta v_y(\hat{y} + ET, \hat{w}) + E\eta v_{yy}(\hat{y} + ET, \hat{w}) \left[ E \frac{\partial T}{\partial E} + T \right] = 0$$

Using the first-order condition again:

$$\frac{v_{yy}(y - T, w)}{v_y(y - T, w)} \frac{\partial T}{\partial E} + \frac{1}{E} + \frac{v_{yy}(\hat{y} + ET, \hat{w})}{v_y(\hat{y} + ET, \hat{w})} \left[ E \frac{\partial T}{\partial E} + T \right] = 0$$

Defining CRRA as  $\gamma \equiv \varepsilon_{v_y, y} = \frac{(y+w)v_{yy}(y,w)}{v_y(y,w)}$ , this is equivalent to:

$$\frac{1}{y + w - T} \gamma \frac{T}{E} \varepsilon_{T,E} - \frac{1}{E} + \frac{T}{\hat{y} + \hat{w} + ET} \gamma [\varepsilon_{T,E} + 1] = 0$$

and rearranging we get:

$$(A1) \quad \varepsilon_{T,E} = \left( \frac{1}{\gamma} - \frac{T}{T + \frac{1}{E}(\hat{y} + \hat{w})} \right) \frac{T + \frac{1}{E}(\hat{y} + \hat{w})}{T} \frac{y + w - T}{y + w + \frac{1}{E}(\hat{y} + \hat{w})}$$

From Equation (2) in the paper, we know that the effect of exchange rate on earnings depends on two factors: the elasticity of labor earnings with respect to unearned income ( $ELE$ ), as well as how the exchange rate will affect the amount of immigrants' remittances and saving ( $\varepsilon_{T,E}$ ). As Equation (A1) states, the magnitude of the latter ( $\varepsilon_{T,E}$ ) depends on the CRRA over wealth. As the level of wealth decreases, agents who are more risk-averse over wealth will experience a higher reduction in their marginal utility of wealth. This intuition suggests that for more risk averse individuals, the difference in marginal utility between two agents with different levels of wealth will be larger. Consequently, a higher degree of risk aversion implies a relatively higher value of remittances sent by an immigrant to a member of his household in the home country with a lower level of wealth.

What does the exchange rate effect on immigrants' earnings reveal about their preferences? If we assume that an immigrant receives utility directly from remittances, in addition to consumption and leisure, the real exchange rate plays the role of the price of remittances.

$$\max_{\substack{c, z, T \\ c+T=z}} U(c, z/w, ET)$$

This general setting incorporates the model of section I as a special case. The empirical finding that the elasticity of earnings with respect to the exchange rate is negative ( $\varepsilon_{z,E} < 0$ ) is a parametrical test suggesting that the income effect of

the exchange rate on earnings is larger than the substitution effect. This can be interpreted as equivalent to leisure being a gross complement of remittances.

### Immigrants Earn Less, Consume More, and Send Less Remittances

The negative elasticity of earnings with respect to the exchange rate implies a negative elasticity of remittances with respect to the exchange rate, that is:

$$\varepsilon_{z,E} < 0 \Rightarrow \varepsilon_{T,E} < 0$$

This is the direct result from Equation (2). The negative elasticity of remittances with respect to the exchange rate means that remittances are normal goods.

What can we say about the consumption elasticity with respect to the exchange rate? One can easily show that an equivalent of Equation (2) holds for consumption as well, that is  $\varepsilon_{c,E} = -\varepsilon_{T,E} \times \varepsilon_{c,y}$ .

$$\varepsilon_{T,E} < 0 \Rightarrow \varepsilon_{c,E} > 0$$

So the negative sign of the exchange rate elasticity of remittances implies that the exchange rate elasticity of consumption is positive. Therefore, our findings indicate that in response to a U.S. dollar appreciation, immigrants earn less, consume more, and send fewer dollars home.

### Lower Bound of 1 for CRRA

The negative elasticity of earnings with respect to exchange rate implies a lower bound for the CRRA with respect to wealth equal to 1.

$$\varepsilon_{z,E} < 0 \Rightarrow \gamma > 1$$

Using equation (A1),  $\varepsilon_{T,E} < 0$  implies  $\frac{1}{\gamma} < \frac{ET}{ET + \hat{y} + \hat{w}} < 1$ . A tighter bound of  $1 + \frac{\hat{y} + \hat{w}}{ET}$  for CRRA is possible. This is less useful in the absence of a relevant estimate of the importance of remittances for its recipients, i.e.  $\frac{\hat{y} + \hat{w}}{ET}$ .

One must note that the present model, like the standard life-cycle model, mechanically links CRRA to the elasticity of inter-temporal substitution (EIS), as a result of the assumption that utility is time-separable. Thus, (7) is equivalent to  $EIS < 1$ . The bounds are consistent with mainstream estimations of CRRA. In fact, while some argue for a CRRA of one (e.g. Metrick (1995), Chetty (2006)), most of the literature estimates a substantially higher level of CRRA (e.g. Gertner (1993), Cohen and Einav (2007)). An upper bound of 1 for EIS is also consistent with most existing empirical estimates (See Browning, Hansen and Heckman (1999)).

### Lower Bound of 0.092 for ELE

Third Corollary: The finding of  $\varepsilon_{z,E} \simeq -0.092$  implies a lower bound of 0.092 for the elasticity of labor earnings with respect to unearned income (ELE):

$$(8) \quad 0.092 < |\varepsilon_{z,y}|$$

In fact,  $\gamma > 1$  implies that  $\varepsilon_{T,E} > -1$ , which implies  $|\varepsilon_{z,E}| = |\varepsilon_{z,y}\varepsilon_{T,E}| < |\varepsilon_{z,y}|$ . Note that, a tighter bound exists, and it is larger with a factor of  $1 + \frac{\frac{1}{E}(\dot{y} + \dot{w}) + T}{y + w - T}$ . However, it is probably not too far from  $|\varepsilon_{z,E}|$  as the ratio of total income after remittances should be small. In the absence of a reliable estimate of this ratio, the smaller bound is used.

The lower bound of 0.092 suggests a rather large ELE, which is consistent with most macro estimations, but not the majority of micro estimations<sup>1</sup>. This issue is discussed in section V of the paper.

