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TRADE AND TURNOVER: THEORY AND EVIDENCE*

Carl Davidson and Steven J. Matusz

Michigan State University

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Abstract: Is the pattern of trade correlated with cross-sector differences in job turnover? Theoretically, external shocks feed through to changes in domestic employment and cross-sector differences in turnover give rise to compensating wage differentials, which feed through to output prices. Using two different data sets on turnover, we find strong evidence that normalized US net exports by sector are negatively correlated with job destruction and worker separation rates. Weaker evidence suggests a positive correlation with between normalized net exports and job acquisition. Using sector-specific job destruction data for both Canada and the US, we find confirmation of the theoretical prediction that normalized net exports to Canada are negatively related to the ratio of the US job destruction rate to the Canadian job destruction rate.

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1. Introduction

A view that seems to be commonly held by a significant portion of the public is that international trade generates forces that threaten job security, particularly in the US manufacturing sector. The basic idea is simple and intuitive – a sudden surge of imports in a sector intensifies competition, drives American firms out of business and destroys American jobs. Of course, international trade could also have a positive effect on labor market outcomes -- a sudden increase in the demand for American made goods could lead to an increase in the number of jobs available as export sectors expand. In either case, changes in the international trading environment create or destroy jobs, leading in turn to worker turnover.[1]

Recently, Carl Davidson, Lawrence Martin, and Steven Matusz (1999) have explored the implications that labor market turnover might have for net exports in a general equilibrium model of trade. In the model that they construct, jobs are continuously created and destroyed at parametrically-given rates. In order to attract and retain workers, sectors with above-average rates of job destruction or where jobs are harder than average to find need to compensate searching workers for their risk by paying higher than average wages. Higher wages drive up production costs. By adding a second country, DMM are able to relate exogenously-specified cross-country differences in turnover rates to endogenously-determined trade patterns. In particular, holding all else constant, an increase in the rate at which jobs breakup in sector *i* in country *C* raises the cost of producing that good and erodes the country's comparative advantage in that good (or aggravates its comparative disadvantage). In this view of the world, exogenously given labor market turnover is an independent determinant of comparative advantage.[2]

As we point out below, neither view of the world *necessarily* implies that we would observe a correlation between a country's net exports and labor market turnover. However, both views are at least suggestive of a negative correlation between net exports in a given sector and the rate at which jobs are lost in that sector, with a positive correlation between net exports and the ease with which jobs are found in that sector. Of course, the two theories differ in terms of what they take to be the exogenous cause and the endogenous effect. The two also differ in that the first derives from a partial-equilibrium model linking *changes* in trade patterns or volumes to *changes* in employment (and therefore rates of job loss), whereas the second is grounded in a general-equilibrium framework describing a steady-state relationship between rates of job turnover and the pattern of trade.

Our purpose in this paper is to more fully articulate the two theories linking trade and turnover and then use data on job turnover, worker turnover and trade patterns to see if we can find empirical support for either theory. Unlike earlier work that finds only weak evidence of a correlation between job turnover and changes in net exports, we find a very strong negative correlation between rates of job loss and the level of net exports. Moreover, we also look at the connection between job acquisition rates and trade patterns, something that has not (to our knowledge) been explored in the literature. We find some evidence that job acquisition rates are positively correlated with net exports, though the evidence here is not as strong as our evidence on the correlation between net exports and job loss. This may be due to the fact that our measure of job acquisition does not conform as closely to the theoretical concept as does our measure of job loss.[3]

In addition to finding these correlations, we attempt to sort out the cause-and-effect relationship. Using a variety of different techniques, we find that the weight of the evidence suggests that it is more likely that turnover causes trade than vice versa.

2. From Trade to Turnover

In a recent series of papers, Lori Kletzer (1998a, 1998b, 2000) finds some weak evidence to support the hypothesis that worker displacement rates are positively correlated with the degree of foreign competition.[4] Before reporting Kletzer's empirical findings, it is useful to describe the conceptual framework that underlies her empirical implementation. This is best done with reference to Figure 1.

