Supplemental Appendix for "Financial Crises and Labor Market Turbulence"

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1. Data sources and construction

1.1. Mexico's Encuesta Nacional de Empleo Urbano *(ENEU)*

The microlevel data we use in this study come from the ENEU, which is a nationally representative household survey designed to gather socio-demographic and occupational information about the labor force in Mexico. Information is gathered on individuals over 12 years of age and covers over 60% of all urban areas in Mexico. As mentioned in the text, data are collected every quarter from a rotating panel of households. One fifth of all households are replaced every quarter, and it is therefore possible in principle to follow a given individual for up to 5 quarters. To make sure that individual identifiers are properly recorded, we discarded from the analysis any sequence of individual identifiers where gender characteristics are not constant, or the age sequence displays an inconsistent pattern. The following list defines the variables we use in our analysis:

1. *Employed individuals*: We consider a worker employed if they worked in the previous week, or did not work but were on paid vacation, sick leave or strike. Individuals who did not work but were joining (or re-joining) work within the month are also categorized as employed.
2. *Unemployed individuals*: Respondents who report that they did not work in the previous week and were looking for a job or are waiting for a response from a prospective employer are classified as unemployed.
3. *Involuntarily unemployed*: We consider workers to be involuntarily unemployed if they report to be unemployed because their employer laid them off or went bankrupt, if their contract expired and was not renewed, or if their employer moved.
4. *Formal employee*: Individuals are considered formally employed if they receive public or private health insurance benefits, or hold retirement accounts.
5. *Self employed*: Individuals who report to be sub-contractors, owners or own-account workers are classified as self-employed.
6. *Large firms*: We define a firms to be large if it employs more than 50 employees.
7. *Hourly Earnings*: The survey collects information on monthly earnings of workers and hours worked per week. To calculate hourly earnings, we multiply hours worked by 4.33 to get monthly hours worked. If individuals report that they earn an *aguinaldo*, i.e. a thirteenth month salary which is a common form of bonus in Mexico, we multiply the ratio of monthly earnings to monthly hours worked by 13/12. Earnings per hour are monthly earnings divided by monthly hours worked and are deflated by Mexico's consumer price index. Hours are recorded up to a maximum of 94 per week, and topcoded above that threshold. Earnings are topcoded at 999,990 pesos. Since topcoded observations constitute a very small fraction (0.1%) of our sample, we dropped them.

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1.2. Macroeconomic data

Measuring aggregate TFP on a quarterly basis in Mexico requires empirical counterparts for $\widehat{y}_t, \widehat{k}_t$ and l_t. We use quarterly data when available, and impute quarterly series from yearly series otherwise. All data are in 1993 prices, and data from original sources are seasonally adjusted using the Census Bureau's X12Q-Arima procedure. Quarterly series are available from Mexico's Instituto Nacional de Estadística, Geografía e Informática (INEGI) and Mexico's Central Bank. Because GDP per hour as we compute it below displays no trend over our period of study (1990 to 2003), we did not detrend the output or capital stock series. Neoclassical accounting over longer time periods (see e.g. section 2 in Meza and Quintin, 2007) would require some detrending of these series.

Using data on private and public gross fixed capital formation, and purchases of durable goods, we construct three capital stock series using the perpetual inventory method. We assume a yearly depreciation rate of 6% for private capital, 5% for government capital and 20% for durable goods.[1] The total stock of capital is the sum of the three resulting series.

We calculate the data counterpart of output in our model by subtracting from GDP indirect business taxes, and adding the imputed returns and depreciation of government capital and durable goods. To calculate gross returns to government capital and the stock of durables we assume a net yearly return of 4% and the same depreciation rates as above.

To measure the size of Mexico's working age population, we use the yearly series for population of age 15 to 64 reported in Bergoeing et al. (2002). We use yearly growth rates of population to infer implicit quarterly rates of population growth. To measure hours worked, we first calculate (seasonally adjusted) average hours worked in the manufacturing industry from Mexico's Manufacturing industry Survey available from INEGI.[2] To calculate a measure of workers relative to total working age population, we multiply quarterly measures of the ratio of economically active population relative to population of age 12 and higher by the employment rate. Our measure of the labor input is hours per employees times the ratio of employed persons to population, scaled by 1300, an approximation of the total number of hours of discretionary time available in a quarter.

