Exchange Rates and Employment Instability: Evidence from Matched CPS Data

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The past two decades have been associated with a rapid increase in the internationalization of production and sales by U.S. producers. These phenomena suggest heightened potential for labor market participants to be directly affected by dollar movements. When the dollar appreciates, a decline in the competitiveness of U.S. producers may force job loss and churning, and lead to reduced worker earnings. Conversely, when the dollar weakens, the demand for workers by exposed sectors may increase, and employment and earnings may expand. Dollar fluctuations may lead to efficiency-enhancing adjustments by producers, but these opportunities and losses by employees may translate into increased job instability for workers.

Recent evidence using industry-level data confirms that dollar movements have had implications for labor market outcomes in some United States industries. Within manufacturing, both wages and employment appear sensitive to exchange rates, although the employment effects may not be large.[2] Given these small employment effects, it is reasonable to question whether dollar movements have important consequences for worker displacements and job insecurity.

Industry-level data used in prior studies has the disadvantage of understating job turnover to the extent that workers change jobs voluntarily or involuntarily without changing their industry of employment or physically moving across state lines. To better address importance of dollar movements worker displacements and job insecurity, we examine the micro data on job-changing and industry-switching of a matched panel of workers drawn from consecutive March Current Population Surveys (CPS), covering 1977 through 1996. We also consider whether dollar appreciations and depreciations have asymmetric effects, and we ask if these effects change over time and as industries alter their international orientation.

We find that dollar appreciations can drive adjustments in job-changing and industry-switching probabilities. These dollar effects are most pronounced for employees in manufacturing non-durables sectors and in non-manufacturing jobs outside of the service sectors. In manufacturing sectors, dollar

appreciations can reduce job-changing or industry switching. In non-manufacturing overall, the effects of exchange rate appreciations and depreciations are more mixed. Employment instability falls (rises) with an appreciation (depreciation) of the export exchange rate, but rises (falls) with an appreciation (depreciation) of the import exchange rate. The net effect for worker instability differs across non-manufacturing subsectors and can vary over time.

I. Data and Empirical Specification

A. Basic CPS Data and the Matching Technique. The basic micro data of our study is a set of 18 two-year panel data sets constructed from the March basic surveys and the annual demographic supplements to the CPS. The data span the 1977 through 1997 survey years and contain approximately 123,000 matched pairs of observations. Our sample consists of civilian men between age 18 and 63 in the first year of each panel and satisfying several sample-inclusion criteria.[3]

The basic CPS survey is fielded monthly to households that are interviewed eight times over a sixteen-month period. The survey structure allows short panels to be created across interview months. More specifically, households are interviewed for four consecutive months, followed by an eight-month hiatus, after which they are again interviewed for four consecutive months. As a result, households on their first four-month stretch of interviews--about half the data in any given March -- can be matched to their March interview in the following year. Within the households, individual males are then matched.[4]

The matched-CPS samples are not random sub-samples from the March surveys. In particular, individuals who move or change family characteristics are less likely to be matched. Our matched sample is somewhat older and more likely to be married--and hence, more stable--than those individuals we are unable to match. Our matched sample also excludes workers who were initially employed, but then left and stayed out of the labor force through the next survey date.

B. Employment Stability Measures. We construct measures of employment instability from the survey responses of the matched individuals. We classify a worker as a job changer in year *t* if he responded that he had more than one employer in that year or if reported at least one spell of unemployment (not including

temporary layoffs). A workers also is a job changer if he answered in the basic survey either that he is on indefinite layoff or has accepted a job that is due to start within 30 days. This will capture as job changers some individuals who make job-to-job transitions without an intervening spell of unemployment, or who lose a job and immediately leave the labor force.

The CPS also contains questions that we use to determine industry switching by workers. The variables dealing with the industry classification of the worker cover a 27-month time span. In the March basic survey, workers provide information regarding their industry in the reference week. In the March supplement survey, which is administered after the basic survey, workers provide information regarding the industry for the longest job they held in the prior year. If the interviewer verifies that the two jobs are the same, then the current industry coding (in the basic survey) is copied to the industry last year coding (from the supplement survey). This eliminates any spurious industry changes due to measurement error if the worker has not changed jobs. For the match between the March year t survey and March year $t+1$ survey, we use the four industry questions to assign to each worker the most likely industry classification for the job they held at the beginning and end of year t.