Consider a partial equilibrium model of a single good produced in two countries (the US and a Foreign country) under conditions of perfect competition and increasing marginal cost. The left hand panel of Figure 1 represents the US market for this good, while the right hand panel represents the Foreign market. The US and Foreign demand as well as the US and Foreign supply for this good are taken as exogenous. All quantities and prices are endogenously determined in equilibrium.

As drawn, the US would be a net importer of this good. The equilibrium price of this good can be found by adding the Foreign excess supply curve to the US supply curve and then finding the intersection of the resulting summation with the US demand curve.[5] Assuming that no goods are lost in transit, the quantity of US imports (M_{US}) must equal the quantity of Foreign exports (X_F). The import-penetration ratio for this good can be defined as $m = \left(M_{US}/Q_{US}^{D}\right)$. Suppose now that there is some change in the Foreign market that induces the exogenously-specified Foreign supply curve to shift to the right. Examples of such shocks might include technological improvement, reduction in the cost of some important input, or change in government legislation. From Figure 1, it is evident that this shock will cause (a) a decrease in the world price of the product; (b) an increase in the quantity demanded in the US; (c) a decrease in the quantity supplied in the US; and (d) an increase in the quantity of the good imported by the US from the Foreign country. In turn, (b) and (d) combined imply that the shock creates an increase in the import-penetration ratio. Assuming, as is natural, that US employment is positively related to the quantity supplied in the US, the exogenous shock to the Foreign supply curve creates a negative correlation between the endogenously-determined import-penetration ratio and US employment and a positive correlation between the endogenously-determined world price of the product and the US employment rate.

Kletzer generalizes this comparative static, postulating that shocks occur every time period. She defines the displacement rate (d) as:

$$d_t = -\frac{N_t - N_{t-1}}{N_{t-1}} - a_t \tag{1}$$

where N_t is industry employment in period *t*, and *a* is the rate of unreplaced attritions (e.g., voluntary quits that are not replaced by new hires).

Based upon this framework and using these definitions, Kletzer tests the hypothesis that $d_{i,t}$ is positively related to $\Delta m_{i,t}$ and negatively related to changes in $\Delta P_{i,t}$, where the subscript *i* is used to denote an industry and where Δ is the first-difference operator.

There are two fundamental problems with this approach, both of which are acknowledged by Kletzer.[6] The first, as already noted, is that both $m_{i,t}$ and $P_{i,t}$ are endogenous. It is because of this endogeneity problem that Kletzer is careful about not attributing causality to the results.

The second problem is that the model is also consistent with a *negative* correlation between $d_{i,t}$ and $\Delta m_{i,t}$ and a *positive* correlation between $d_{i,t}$ and $\Delta P_{i,t}$. For example, suppose that there is an exogenous increase in US demand. This creates an unambiguous increase in the equilibrium price of the product, inducing greater US production and employment (less displacement). The import-penetration ratio could increase as well if the Foreign excess supply curve is more elastic than the US supply curve. In this case, there would be a negative correlation between $d_{i,t}$ and $\Delta m_{i,t}$.[7] Alternatively, suppose that there is a negative shock to US supply, causing the aggregate supply of goods to the US market to shift leftward. In this case, the price of the good unambiguously increases, but the quantity produced domestically (and therefore employment) might actually fall, creating a *positive* correlation between $d_{i,t}$ and $\Delta P_{i,t}$. It is not possible to sort out these conflicting relationships in the absence of data relating to both US and Foreign shocks.