2. Labor flows across industries

Table 1 shows labor flows across 2-digit industries between the fourth quarter of 1994 and the fourth quarter of 1995. The top panel shows the 10 fastest growing industries in terms of employment during the crisis, while the bottom panel shows the industries that suffered the largest contractions during the same period.

3. Propensity score estimation

Tables 2 shows the probit specification we used to estimate yearly propensity scores for movers at the 4-digit level. Results are similar at the 3-digit level. The categorical variable takes the value 1 if the individual changes industry and/or occupation in a given year, 0 otherwise. While results vary from year to year, some consistent patterns emerge. For instance, unmarried males are more likely to change industries and occupations. Neither education nor formality seem to be significant.

Since we use propensity scores to match individuals, it is critical to verify that individuals with similar propensity scores have similar observable characteristics. Table 3 shows the t-statistic from a hypothesis test for differences in means for various characteristics of movers and stayers, across different propensity

[1] The average yearly depreciation rate implied by these numbers for the total stock of capital is around 8%, the number we use in our benchmark parameterization.

[2] The survey produces monthly series for man-hours and for employment. There are two versions of the survey. The first one has data from 1987.01 to 1995.12. The second one has data starting in 1994.01. We splice the quarterly hours per employee of the two surveys.

scores intervals. As the table shows, even for coarse propensity score categories, differences in means are not significant, and we cannot reject the hypothesis that individuals with similar propensity scores have similar characteristics.[3]

4. Computations

Simple manipulations of first-order conditions for profit and utility maximization show that output can be reduced to a function of capital, so that equation (12) in the text is a second order difference equation in capital only. Given k_0 (the initial level of the capital stock) and a TFP path, we look for the unique k_1 such that the economy eventually converges to steady state via a standard shooting algorithm. All variables can then be calculated as a function of the path of physical capital.

In the perfect surprise (PS) experiment, we first calculate the path for all endogenous variables under the assumption that there is no TFP shock in 1995. The algorithm is then restarted in the first quarter of 1995 using as initial value for capital the value agents chose under these optimistic expectations, but using the actual productivity path from the first quarter of 1995 on.

Since our Brady bonds data start in the last quarter of 1990 and end in the first quarter of 2003, we make the last quarter of 1990 date 0 and set the initial value of the capital stock to its data value at that date.

[3]Since the lowest propensity score in our sample is about 0.25, and the highest is about 0.8, we compress the lowest category and highest category of propensity scores

Table 1: Labor flows across industries 1994.4 to 1995.4

	Largest Expansion	Net Change	Rank		Entry	Exit
SIC	Industry	(Percent)	Last Year	Next Year	(Percent)	
61	Electricity	0.48	20	16	0.51	0.04
64	Transport	0.23	5	12	1.31	1.08
72	Leasing and Repair	0.21	6	31	3.82	3.60
27	Clothing	0.19	7	3	0.48	0.28
73	Public Admin	0.19	18	8	1.61	1.42
42	Plastic	0.14	15	13	0.42	0.27
54	Electronic Eqpt	0.12	3	20	0.35	0.22
47	Non Ferrous Metals	0.12	12	4	0.15	0.04
51	Non-electric machinery, eqpt.	0.11	23	25	0.26	0.15
62	Commerce	0.09	26	30	3.99	3.90
68	Professional and Technical Services	0.10	3	18	1.44	1.35
18	Animal Food	0.09	14	12	0.10	0.01
	Largest Contraction	Net Change	Rank		Entry	Exit
SIC	Industry	(Percent)	Last Year	Next Year	(Percent)	
34	Basic Petrochemicals	-0.04	8	23	0.04	0.07
39	Soaps, Detergents, Cosmetics	-0.04	17	7	0.08	0.12
40	Other Chemical Products	-0.04	5	10	0.05	0.09
22	Carbonated Drinks	-0.04	13	22	0.19	0.23
35	Other Basic Chemicals	-0.04	19	24	0.10	0.14
38	Pharamaceutical Products	-0.04	10	18	0.05	0.10
65	Post, Telegraph, Communications	-0.04	14	18	0.12	0.17
66	Financial Services	-0.04	22	12	0.27	0.31
70	Medical Services	-0.05	2	16	0.66	0.71
48	Metallic Furniture, Machinery, Eqpt	-0.06	12	18	0.07	0.13
50	Other Metallic Products	-0.06	18	9	0.35	0.41
59	Other Manufacturing Industries	-0.07	14	3	0.18	0.25
9	Sand, Gravel and Clay Quarrying	-0.09	11	16	0.01	0.10
56	Automobiles	-0.09	9	6	0.06	0.15
63	Restaurants and Hotels	-0.09	12	10	1.19	1.27
32	Books, magazines, other publishing	-0.11	11	29	0.19	0.29
28	Shoes and Other Leather Articles	-0.12	21	6	0.23	0.35
30	Other Wood and Cork Products	-0.13	1	27	0.33	0.46
55	Batteries and Lightbulbs	-0.20	15	4	0.19	0.39
60	Construction and Installation	-1.23	17	1	2.02	3.25