Table 1 presents three sets of employment instability measures for these workers, broken down according to their initial industry classification and time period. The first indicates the percentage of individuals who changed jobs during the year. Fifteen to twenty percent of the individuals changed jobs at least once during the year. In general, job-change rates are higher in nonmanufacturing than in manufacturing, with the exception of Finance, Insurance and Real Estate. Job change rates are uniformly higher in 1977 to 1985, as compared with 1986 to 1996.[5]

(insert Table 1)

The second and third measures of job instability show the frequency of two-digit versus three-digit industry changes by workers. These frequencies are generally between eight and ten percent, and decline over the two decades. The notable exception is NonDurables: despite a decline over time in the percent of individuals who changed jobs, there was a slight increase over time in the percent of individuals employed

in NonDurables manufacturing industries who changed their two-digit or three-digit industry during the year.

C. Industry-Specific Real Exchange Rates. Our empirical work uses export and import real exchange rates that we have constructed for each industry.[6] For a given industry and year, the export and import real exchange rates are constructed as a weighted average of the real exchange rates of U.S. trading partners, where the weights are the relative shares of each partner in U.S. exports and imports (data from U.S. Department of Commerce and the *International Financial Statistics*). Data limitations prevented construction of industry-specific exchange rates for nine of the nineteen nonmanufacturing industries in our sample (representing 31 percent of the total observations). For these observations we used the exchange rates for the Transportation industry, which had the highest overall correlation with the other non-manufacturing industry exchange rates.

D. Empirical Specification. Recent work shows a clear theoretical link between percentage changes in employment and in exchange rates. The main channels explored emphasize labor demand themes (Campa and Goldberg, 1998), but cross-industry spillovers through alternative wages and labor supply also are considered (Goldberg and Tracy, forthcoming). All else equal, theory predicts that dollar appreciations (depreciation) will contract (expand) revenues and restrict (increase) labor demand in those industries that are more export oriented and face higher import competition. Thus, an appreciation is expected lead to an increase in permanent layoffs by firms. Reliance on imported inputs could mitigate some of these consequences, if the appreciation leads to cost savings on imported components. Market structure also matters: industries closer to perfect competition are expected to be relatively more sensitive to dollar movements.

Exchange rates could also work through labor supply by influencing the willingness of workers to voluntarily leave one job for another. Thus, a dollar appreciation may produce offsetting effects through the firm's incentive to initiate permanent layoffs and the worker's incentives to quit. The latter may reflect a reduced probability of finding alternative employment (Salop, 1979), or a diminished wage incentive for

changing jobs (Mortensen, 1986).

Let I_{ijt} be an indicator variable which takes a value of 1 if worker *i* in industry *j* changes employers / industry in period *t*. We model the probability of this change using a probit specification.

$$\Pr(I_{ijt} = 1) = \Phi(X_i\beta + Z_j\gamma_j + Y_t\delta), \quad (1)$$

where this probability depends first on individual characteristics, *X*, including education (four levels of education completion), race, age (quartic), and marital status; second on industry characteristics, *Z*, which include industry fixed effects, industry-specific time trends and our industry-specific import and export exchange rates; and third on time-varying macro variables, *Y*, which including the real interest rate, the percentage change in real GDP and/or the prime age male unemployment rate.

We examine the contribution of exchange-rate movements to job and industry-changing probabilities for our full sample of workers who are initially employed in any private nonagricultural sectors, and for subgroups of manufacturing and nonmanufacturing industries. We test for separate roles of the industry-specific exchange rates and explore whether the effects of dollar appreciations and depreciations are symmetric. We also consider parameter stability over time. For manufacturing industries, we ask whether the role of exchange rates for job-changing and industry-switching likelihoods evolved in relation to their changing levels of export-orientation and imported-input use.[7]

II. Empirical Findings

Table 2 provides the results of introducing exchange-rate terms into probit specifications of the likelihood of job changing, switching 2-digit industry of employment, or switching 3-digit industry of employment. Asterisks indicate which individual exchange rate terms (export or import) contribute significant explanatory power to these specifications. The joint significance columns ask whether, taken together, the two exchange rate terms contribute significant explanatory power to the regressions. Finally, we test for any evidence of asymmetry in the role of dollar appreciations versus depreciations. Superscript "a" indicates if there is significance (of the dollar for employment instability) in the appreciation periods;

superscript "d" indicates significance in the depreciation periods.