With the above model in mind, Kletzer (2000) created a panel combining data from the Displaced Workers Survey with price and quantity data on international trade to test the hypotheses that $d_{i,t}$ is positively related to $\Delta m_{i,t}$ and negatively related to $\Delta P_{i,t}$. To do so, she regressed $d_{i,t}$ on $\Delta m_{i,t}$, $\Delta P_{i,t}$, and a variety of control variables. Of the 15 regressions that use $\Delta m_{i,t}$ as the independent variable of interest, the point estimate of the slope coefficient is positive in all but two cases. In the two cases where the estimated slope coefficient is negative, it is not possible to reject the null hypothesis that the true value is actually zero. Indeed, of the remaining 13 cases, the *t*-statistic ranges from 0.15 to 3.04, exceeding 1.5 in only 5 instances. Of the 10 regressions where $\Delta P_{i,t}$ was the key independent variable, one resulted in a positive point estimate of the slope coefficient, though it was not possible to reject the null hypothesis that the true coefficient is zero. In the remaining 9 cases, the t-statistics ranged from 0.30 to 2.10, with only three instances in which the value was larger than 1.5. In summary, Kletzer's results provide only weak evidence that increased international competition is correlated with greater worker displacement.

3. From Turnover to Trade

In contrast to the static, partial equilibrium-model that motivates the intuition suggesting that trade shocks cause labor market turnover, DMM developed a dynamic general-equilibrium model to show that cross-country and cross-industry differences in labor market turnover can be an independent source of comparative advantage and therefore help shape the equilibrium pattern of trade.

Consider a simplified version of the DMM model where labor is the only input.[8] Assume that there are two goods and two countries. Suppose that each worker can produce a single unit of either good regardless of country, so that in the absence of any other considerations there would be no basis for trade. Finally, suppose that in each country workers live forever and alternate between spells of employment and spells of unemployment. In particular, we assume that existing jobs breakup and new jobs are acquired according to a Poisson process, where we let b_i^k represent the job breakup rate and e_i^k the job acquisition rate for sector *i* in country *k*. We take these parameters as exogenous, though they would clearly be determined in part by optimizing behavior in a more sophisticated model. Because of the implied frictions in the labor market, there will always be some job loss even if a sector is expanding, and there will always be some job gains even if a sector is contracting.[9]

Unemployed workers choose a sector in which to search for a job. Assuming that workers are risk neutral, it is necessarily the case that diversified production necessitates that (appropriately discounted) expected lifetime income must be the same across sectors.[10] This income is a weighted average of the income earned while unemployed (zero) and the income earned while on the job. We assume here that a worker earns the entire value of his marginal product, which is simply P_i. Using V_i to represent the discounted value of lifetime income, it is relatively straight forward to show that[11]

$$V_i = \left(\frac{r + e_i}{r + b_i + e_i} \right) \frac{P_i}{r} \tag{2}$$

where r is the subjective rate of discount. As already noted, diversified production requires $V_1 = V_2$, which from (2) implies that

$$\frac{P_2}{P_1} = \frac{r + b_2 + e_2}{r + b_1 + e_1} \frac{e_1}{e_2} . \tag{3}$$

If the P_2 increases relative to P_1, all searchers flow to sector 2 and the economy eventually specializes to the production of good 2. The reverse happens if P_2 falls relative to P_1. We illustrate equilibrium in the absence of trade by reference to the relative supply and relative demand curves in Figure 2.

In this model, turnover rates are the exogenous shifters of relative supply. If b_2 increases (or e_2 decreases), all else equal, the price of good 2 must increase in order to continue attracting workers to that sector. The intuition for this result is akin to that of a compensating wage differential. Holding all other factors constant, sectors that have relatively high breakup rates need to pay higher wages to encourage prospective employees to accept jobs within that sector rather than in a sector where jobs are more secure. Similarly, jobs that are relatively difficult to obtain (that is, where e_i is relatively small) need to offer a wage premium to induce prospective employees to undertake the time and effort needed to obtain a job in that sector rather than another sector where jobs are easier to obtain.[12]

The implication for trade theory is that a country should have a comparative advantage in sectors where the breakup rate is low and/or the job acquisition rate is high relative to the same sector in other countries. This would seem to imply that export industries should be characterized by relatively low wages while import-competing industries should be characterized by high wages. Given the strong evidence to the contrary in the United States, it would appear that this is *prima fascia* evidence against the model. However, this would be a misinterpretation of the model. In particular, each category of labor (skilled, semi-skilled, unskilled, and so on) has to be compensated for increased job risk, but this will not impinge on the rank ordering of wages across skill groups. Since US exports are relatively intensive in the use of high-skilled labor, average wages should be higher than in import-competing industries.