Note: Net changes, entry and exit are percentage changes calculated using all employed individuals who are present in the last quarters of successive years. The last year column refers to the change between 1993.4 and 1994.4 and the next year column refers to the change between 1995.4 and 1996.4.

Table 2: Probit for propensity scores at 4-digit level

	Constant	Age	Education	Gender	Formal	Civil Status	Firm Size
1988.4 to 1989.4	0.317	-0.007	0.003	0.319	0.154	-0.072	
	0.087	0.002	0.005	0.046	0.040	0.046	
1989.4 to 1990.4	0.109	-0.009	0.009	0.379	0.007	-0.019	0.039
	0.090	0.002	0.005	0.047	0.059	0.048	0.010
1990.4 to 1991.4	0.254	-0.007	-0.003	0.428	0.092	-0.165	0.014
	0.090	0.002	0.005	0.047	0.058	0.048	0.009
1992.4 to 1993.4	-0.056	-0.006	0.010	0.284	-0.015	-0.119	0.059
	0.063	0.001	0.003	0.032	0.041	0.034	0.007
1993.4 to 1994.4	-0.125	-0.004	0.005	0.366	0.037	-0.124	0.047
	0.059	0.001	0.003	0.030	0.038	0.031	0.006
1994.4 to 1995.4	0.050	-0.004	0.004	0.259	0.034	-0.147	0.081
	0.058	0.001	0.003	0.029	0.039	0.031	0.007
1995.4 to 1996.4	0.156	-0.009	-0.002	0.406	-0.011	-0.150	0.036
	0.054	0.001	0.003	0.027	0.035	0.029	0.006
1996.4 to 1997.4	0.124	-0.007	-0.001	0.384	-0.030	-0.190	0.036
	0.052	0.001	0.003	0.026	0.034	0.027	0.006
1997.4 to 1998.4	0.182	-0.009	-0.002	0.383	0.046	-0.142	0.026
	0.051	0.001	0.003	0.025	0.033	0.026	0.006
1998.4 to 1999.4	0.092	-0.008	0.005	0.370	0.053	-0.167	0.036
	0.047	0.001	0.003	0.023	0.030	0.024	0.005

Notes: Standard errors are below estimates. Education is measured in years. The formal, gender and civil status dummies take value 1 for formally employed, male, and married workers, respectively, and value 0 or others. Size is measured by a continuous variable that varies positively with the size of the firm. There is no data on firm size for self employed individuals in 1988.4. Because the occupation classification changed in 1992, probits cannot be computed for the 1991.4 to 1992.4 period.