## II. Empirical Appendix

### i. Exchange Rate Measures

Three different measures of real exchange rate are used (see Table A8). The first one is used throughout the paper and it is defined in Section II.

The second one, WDI, is directly from the World Bank's World Development Indicators. It is based on the variable "PPP conversion factor (GDP) to market exchange rate ratio". This variable is constructed by dividing the PPP conversion factor (the cost of the bundle of goods that constitutes GDP) by the market exchange rate.

The third measure of real exchange rate, PWT, is from the Penn World Tables. We construct the real exchange rate in this case as  $\text{XRAT}/\text{PPP}=100/\text{P}$ , i.e. exchange rates (XRAT) over purchasing power parity conversion factors (PPP). XRAT is mainly from UN and World Bank sources. The PPP variable is a purchasing power parity calculated over GDP. Thus both above measures of the real exchange rate are based on the GDP price deflator.

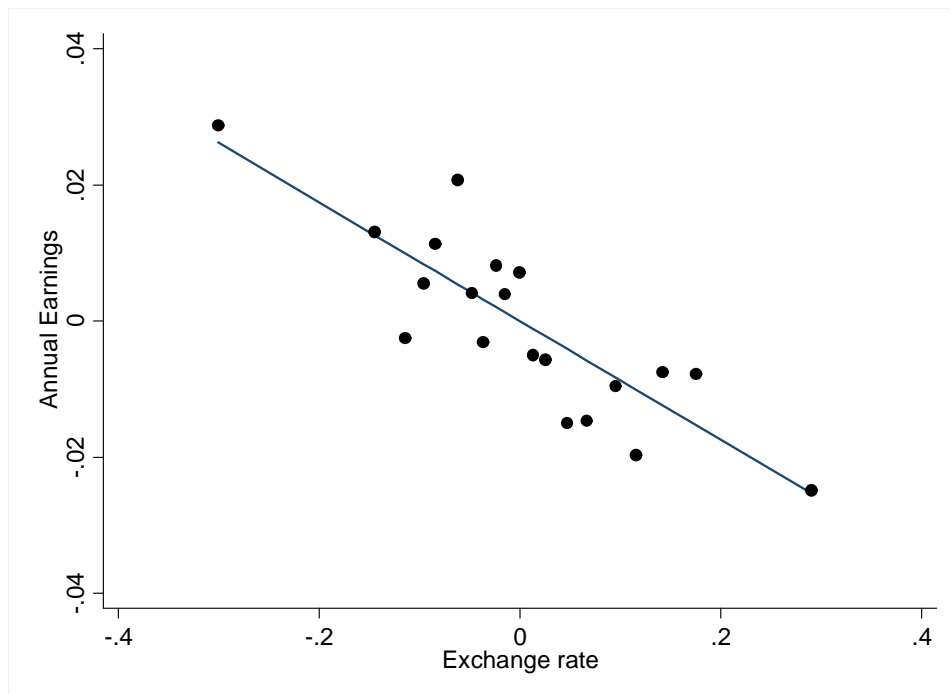
### ii. Rate of Return Construction using ACS

I used American Community Survey (ACS) for the years 2005 and 2009, and focused on the cohort who arrived to the U.S. in the 5-year interval of 2000-2004. I aged forward the immigrant population in the 2005 data, and selected individuals who were between 16-64 years old in 2009. I then calculated the number of immigrants in the 2005 and 2009 sample for each country. The relative difference between the two numbers provided an estimation for the return rate per country.

<sup>1</sup>See table 1 in Chetty (2006), or for a recent example, see Blomquist and Selin (2010) who report one of the highest micro estimates of ELE, which is  $-0.07$  for males.

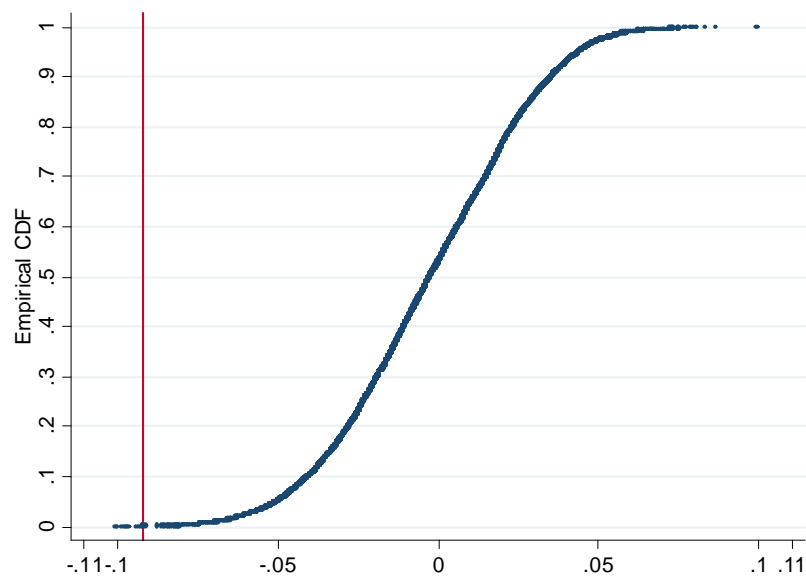
iii. A note on Table A13

Table A13 in the Online Appendix directly investigates the existence of a general equilibrium effect. I focus on immigrants who live close to other immigrants from countries with correlated exchange rate variation, which are, however, not neighboring countries, in order to avoid self-selection issues.