Our intent in the remainder of this paper is to use available data on job turnover, worker turnover, and trade patterns to see if we can find support for our theoretical findings.[13] To preview our results, we do indeed find strong evidence that higher rates of job destruction or worker separations are associated with a smaller level of net exports.[14] This correlation emerges from the data even after controlling for other variables that are likely to be associated with the volume and pattern of trade. We also use job creation and worker accessions to create a proxy for the job acquisition rate. While we do find that our proxy for job acquisitions is positively correlated with net trade, the correlation is not as strong as that relating net trade with job destruction or worker separations. As we note in our discussion of the data, our proxy for the job acquisition rate only loosely approximates the theoretical counterpart. By contrast, both the job destruction rate and the job separation rate are reasonably good proxies for the breakup rate that shows up in the theoretical model.[15]

4. The Data[16]

As indicated in the introduction, we make use of two distinct sets of data on labor market turnover. The purpose of this section is to describe this data and discuss the conceptual fit between the data and the theoretical underpinnings of the general-equilibrium model presented in the previous section.[17]

The data underlying the statistical analysis of job creation and destruction undertaken by DHS is the Longitudinal Research Database (LRD) that was developed by the United States Census Bureau. While the original establishment-level data is not available for public use, DHS have aggregated the data to the sectoral level and made these data freely available for anyone to use.[18]

The LRD combined data from the quinquennial census of manufactures with annual survey data to ascertain, *inter alia*, establishment-level employment numbers.[19] The survey asks respondents to list the number of employees (both full time and part time) on the payroll as of a specified pay period in March of the designated year. Since the same establishments were surveyed every year, DHS were able to track plant-level employment changes.[20]

To generate job creation and job destruction data for any particular grouping of establishments (for example, by SIC) for year t, DHS first divide the entire set of establishments into three groups. The first group includes all of those establishments that had more employees on the payroll in March of year t than they did in March of year $t-1$. Call this set of establishments S^{+}. The second group includes all of those establishments that had fewer employees on the payroll in March of year t than they did in the previous March. The set of establishments in this group is denoted by S^{-}. Of course the remaining establishments (presumably accounting for only a very small share of overall manufacturing employment) constitute the set of establishments for which there was no change in employment.

Considering only those establishments in the set S^+, DHS define the gross number of new jobs created as the sum of all employment increases between year *t-1* and year *t*. To convert this into a job creation *rate*, DHS divide by the average aggregate employment level of all firms in sector *S* between *t-1* and *t*. That is, if N_{et} represents employment at establishment *e* in March of year *t*, and if C_{st} represents the gross number of jobs created in sector *S*, then

$$C_{s,t} = \sum_{e \in S^+} \left(N_{e,t} - N_{e,t-1} \right) \quad (4)$$

$$c_{s,t} = \frac{C_{s,t}}{\frac{1}{2} \sum_{e \in S} \left(N_{e,t} + N_{e,t-1} \right)} \quad (5)$$

where the lower case letter refers to a rate, while the upper case letter refers to a level.

While this job creation variable is certainly very interesting for many purposes, it is not what we have in mind by the job acquisition parameter represented by e_i in the introduction of this paper. The problem is that it does not really tell us how easy or hard it is for an unemployed worker to find a job in a particular sector, nor does it tell us how easy or hard it is for a firm with vacancies to find appropriate employees. Expanding establishments may hire many workers relative to their existing employment base, yet this may only be a small fraction of the workers who are looking for a job in that sector, implying that it is relatively easy for firms to find workers, but difficult for the unemployed to find jobs. Similarly, a small job creation rate could possibly be associated with a small pool of workers looking for employment in that sector, and therefore correspond to relatively easy entrée into the sector, but possibly higher costs of recruiting. Even so, it is possible to use this measure to tease out an expression that has some bearing on the issue at hand.