(insert Table 2)

The first row of results in Table 2 shows the elasticities resulting from probit specifications that pool together all workers and treat appreciations and depreciations as having symmetrical effects (i.e. equal and opposite coefficients). Observe that exchange rates do not contribute significant explanatory power to job-changing or industry-switching likelihoods. However, when asymmetry of effects is permitted,[8] appreciations influence employment instability, raising the likelihood of job-changing through the export channel, and lowering it through the imported-input channel. On balance, appreciations are associated with a small reduction in job instability.[9]

For Manufacturing workers, dollar movements influence industry-switching rates mainly through the imported input/ import penetration channel. For the full group of workers, appreciations reduce the likelihood of industry switching. The effects of appreciations are larger and more significant for workers starting out in Non-Durables industries and in lower profit margin industries.[10] These effects also become more pronounced when industries have higher imported input shares. Overall, within manufacturing the implications of dollar movements for employment instability differs across industry groups and are sensitive to the interval studied.

For the full sample of Non-Manufacturing workers, the likelihood of job-changing over the course of a year is not influenced significantly by the dollar movements. However, the likelihood of changing the 2-digit or 3-digit industry of employment is very responsive to both export and import exchange rate movements. Table 2 shows that the appreciation (depreciation) of the export exchange rate reduces (raises) measured employment instability, while appreciation (depreciation) of the import exchange rate raises (lowers) employment instability. The net effect from these channels differs across nonmanufacturing subsectors and fluctuates over time.

Finally, we find that the other demographic and macroeconomic variables included in our specifications contribute explanatory power to worker instability. Job-changing rates decline sharply with a

worker's age and education. Married males have lower job-turnover rates than non-married males, but there are no significant racial differences. Job turnover increases with the unemployment rate, decreases with the percent change in real GDP, and is unrelated to the real interest rate. This pattern of effects is similar for industry-changing rates, with the exception of that the percent change in real GDP has a positive but insignificant effect.

III. Conclusions

Our probit specifications suggest that dollar movements, and especially dollar appreciations, may be associated with altered employment instability. However, no single relationship holds for all industries or over time. For the full sample of workers, there is some evidence that appreciations reduce worker instability, rather than increase it, as might be expected if exporters were to lay off workers under adverse demand conditions. One issue that could be explored is whether an appreciation leads to a reduction in quits that offsets some of the rise in permanent layoffs.

In conclusion, however, our examination of the matched CPS data does not find an important role for dollar fluctuations in adding to employment instability. Our findings reinforce the findings of weak employment implications of the dollar in studies using more aggregated industry data. Although dollar movements may have implications for employment in specific industries, the overall effects for employment in industry groups and for employment instability are more difficult to find.

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Table 1 Average Probabilities of Job-Changing and Industry Switching, By Industry Group, 1977-1996

	Percent of Individuals who Changed Jobs		Percent of Individuals who Switched 2-digit Industry		Percent of Individuals who Switched 3-digit Industry	
Industry Group	1977-1985	1986-1996	1977-1985	1986-1996	1977-1985	1986-1996
All Manufacturing	16.7	13.8	8.3	7. 7	8.9	8.2
Durables	18.3	14.7	8.9	7.8	9.5	8.4
NonDurables	13.8	12.3	7.2	7.5	7.8	8.0
Non-Manufacturing	20.6	18.8	9.8	8.8	10.6	9.7
Wholesale & Retail	19.6	18.0	11.8	10.0	14.0	12.3
Finance, Insurance, Real Estate	14.2	13.3	7.9	7.7	8.7	8.2
Services[a]	16.6	16.5	9.5	8.7	9.7	9.0
Other	25.4	22.6	9.0	7.9	9.3	8.4

Data excludes sample years 1985 and 1995. Agriculture and Public Administration also are excluded.

[a] Services includes Personal Services, Business Services, Auto and Repair Services, Entertainment and Recreation Services, Health Services, Hospitals, Educational Services, Social Services, Private Household Services, and Other Professional Services.

[b] Other Nonmanufacturing includes Mining, Construction, Transportation and Postal, Communications, and Utilities and Sanitary Services.