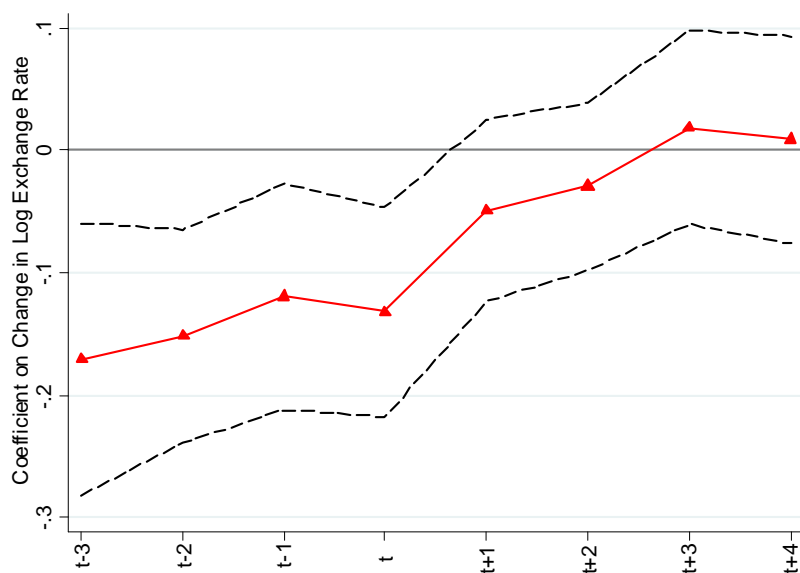
**A1 Relation Between Earnings and Exchange Rate**

Note: This figure plots the raw correlations between immigrants' earning and exchange rate, after controlling for time and country dummies. To construct this figure, I bin exchange rate into twenty bins such that each bins contains the same number of observations (Compare with Figure 1). I then plot the mean of the immigrant earnings for each bin. The solid line shows the best linear fit estimated on the underlying data using OLS. The bins that contains less than 10 observation were neglected.



**Figure A2 Non-Parametric Permutation Test: 10,000 Replications**

Note: This figure compares the estimated exchange rate elasticity of earnings of  $-0.092$  (the red orthogonal line) with the empirical distribution obtained from 10,000 repetitions of the following exercise: Instead of matching the exchange rate of each country to immigrants from that country, I first randomly ‘mismatch’ the exchange rates to immigrants and then run the same regression (3).



**Figure A3 Timing of the Effect**

Note: This figure illustrates the effect of past, present and future exchange rate shocks on immigrant earnings. The x-axis represents time with respect to time  $t$ , when earnings were observed. Each triangle reports the coefficient of change in exchange rate for the corresponding period. For example, the first triangle from the left reports the effect of a change in the exchange rate 3 periods prior on immigrants' earnings at time  $t$ .