Table 3: Difference in means of characteristics of stayers and movers

	Propensity Score	Age	Education	Gender	Formal	Civil Status	Firm Size
1988.4 to 1989.4	0.0 to 0.5	0.14	-0.13	0.00	0.28	-0.29	
	0.5 to 0.6	-0.09	-0.05	0.01	-0.12	-0.05	
	0.6 to 0.7	0.02	0.04	0.07	0.07	0.06	
	0.7 to 1.0	-0.20	0.04	0.00	0.05	-0.08	
1989.4 to 1990.4	0.0 to 0.5	0.06	0.23	0.04	-0.02	0.11	0.03
	0.5 to 0.6	0.03	0.09	0.03	0.04	0.03	0.10
	0.6 to 0.7	-0.02	0.02	0.06	-0.02	-0.01	0.00
	0.7 to 1.0	-0.22	-0.12	0.00	0.10	-0.05	-0.03
1990.4 to 1991.4	0.0 to 0.5	-0.07	0.05	0.00	0.07	0.04	0.09
	0.5 to 0.6	-0.01	-0.10	0.08	-0.10	-0.01	-0.07
	0.6 to 0.7	0.01	0.01	0.07	0.09	0.06	0.05
	0.7 to 1.0	0.01	0.17	0.00	0.07	-0.04	0.10
1992.4 to 1993.4	0.0 to 0.5	0.09	-0.07	0.14	0.06	0.04	0.10
	0.5 to 0.6	-0.03	-0.03	-0.03	0.08	0.04	0.14
	0.6 to 0.7	-0.05	0.09	0.03	-0.03	-0.03	-0.02
	0.7 to 1.0	-0.07	0.01	0.00	-0.03	-0.07	-0.17
1993.4 to 1994.4	0.0 to 0.5	0.01	0.02	0.08	0.02	-0.02	0.19
	0.5 to 0.6	-0.07	0.00	-0.02	0.05	-0.07	0.04
	0.6 to 0.7	0.03	0.05	0.08	0.02	0.08	0.01
	0.7 to 1.0	-0.04	0.01	0.00	-0.10	-0.09	0.01
1994.4 to 1995.4	0.0 to 0.5	0.08	-0.10	0.14	-0.03	0.03	-0.03
	0.5 to 0.6	-0.03	0.10	-0.03	0.09	0.03	0.21
	0.6 to 0.7	-0.01	-0.01	0.02	-0.02	-0.02	0.02
	0.7 to 1.0	-0.07	0.00	0.11	0.00	-0.01	0.02
1995.4 to 1996.4	0.0 to 0.5	0.05	0.07	0.11	0.08	0.04	0.09
	0.5 to 0.6	-0.02	0.01	0.01	0.06	-0.01	0.06
	0.6 to 0.7	-0.15	-0.03	-0.02	-0.08	-0.08	-0.06
	0.7 to 1.0	-0.17	-0.05	0.00	-0.08	-0.13	-0.09
1996.4 to 1997.4	0.0 to 0.5	0.07	-0.02	0.10	-0.02	0.04	0.02
	0.5 to 0.6	-0.04	0.05	0.00	0.10	0.00	0.10
	0.6 to 0.7	-0.11	-0.04	-0.04	-0.07	-0.12	-0.09
	0.7 to 1.0	-0.04	0.09	0.00	-0.07	0.00	0.04
1997.4 to 1998.4	0.0 to 0.5	-0.01	0.06	0.13	0.04	0.05	0.06
	0.5 to 0.6	0.00	-0.02	0.03	0.03	0.02	0.05
	0.6 to 0.7	-0.13	0.02	-0.06	0.01	-0.10	-0.02
	0.7 to 1.0	-0.24	0.00	0.00	-0.05	0.00	-0.06
1998.4 to 1999.4	0.0 to 0.5	-0.01	0.09	0.14	0.13	0.09	0.12
	0.5 to 0.6	-0.01	-0.03	0.02	0.04	-0.09	0.04
	0.6 to 0.7	-0.07	0.03	0.03	-0.03	0.01	-0.01
	0.7 to 1.0	-0.15	0.01	0.00	-0.09	-0.10	-0.11

Notes: Statistics are t-statistics from a test of difference of means for stayers and movers. An asterisk denotes 5% significance. There is no data on firm size for self employed individuals in 1988.4.