Table 2 Job-Changing and Industry-Switching Sensitivity to Exchange Rate Movements, 1977-1996

	Job-Changers			2-digit Industry Switchers			3-digit Industry Switchers		
Industry Group	Real Export Exchange Rate	Real Import Exchange Rate	Joint Export & Import?	Real Export Exchange Rate	Real Import Exchange Rate	Joint Export & Import?	Real Export Exchange Rate	Real Import Exchange Rate	Joint Export & Import?
ALL INDUSTRIES n= 123, 017	2.4[a]	-1.2[a]	no	-1.6	1.4	no	-1.1	0.8	no
All Manufacturing n= 39,311	-2.0	-1.7	no	0.4	-6.6[a]	no	-1.0	-6.5[a]	yes
Durables n= 25,415	-2.2	-1.0	no	1.0	-1.3	no	0.6	-2.4[a]	no
NonDurables n= 13,891	3.2	-6.3	no	2.7	-21.0***[d]	yes	-1.0	-17.3**	yes
Non-Manufacturing n= 83,706	0.5	-1.6	no	-5.2*[a]	6.5**[a]	yes	-4.5*	5.9**[a]	yes
Wholesale & Retail Trade n= 21,768	-0.1	1.7	no	-12.0*	14.6*	no	-11.0*	14.1*	no
Finance, Insurance, Real Estate, n= 5,483	-10.8	7.8	no	-30.2**	15.4	no	-28.7**	14.1	no
Services n= 26,095	-1.5	4.1	no	-2.3	5.0	no	-1.8	4.5	no
Other n= 30,492	-1.6	3.1	no	-7.3	7.3	no	-7.0[d]	7.0*[a]	no

Reported numbers are the percent changes in Job-changing or Industry-Switching Probabilities associated with a 10 percent movement in a given year's average exchange rate for an industry, relative to the prior year's rate.
Data excludes sample years 1985 and 1995. Agriculture and Public Administration excluded.
"Joint export and import?" Yes, if the exchange rate terms are jointly significant at the 10 percent level.
[a] evidence of asymmetry of exchange rate effects, with significance through the dollar appreciation periods.
[d] evidence of asymmetry of exchange rate effects, with significance through the dollar depreciation periods.
*, **, *** indicate statistical significance at 10 percent, 5 percent, and 1 percent levels respectively.

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[2] Industry-level data for manufacturing is explored in Revenga (1992) and Campa and Goldberg (1998). Goldberg and Tracy (forthcoming) also consider industry outcomes at the state level. Gourinchas (1998) uses the Census's Longitudinal Research Database to examine gross and net job flows.

[3] First, the sample is limited to workers who were not in school, who were not primarily self-employed, who were not employed in agriculture or public administration, and who had positive weeks of work and positive earnings in both interview years. Second, observations with imputed earnings in either sample year were eliminated. Third, workers were eliminated from the sample if their earnings fell into either the top or bottom 1.5 percent of the earnings distribution in either survey year. This procedure essentially amounts to deleting from the top of the earnings distribution all observations with top-coded annual earnings in either survey year and amounts to deleting from the bottom of the distribution all observations with annual earnings below around $2,000 (real 1995 dollars).

[4] Peracchi and Welch (1995) provide an excellent discussion of the general matching procedure for the CPS data. Cameron and Tracy (1998) provide a detailed discussion of the match criteria for our sample. Starting in 1994, the CPS contains unique person identifiers that are common across surveys. These identifiers can be used to guarantee accurate matching. Some pairs of years – 1976/1977, 1985/1986 and 1995/1996 -- could not be matched at all due to changes in the CPS survey design. and the selection issues that arise in the process.

[5] Our matched panel only includes those workers who have not relocated over the survey interval. Because of this sample selection criteria, it is reasonable to ask whether the reported results understate the extent of

severe employment status changes that may be attributed to dollar movements. We have compared the job-changing rates from our matched panel with the rates from non-matched cross-sections of CPS workers. Our matched sample can miss up to a third of the job-changers. However, in regressions that control for aggregate unemployment rates, we find that the degree of undercounting does not appear to move with the dollar.

[6] Goldberg and Tracy (1998) provide a more extensive discussion of these industry-specific exchange rates. Industrialized countries have higher partner weights in U.S. exports compared with U.S. imports.

[7] We use data on time-varying trade shares by industry from Campa and Goldberg (1997). Lagged trade shares interact with the contemporaneous percentage changes in exchange rates in our specifications.

[8] Estimates from these regressions are discussed but not reported.

[9] The magnitude and significance of all of the parameters reported in Table 2 vary with the estimation interval selected. In the late 1980s through mid 1990s, dollar movements were less pronounced and had weaker implications.

[10] We also run our probit specifications with manufacturing industries grouped accorded to higher versus lower price-over-cost markup ratios. The high-markup-industry regressions do not register significant exchange rate terms in any of the regression specifications. For low-markup-industries, the likelihood of industry changes declines with dollar appreciations through the import penetration/ imported input channel.