Table A1: Descriptive Statistics

Country	Number of Observations	Male (in %)	Age	Years Since		Worker (in %)	Annual Earnings	Annual Hours Worked	Annual Weeks Worked			Wage Rate
				Arrival	Education				All	Full-time	Part-time	
1 Argentina	1,160	53	42 (11.3)	16.7 (12.8)	12 (3.2)	80	53931.6 (69873.4)	2002.5 (739.3)	47.8 (10.6)	42.2 (18)	5.5 (14.2)	27.4 (37.8)
2 Armenia	486	47	40.7 (11.1)	13.8 (9.1)	12 (3.1)	67	38590.3 (48333.3)	1826.6 (731.4)	48.3 (9.6)	35.9 (22.5)	12.4 (20.5)	21.2 (35.9)
3 Australia	404	53	40 (10.9)	14.9 (13)	13 (2.9)	83	72868 (76794.3)	2125.6 (753)	48.4 (9.6)	43.5 (16.6)	4.9 (13.1)	33.9 (32.1)
4 Austria	246	45	47.5 (11.8)	30.6 (18.5)	13 (2.9)	77	60347.9 (69211.8)	1995 (818.4)	47.6 (10.9)	39.2 (20.5)	8.4 (17.3)	30.3 (34.6)
5 Bangladesh	848	60	38.4 (10)	12 (7.7)	13 (3.4)	73	43510 (50894)	2018.6 (757.2)	48.3 (10.2)	41.7 (19)	6.7 (15.9)	20.7 (19.4)
6 Barbados	376	40	45 (11.1)	23.7 (10.5)	12 (3)	84	43023.2 (30122)	1975.1 (555.4)	49 (8.8)	45 (15.9)	3.9 (12)	21.6 (13.8)
7 Belgium	208	49	44.5 (10.8)	24.6 (16.2)	14 (2.9)	78	74700.7 (81063)	2030.8 (759.3)	46.9 (11.6)	42.5 (18.1)	4.4 (12.9)	46.7 (133.7)
8 Bolivia	550	46	39.4 (10.8)	15.1 (10.5)	12 (2.8)	85	35386.8 (40924)	1924.2 (665.1)	47.6 (11.2)	41.8 (18.5)	5.9 (14.4)	17.9 (17.5)
9 Brazil	1,875	46	37.3 (10.4)	11.3 (10)	12 (3.4)	81	38545.9 (49764.5)	1881.2 (708.8)	46.6 (11.3)	38.8 (19.9)	7.8 (16.6)	20.2 (22.1)
10 Canada	5,004	43	43.5 (11)	23.2 (15.8)	13 (3.1)	81	63382.1 (76494.5)	1991.2 (789.8)	47.4 (10.8)	40.3 (19.7)	7.1 (15.9)	33.5 (104.2)
11 Chile	746	48	42.1 (11.7)	17.4 (11.9)	12 (2.9)	81	42586.9 (50098.8)	1969 (714.9)	47.9 (10.2)	41.6 (18.6)	6.4 (15.3)	21.4 (25.1)
12 China	8,253	47	42.2 (11.1)	14.5 (10.8)	13 (4)	79	48882.6 (54609.5)	1954.9 (681.3)	48.3 (9.9)	42 (18.7)	6.3 (15.6)	25.1 (33.4)
13 Colombia	5,275	42	41.4 (11.3)	16.8 (11)	11 (3.2)	80	35863.8 (44967.7)	1900.2 (665.8)	47.7 (10.5)	40.6 (19.3)	7.1 (16.1)	18.7 (23)
14 Costa Rica	688	47	40.5 (11.6)	19.8 (13)	11 (3.4)	82	35720.9 (43167.4)	1924.6 (665.9)	46.9 (11.2)	41.2 (18.1)	5.8 (14.5)	18.3 (19.7)
15 Denmark	151	42	47.6 (11.7)	22.7 (15.5)	14 (2.4)	80	74733.2 (98408.5)	1961.6 (800.3)	45.8 (12)	40 (19)	5.8 (13.5)	39.6 (59.8)
16 Dominica	204	34	41.2 (11.3)	17.7 (10.9)	10 (3.5)	75	30373.6 (23876.7)	1858 (669.8)	46.7 (12.3)	40.7 (19.2)	5.9 (15.7)	16.4 (10.9)
17 Dominican Republic	7,525	39	39.8 (11.4)	16.8 (10.3)	9 (3.4)	71	27157.3 (31182.3)	1827.2 (659.5)	46.3 (12.1)	40.3 (19.1)	6.1 (15)	15.6 (23.5)
18 Ecuador	3,536	51	39.1 (11.2)	16.2 (10.8)	10 (3.4)	79	31045.6 (37548.6)	1899.4 (622.5)	47.7 (10.4)	42.1 (17.9)	5.6 (14.3)	16.5 (18.7)
19 Egypt, Arab Rep.	804	58	42.5 (11.3)	16.3 (11.1)	14 (3.2)	74	58919.8 (79785)	2012.6 (792.9)	47.5 (10.4)	41 (18.9)	6.5 (15.3)	28.6 (37.3)
20 El Salvador	10,758	50	37.1 (10.7)	15.3 (8.8)	8 (3.4)	82	25904.6 (29975.9)	1862 (601.8)	47.4 (10.5)	41.4 (18.1)	6.1 (14.5)	14.3 (21.5)
21 Ethiopia	892	52	37.5 (9.9)	11.8 (8.6)	12 (3)	83	35664.3 (46561.2)	1909.5 (693)	47.8 (10.4)	40.2 (19.3)	7.5 (16.5)	18.5 (22.1)
22 Finland	102	30	44 (10.3)	17.8 (15.1)	14 (2.8)	75	54734.9 (39722)	1937.6 (863.5)	46.7 (12.8)	39.4 (20.7)	7.3 (16.7)	27.7 (16.5)
23 France	858	46	42.3 (11.1)	18.1 (14.5)	14 (2.8)	79	67089.9 (80911.9)	1984 (835.5)	46.6 (12)	39.8 (19.8)	6.8 (15.9)	33.7 (44.7)
24 Germany	3,271	36	46.8 (11.3)	28.7 (16.5)	13 (2.8)	74	51614.5 (58468.5)	1949.3 (744.9)	47.7 (10.5)	40 (19.9)	7.7 (16.7)	26.9 (50.4)
25 Ghana	697	54	40.2 (10.7)	13 (9.7)	12 (2.8)	83	40700.2 (41757.6)	1935.6 (677.4)	47.6 (10.6)	42.3 (17.8)	5.3 (14.3)	21.8 (23.4)
26 Greece	953	57	47.3 (10.5)	28.6 (12)	11 (3.8)	79	49315.6 (53702.1)	2072.7 (802.1)	48.2 (10)	41 (19.2)	7.1 (16.3)	24 (24.2)
27 Grenada	213	49	41.6 (10.9)	19.4 (10)	11 (2.8)	84	37511.2 (53525.8)	1921.3 (697.6)	46.7 (11.7)	42.6 (17.7)	4.1 (12.3)	18.7 (17.3)
28 Guatemala	6,033	57	35.4 (10.8)	13.4 (9.1)	8 (3.5)	80	23747.3 (29030.2)	1829.8 (622.4)	46.7 (11.3)	40.3 (18.7)	6.4 (14.9)	13.1 (14.9)
29 Haiti	3,269	48	41.5 (11.1)	16.7 (10.1)	10 (3.3)	81	32791 (42633.6)	1887.4 (621.4)	47.9 (10.4)	41.8 (18.4)	6.1 (14.9)	17.2 (20)
30 Honduras	3,435	50	36 (10.7)	12.9 (9.3)	8 (3.5)	79	23726.9 (25838.9)	1796.5 (651.7)	45.9 (12)	39.2 (19.2)	6.8 (15.1)	13.6 (14.2)
31 Hong Kong	1,341	47	41.4 (10.6)	21.1 (11.4)	13 (3.3)	82	55818.9 (53413.2)	1995.7 (677.4)	48.7 (9.6)	43.2 (17.8)	5.4 (14.6)	27.5 (24.7)
32 Hungary	445	48	46.1 (12.2)	25.5 (16.4)	13 (3.1)	73	53933.6 (61993.3)	2030.5 (780.4)	47.2 (11.6)	42.5 (18)	4.7 (12.8)	24.8 (23)
33 India	10,305	53	38.8 (11)	13 (10)	14 (2.8)	78	69339.8 (71269.9)	2013.2 (698.5)	48.3 (10)	43.2 (17.4)	5 (14)	36.3 (148.3)
34 Indonesia	511	45	39.8 (11.3)	15.2 (12)	14 (2.5)	76	45901.3 (48379.9)	1907.4 (711.3)	48.2 (9.7)	40.2 (20.1)	8 (17.1)	26.7 (74.7)
35 Iran	2,039	53	43.3 (10.3)	18.6 (10.1)	14 (3)	78	61221.6 (68155.7)	2029 (798.8)	48 (10.3)	40.8 (19.6)	7.2 (16.4)	29.7 (33.6)
36 Ireland	925	49	44.5 (11.8)	22.6 (14.3)	12 (3.1)	81	57709.3 (62556.3)	2030.6 (740)	48 (10)	41.5 (18.7)	6.5 (15.2)	28.8 (30.4)
37 Israel	727	54	41.3 (10.3)	20.1 (12.8)	13 (3.3)	77	66051.4 (75831.7)	2043.5 (828)	47.7 (10.9)	41.4 (19.1)	6.3 (15.1)	34 (50)
38 Italy	2,283	54	47.7 (10.6)	30.7 (13.7)	11 (3.6)	75	54587 (62906.8)	2070.6 (747.4)	48.4 (9.4)	42.9 (17.5)	5.5 (14.2)	27 (39.3)
39 Jamaica	4,121	41	42.4	19.1	11	84	39297.1	1950.9	48	43.2	4.8	21.1

40 Japan	2,470	35	(11.6)	(10.4)	(3)	68	(42404.2)	(640.9)	(10.2)	(17.2)	(13.3)	(42.7)
			42.1	15.5	13		56874	1903.6	47.5	39.2	8.3	29.8
			(11.3)	(13.1)	(2.7)		(72704.1)	(779.1)	(11.1)	(20.8)	(17.3)	(44.8)
41 Jordan	393	60	40.3	17.2	12	69	50377.5	2034.7	46.7	41.1	5.5	23.3
			(10.6)	(11.4)	(3.4)		(65211.2)	(844.8)	(11.5)	(18.8)	(14.3)	(23.9)
42 Kenya	406	56	37.2	12.2	13	86	46797.9	2035.1	48.3	43.2	5.1	22.9
			(11.2)	(9.7)	(2.9)		(54419.7)	(733.6)	(10.4)	(17.5)	(13.9)	(24.6)
43 Korea, Rep.	6,107	40	42.5	17.7	13	72	47800	2015.9	47.9	40.2	7.7	25.2
			(11)	(10.6)	(3.1)		(58543)	(812.6)	(10.5)	(19.9)	(17.1)	(52.2)
44 Lao PDR	1,639	50	40.2	20.2	9	75	31231.4	1940.1	48	43.6	4.4	16.3
			(10.8)	(8.6)	(4.2)		(27892.8)	(626.7)	(10.3)	(16.5)	(12.5)	(14.6)
45 Lithuania	167	42	40.6	12.5	13	77	42841.1	2044	47.4	43.7	3.7	21.3
			(12.1)	(13.3)	(2.8)		(43706.5)	(722.7)	(11.3)	(16.2)	(12)	(22.5)
46 Malaysia	392	45	39.2	14.3	14	82	58322.2	1926.7	48.1	39.5	8.6	42.5
			(10.5)	(8.9)	(3.1)		(61557.9)	(722.9)	(10.2)	(20.6)	(17.8)	(239.5)
47 Mexico	96,732	53	36.3	15.8	8	74	24733.1	1856.6	46.5	40.8	5.7	14
			(11.1)	(10.6)	(3.2)		(27904.8)	(634.1)	(11.5)	(18)	(13.9)	(42.4)
48 Morocco	295	58	38.5	13.6	12	78	47879.2	1944.5	47	39.2	7.8	23.6
			(9.7)	(11.7)	(3.4)		(73455.9)	(746.5)	(10.8)	(19.8)	(16.7)	(29.7)
49 Myanmar	408	51	39	11.6	11	77	43527.3	1900.3	47.1	41.8	5.3	22
			(12.1)	(10.5)	(4.7)		(59169)	(679.1)	(12.3)	(18.5)	(13.7)	(26)
50 Netherlands	549	53	47.1	26	13	81	69085.8	2061.9	47.8	41.2	6.6	33.3
			(10.6)	(16.3)	(2.7)		(79140.5)	(840.8)	(10.9)	(19.3)	(15.5)	(45.5)
51 Nigeria	1,025	59	40.5	14.1	14	86	49891.7	2016.2	47.8	42.7	5.1	25.2
			(9.5)	(10)	(2.5)		(57798.5)	(690.7)	(10.4)	(17.6)	(14)	(33.2)
52 Norway	134	46	45.8	25.5	13	83	70233.2	1991.8	47.9	38	9.9	34.8
			(11.3)	(18)	(2.7)		(79048.9)	(780.1)	(10.1)	(21.5)	(19)	(39)
53 Pakistan	1,595	56	39.2	13.6	13	72	58288.5	2067.6	48.1	42.1	6	34.7
			(10.6)	(9.1)	(3.4)		(75921)	(814.2)	(10.2)	(18.3)	(15.1)	(235.4)
54 Peru	3,090	46	40.7	14.9	12	82	34044.9	1915.1	47.9	41.3	6.6	18
			(11.4)	(10.1)	(2.9)		(37430.1)	(658.4)	(10.2)	(18.7)	(15.5)	(22.8)
55 Philippines	13,506	39	43	18	13	85	42599.2	1937.6	48.3	43.1	5.3	22.8
			(11.6)	(11)	(3)		(43122.7)	(638.6)	(10)	(17.6)	(14.2)	(44.3)
56 Poland	2,821	45	41.6	16.6	12	80	42803.1	1978	48	41.9	6.1	23.5
			(11.6)	(11.9)	(2.9)		(45821.2)	(690.1)	(10)	(18.2)	(15.2)	(59.7)
57 Portugal	1,969	49	43.7	26.6	9	79	41162	1975.7	48.2	43.7	4.5	20.8
			(10.7)	(10.8)	(3.5)		(46144.9)	(604.8)	(9.3)	(16.4)	(13.2)	(23.7)
58 Romania	735	46	40.2	15.5	13	79	55057.8	2052.3	47.8	42.2	5.6	25.8
			(11.6)	(10.3)	(3.3)		(67183.6)	(778.9)	(10.3)	(18)	(14.4)	(27)
59 Russian Federation	2,601	44	40.6	11.7	14	76	49625.5	1950.9	47.7	41.8	6	25.2
			(11.6)	(8.8)	(3)		(53682.3)	(712.1)	(10.7)	(18.5)	(14.9)	(28.3)
60 Saudi Arabia	152	64	32.7	12.1	13	59	55610.8	1948.5	46.1	38.5	7.6	29
			(9.2)	(12.1)	(2.8)		(77217.9)	(846.8)	(12.7)	(20.2)	(16.7)	(50.1)
61 Singapore	165	43	41.2	14	14	74	64934.2	2125.5	49.1	43.5	5.6	29.2
			(10.4)	(9.6)	(3.3)		(72573.8)	(681.8)	(7.9)	(16.9)	(14.3)	(25.5)
62 South Africa	498	49	40	13.7	14	81	67357.8	2008.5	46.7	41.4	5.3	32.4
			(9.9)	(10.2)	(2.8)		(81647.8)	(835.5)	(12)	(18.3)	(13.7)	(33.5)
63 Spain	656	46	42.8	20.9	13	82	52511.3	1983.6	48.1	42	6.1	25.5
			(11.5)	(13.1)	(3.3)		(55513.9)	(667.7)	(9.6)	(18.1)	(14.8)	(23.3)
64 Sweden	265	42	41.2	16.3	14	77	56387.6	1938.5	46.9	39	7.9	337.3
			(11)	(13.3)	(2.4)		(59710)	(711.3)	(11.3)	(20.2)	(17.5)	(442.3)
65 Switzerland	228	51	42.6	19.6	14	84	58485	2070.4	48.8	42.5	6.3	29
			(11)	(15.4)	(2.8)		(51777.6)	(691.2)	(9)	(18.3)	(15.7)	(27.9)
66 Syrian Arab Republic	347	56	41.5	17.6	12	69	67045	2109	49.8	41.9	7.9	29.7
			(11.3)	(11.6)	(3.9)		(87748.3)	(760)	(6.9)	(18.9)	(17.7)	(33.4)
67 Thailand	1,416	34	40.1	18.8	11	76	34384.9	1863.8	47	38.9	8.2	19.6
			(12.5)	(11)	(3.8)		(40874.5)	(741.8)	(11.7)	(20.5)	(17.1)	(44.1)
68 Trinidad and Tobago	1,514	42	42.9	19.9	12	79	39795.4	1937.1	47.4	42.6	4.9	20.7
			(11.9)	(10.5)	(2.9)		(35196.3)	(672.9)	(10.8)	(17.5)	(13.3)	(17.7)
69 Turkey	605	56	38.5	14.4	13	76	52147	1992	47.3	40.8	6.6	25.7
			(10.9)	(11.3)	(3.8)		(66068.8)	(807.8)	(11.1)	(19.3)	(15.4)	(30.4)
70 Ukraine	1,081	45	40.4	12	13	78	49050.5	1871.4	47.2	39.5	7.7	26
			(11.5)	(9.8)	(3.1)		(60713.8)	(736.5)	(11.2)	(20.1)	(16.8)	(30.2)
71 United Kingdom	4,216	48	43.7	20.9	13	81	64575.9	2004.4	47.7	41.2	6.5	31.5
			(11)	(14)	(2.9)		(73609.3)	(760)	(10.3)	(18.9)	(15.3)	(57.8)
72 Uruguay	422	54	42.1	16	11	84	42721.5	2009	47.1	41.8	5.4	20.4
			(12.2)	(11.4)	(3.3)		(55287.2)	(743.9)	(11.1)	(18.1)	(13.3)	(21.2)
73 Venezuela	1,062	45	38.4	13.4	13	77	45432.6	1946.5	47.9	41.4	6.5	23.3
			(10.1)	(10.3)	(3)		(52786.2)	(691.5)	(10.1)	(18.5)	(15.2)	(27.4)
Non-Mexican	144,446	47	40.9	17.2	12	79	44472.2	1941	47.7	41.5	6.2	23.8
			(11.4)	(11.9)	(3.8)		(54553.7)	(696.5)	(10.5)	(18.6)	(15.1)	(196.1)
All Immigrants	241,178	49	39.1	16.6	10	77	36873.5	1908.5	47.2	41.3	6	20.1
			(11.5)	(11.4)	(4.1)		(47142.8)	(674.4)	(10.9)	(18.4)	(14.6)	(156.1)
Native-born	1,556,037	48	40.7	0	12	83	43802.9	1923.9	47.5	40.2	7.2	24.1
			(12.2)	(0)	(2.8)		(49716.9)	(724)	(10.8)	(19.5)	(16.1)	(422.9)

Note:

The sample is limited to (non-military) individuals, ages 16-64. Standard deviations in parentheses. Earnings as well as labor supply variables are conditional of being employed. No weights have been used.

**Table A2: Direct Exchange Rate Effect vs. Macroeconomic Fundamental Effect**

	Dependent variable									
	Log of Annual Earnings					Log of Annual Hours Worked				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Log(Real Exchange Rate)	-0.092*** (0.027)	-0.090*** (0.023)	-0.100*** (0.025)	-0.110*** (0.029)	-0.104*** (0.035)	-0.055*** (0.02)	-0.059*** (0.018)	-0.068*** (0.019)	-0.049** (0.022)	-0.049* (0.027)
Log(GDP)		0.099*** (0.024)			0.093** (0.038)		0.025 (0.022)			-0.001 (0.025)
Log(Consumption)			0.109*** (0.033)		-0.001 (0.002)			0.013 (0.02)		-0.002 (0.001)
Unemployment				-0.001 (0.002)	-0.001 (0.052)				-0.002 (0.001)	-0.005 (0.034)
Observations	185,419	184,977	173,664	153,791	149,786	185,640	185,196	173,873	153,969	149,963
R-squared	0.29	0.29	0.29	0.28	0.28	0.07	0.07	0.07	0.07	0.07

Note:

All regressions include the same sample and control variables as the baseline regression reported in Column 3 of Table 2. Robust standard errors in parentheses, adjusted for clustering at country level.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

**Table A3: Exchange Rate Effect on Female vs. Male Immigrants**

Dependent Variable:	Male		Female		All	
	Mean	(1)	Mean	(2)	Mean	(3)
Log of Annual Earnings	10.3	-0.085*** (0.025)	9.8	-0.091** (0.037)	10.1	-0.092*** (0.027)
Log of Wage	2.7	-0.031** (0.014)	2.5	-0.044** (0.017)	2.6	-0.038*** (0.013)
Log of Annual Hours	7.5	-0.055*** (0.019)	7.3	-0.048* (0.026)	7.4	-0.055*** (0.02)
Log of Weekly Hours	3.7	-0.023*** (0.007)	3.6	-0.009 (0.016)	3.6	-0.017* (0.009)
Log of Annual Weeks	3.8	-0.032** (0.015)	3.8	-0.039*** (0.014)	3.8	-0.038*** (0.013)
Annual Weeks Worked Full-time	44.6	-2.302*** (0.784)	36.7	-1.703** (0.841)	41.3	-2.129*** (0.752)
Annual Weeks Worked Part-time	3.6	1.315*** (0.431)	9.3	0.863 (0.692)	6.0	1.113** (0.466)
Annual Weeks Not Worked	3.8	0.985** (0.428)	6.0	0.865** (0.37)	4.8	1.024*** (0.358)
Worker Dummy:	0.91		0.64		0.77	
Coefficient		-0.022 (0.067)		0.033 (0.046)		0.008 (0.046)
Marg. Effect		-0.003 (0.01)		0.012 (0.017)		0.002 (0.012)
Observations						
Intensive		107,668		77,972		185,419
Extensive		118,951		122,227		241,178

Note:

This Table reports the coefficients of Log (Real Exchange Rate) for different dependent variables (rows). All regressions are OLS, except for the regression with "worker dummy" as dependent variable, which is Probit. All regressions include the same sample and control variables as the baseline regression reported in Column 3 of Table 2. Robust standard errors in parentheses, adjusted for clustering at country level.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

**Table A4: Exchange Rate Effect on Immigration/Emigration Decisions**

	Dependent variable							
	Log of Annual Earnings				Log of Annual Hours Worked			
	All		Excluding Recent		All		Excluding Recent	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log(Real Exchange Rate)	-0.092***		-0.075***		-0.055***		-0.052***	
	(0.027)		(0.024)		(0.02)		(0.015)	
Diff Log(ExR)		-0.097***		-0.088***		-0.057***		-0.057***
		(0.022)		(0.022)		(0.021)		(0.017)
Lagged Log(Real Exchange Rate)		-0.085***		-0.073***		-0.048**		-0.051***
		(0.03)		(0.027)		(0.02)		(0.016)
Observations	185,419	185,330	171,709	171,643	185,640	185,551	171,923	171,857
R-squared	0.29	0.29	0.29	0.29	0.07	0.07	0.07	0.07

Note:

Even-numbered Columns report the result of a regression that includes lagged exchange rate and the change in the exchange rate during the last period, instead of exchange rate itself. "Excluding Recent" columns present the results of similar regressions for a sub-sample that excludes all immigrants who arrived in the U.S. during the year prior to interview. All regressions include the same sample and control variables as the baseline regression reported in Column 3 of Table 2. Robust standard errors in parentheses, adjusted for clustering at country level.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

**Table A5: Composition Effect**

	Dependent variable									
	Sex		Age		YSA		Education		Married Dummy	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Log(Real Exchange Rate)	-0.022 (0.023)	-0.022 (0.023)	0.105** (0.05)	0.065 (0.05)	0.073 (0.068)	0.047 (0.069)	0.173 (0.15)	0.074 (0.119)	-0.009 (0.03)	0.005 (0.034)
Log(GDP)		-0.070** (0.035)		-0.216*** (0.066)		-0.043 (0.093)		0.074 (0.183)		0.08 (0.092)
Observations	241,178	240,603	241,178	240,603	241,178	240,603	241,178	240,603	241,178	240,603
R-squared			0.08	0.08	0.09	0.09	0.38	0.38		

Note:

OLS regressions used for Age, YSA, and education; Probit for Sex and Married Dummy. "YSA" Stands for "Years Since Arrival". The sample is limited to foreign-born males (non-military) employed, ages 16-64. The unit of time for age and YSA is one decade. Robust standard errors in parentheses, adjusted for clustering at country level.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

**Table A6: Firm Effect**

	Log of Annual Earnings	Log of Wage	Log of Annual Hours Worked	Observations
	(1)	(2)	(3)	
Non-tradable Industries	-0.125*** (0.038)	-0.059*** (0.017)	-0.067** (0.028)	108,475
Tradable Industries	-0.053* (0.028)	-0.007 (0.02)	-0.046** (0.02)	76,724
Full Sample	-0.092*** (0.027)	-0.038*** (0.013)	-0.055*** (0.02)	185,419

Note:

All regressions include the same sample and control variables as the baseline regression reported in Column 3 of Table 2. Robust standard errors in parentheses, adjusted for clustering at country level.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

**Table A7: Labor Demand Effect**

	Log of Annual Earnings						
	(0)	Industry		Education		Industry & Education	
		(1)	(2)	(3)	(4)	(5)	(6)
Log(Real Exchange Rate)	-0.092*** (0.027)	-0.093*** (0.021)	-0.089*** (0.021)	-0.084*** (0.026)	-0.076*** (0.023)	-0.095*** (0.026)	-0.091*** (0.025)
Observations	185,419	175,345	175,345	185,419	185,419	148,078	148,078
R-squared	0.29	0.31	0.31	0.29	0.29	0.31	0.30
	Log of Annual Hours						
	(0)	Industry		Education		Industry & Education	
		(1)	(2)	(3)	(4)	(5)	(6)
Log(Real Exchange Rate)	-0.055*** (0.02)	-0.057*** (0.017)	-0.056*** (0.017)	-0.050** (0.02)	-0.047** (0.019)	-0.058*** (0.018)	-0.057*** (0.018)
Observations	185,640	175,584	175,584	185,640	185,640	148,304	148,304
R-squared	0.07	0.07	0.08	0.07	0.07	0.07	0.07

Note:

Column (0) replicates our baseline regression in Columns (3) and (6) of Table 2, in the first panel for earnings, and in the second for hours worked. The rest of the Table reports the results of the same regression after controlling for the average earnings/hours of native workers who have the same gender, live in the same state, and work in the same industry (Columns (1) and (2)); have the same level of education (Columns (3) and (4)); are both in the same industry and have the same level of education (Columns (5) and (6)). In the odd Columns, the control variable is the earnings/hours of an average American worker, while in the even Columns, the control variable is the residual earnings/hours after controlling for individual characteristics.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

**Table A8: Different Measures of Real Exchange Rate**

	Log of Annual Earnings	Log of Wage	Log of Annual Hours Worked	Log of Annual Weeks Worked	Log of Hours Worked in a Usual Week
	(1)	(2)	(3)		
CPI	-0.092*** (0.027)	-0.038*** (0.013)	-0.055*** (0.02)	-0.038*** (0.013)	-0.017* (0.009)
WDI	-0.102*** (0.028)	-0.045*** (0.016)	-0.057*** (0.02)	-0.040*** (0.014)	-0.017* (0.009)
PWT	-0.109*** (0.022)	-0.054*** (0.015)	-0.055*** (0.017)	-0.038*** (0.012)	-0.017** (0.008)

Note:

All regressions include the same sample and control variables as the baseline regression reported in Column 3 of Table 2. Robust standard errors in parentheses, adjusted for clustering at country level.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

**Table A9: Error Structure**

Dependent variable	Log of Annual Earnings	
	Individual Level	Country Level
	(1)	(2)
Log (Real Exchange Rate)	-0.092*** (0.015)	-0.083*** (0.018)
Robust	(0.016)	(0.018)
Clustering at Country Level	(0.027)	(0.027)
Clustering at Time Level	(0.019)	(0.017)
2-way Clustering	(0.027)	(0.025)
Serial Correlation, AR(1)		(0.017)
Serial Correlation, AR(1) and 2-way Clustering		(0.025)
Observations	185,419	1,272

Note:

All regressions include the same sample and control variables as the baseline regression reported in Column 3 of Table 2. Each Row uses a different error structure, with standard errors in parentheses. Column (1) uses individual data, as all other tables in the paper, whereas Column (2) uses the country average for each variable.

**Table A10: Adding Extra Fixed Effects**

	Log of Annual Earnings						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log(Real Exchange Rate)	-0.092*** (0.027)	-0.091*** (0.026)	-0.089*** (0.027)	-0.084*** (0.027)	-0.083*** (0.026)	-0.118*** (0.021)	-0.104*** (0.022)
Time Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort Dummy		Yes			Yes		Yes
State Dummy			Yes	Yes	Yes		Yes
State * Year Dummy				Yes	Yes		Yes
Country -Specific Time Trend						Yes	Yes
Observations	185,419	185,419	185,419	185,419	185,419	185,419	185,419
R-squared	0.29	0.29	0.29	0.29	0.29	0.29	0.30

Note:

All regressions include the same sample and control variables as the baseline regression reported in Column 3 of Table 2. Robust standard errors in parentheses, adjusted for clustering at country level.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

**Table A11: Different Periods**

	Log of Annual Earnings		Log of Annual Earnings
	(1)		(2)
1993-2007	-0.088*** (0.022)	1993-2002	-0.086*** (0.024)
1994-2008	-0.075*** (0.023)	1994-2003	-0.085*** (0.019)
1995-2009	-0.087*** (0.025)	1995-2004	-0.088*** (0.021)
1996-2010	-0.103*** (0.03)	1996-2005	-0.097*** (0.022)
		1997-2006	-0.116*** (0.023)
		1998-2007	-0.117*** (0.028)
		1999-2008	-0.102*** (0.032)
		2000-2009	-0.121*** (0.037)
		2001-2010	-0.133*** (0.037)
Full Sample	-0.092*** (0.027)		-0.092*** (0.027)

Note:

All regressions include the same sample and control variables as the baseline regression reported in Column 3 of Table 2. Robust standard errors in parentheses, adjusted for clustering at country level.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

**Table A12: Absent Spouse and Remittances**

Dependent Variable: Remittances Dummy, Probit Regression (Extensive Margin)							
	(1)	(2)	(3)		(4)	(5)	(6)
Dummy for Married and Spouse Absent	0.612*** (0.071)	0.472*** (0.06)	0.406*** (0.065)	Number of Married and Spouse Absent	0.481*** (0.05)	0.364*** (0.051)	0.317*** (0.049)
Household Characteristics		Yes	Yes			Yes	Yes
Country Dummy			Yes				Yes
Observations	6,979 0.00	6,052 0.00	6,004 0.00		6,979 0.00	6,052 0.01	6,004 0.04
Dependent Variable: Remittances/Household Earnings (Intensive Margin)							
	(1)	(2)	(3)		(4)	(5)	(6)
Dummy for Married and Spouse Absent	0.066*** (0.017)	0.052*** (0.018)	0.044*** (0.017)	Number of Married and Spouse Absent	0.048*** (0.012)	0.037*** (0.013)	0.030*** (0.01)
Household Characteristics		Yes	Yes			Yes	Yes
Country Dummy			Yes				Yes
Observations	1,471	1,471	1,471		1,471	1,471	1,471
R-squared	0.01	0.04	0.11		0.01	0.04	0.11

Note:

Data from CPS August 2008 Immigration/Emigration Supplement. Unit of observation is household. Robust standard errors in parentheses, adjusted for clustering at country level.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

**Table A13: General Equilibrium Effects**

	Log of Annual Hours	Log of Wage Rate	Log of Annual Earnings	Log of Annual Hours	Log of Wage Rate	Log of Annual Earnings
	(1)	(2)	(3)	(4)	(5)	(6)
Log(ExR)	-0.055*** (0.02)	-0.038*** (0.013)	-0.092*** (0.027)	-0.055*** (0.02)	-0.037*** (0.013)	-0.092*** (0.027)
GE				0.004 (0.153)	0.217 (0.314)	0.224 (0.392)
Log(ExR) * GE				0.025 (0.033)	0.013 (0.055)	0.036 (0.068)
Observations	185,640	185,419	185,419	185,640	185,419	185,419
R-squared	0.07	0.3	0.29	0.07	0.3	0.29

Note:

All regressions include the same sample and control variables as the baseline regression reported in Column 3 of Table 2. Robust standard errors in parentheses, adjusted for clustering at country level.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

**Table A14: Disintegration Process by Cohort**

	Dependent Variable							
	Log of Annual Earnings				Log of Annual Hours Worked			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log(ExR)	-0.092*** (0.027)	-0.098*** (0.027)	-0.107*** (0.028)	-0.111*** (0.028)	-0.055*** (0.02)	-0.057*** (0.02)	-0.058*** (0.02)	-0.064*** (0.02)
Log(ExR) * Old Cohort		0.008** (0.003)		0.006 (0.007)		0.002 (0.002)		0.010** (0.004)
Log(ExR) * YSA			0.010*** (0.003)	0.015*** (0.005)			0.002 (0.001)	0.009*** (0.003)
Log(ExR) * YSA * Old Cohort				-0.006 (0.005)				-0.008** (0.003)
Observations	185,419	185,419	185,419	185,419	185,640	185,640	185,640	185,640
R-squared	0.29	0.29	0.29	0.29	0.07	0.07	0.07	0.07

Note:

“YSA” stands for “Years Since Arrival”, ExR for real exchange rate, and Old Cohort is a dummy indicating arrival year before 1990. All regressions include the same sample and control variables as the baseline regression reported in Column 3 of Table 2. Robust standard errors in parentheses, adjusted for clustering at country level. The unit of YSA is one decade.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

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