The supply of new jobs created by firms in sector *S* relative to the aggregate number of new jobs created by manufacturing firms in all sectors combined provides some sense of the relative magnitude of job creation emanating from sector *S*. That is, a sector could have a relatively low job creation rate but be responsible for the lion's share of new jobs created in the manufacturing sector if that sector accounts for a relatively large portion of base employment. To calculate our proxy of the job acquisition rate, which we denote by $e_{i,t}$, define $\lambda_{i,t}$ as the share of total manufacturing employment in year *t* accounted for by sector *i*. The employment-weighted average job creation rate in year *t* is then[21]

$$c_t = \sum_i \lambda_{i,t} c_{i,t} \,. \qquad (6)$$

Furthermore, the share of jobs accounted for by sector *j* is simply

$$e_{i,t} = \frac{\lambda_{i,t} c_{i,t}}{c_t} \,. \qquad (7)$$

We shall refer to $e_{i,t}$ as the job acquisition rate in the remainder of this paper. However, we note here that the measure represented by (7) is not a perfect proxy for the true job acquisition rate, since we know nothing about the pool of workers suited for employment in different sectors. For example, some sectors are intensive in the use of skilled labor; others are intensive in the use of unskilled labor. It may be that e is relatively small for a sector that uses highly skilled labor. However, if the pool of qualified workers is also small, it may not be all that difficult to obtain employment in this sector.

The DHS measure of job destruction is calculated in a manner analogous to the job creation rate. However, this measure is much closer to our concept of the breakup rate, represented by b_i, that is pivotal in our theoretical model. Following the DHS notation, we use the symbol $D_{s,t}$ to represent the gross number of jobs destroyed between period $t-1$ and period t. Then by definition

$$D_{st} = \sum_{e \in S^-} \left| N_{e,t} - N_{e,t-1} \right| \tag{8}$$

$$d_{s,t} = \frac{D_{st}}{\frac{1}{2}\sum_{e \in S}\left(N_{et} + N_{e,t-1}\right)}. \tag{9}$$

Because the DHS measure of job destruction is a close approximation of the job breakup parameter in the general equilibrium model, we shall simply let $b_{s,t} = d_{s,t}$.

While the DHS data captures annual changes in the number of jobs at an establishment, the BLS data focuses squarely on worker accessions and separations. Labor market turnover as reported by the United States Bureau of Labor Statistics represent the gross movement of workers into (accessions) and out of (separations) employment at the level of individual establishments. This data was reported in Table D-2 of *Employment and Earnings* until 1981, when collection of this data ceased because of budgetary reasons.[22] To see the difference between job flows and worker flows, note that an establishment might experience a 10 percent separation rate during the course of the year (due to retirements, quits, or layoffs) at the same time that it has a 10 percent accession rate (consisting of new hires and rehires). This establishment would end the year with the same number of employees as it had at the beginning of the year, and would therefore not exhibit any job creation or destruction, yet turnover would be substantial. Turnover in the DHS data requires heterogeneity between establishments, while turnover in the BLS data may exist due to heterogeneity of worker experience within establishments.[23]

The BLS measure of job accessions is subject to the same weakness as the DHS measure of job creation is vis-à-vis the match with the theoretical model. Therefore we handle this variable in the same way that we handle the DHS measure of job creation. That is, we construct a proxy for job accession that for each industry is the job accession rate multiplied by the industry's share of manufacturing employment relative to the average accession rate in manufacturing.

Both sets of turnover data are reported at the 2-digit and 4-digit SIC level (based on the 1972 revision to SIC codes). However, the DHS data encompasses 447 4-digit industries per year, while the BLS data only covers 106 such industries. The DHS data is available for the years 1973-1986, while the BLS data is available for the years 1978-1981.

In order to look for a correlation between job turnover and trade patterns, we combine the DHS and BLS datasets with data on US trade that was compiled by Robert Feenstra and made available from the National Bureau of Economic Research.[24] To control for a variety of industry-specific characteristics that could be associated with both job destruction and trade patterns, we also use data from the NBER Manufacturing Productivity Database.[25]

5. First Impressions

In order to explore the possible connection between labor market turnover and trade patterns, we must first choose a way to measure the degree to which an industry is engaged in international trade. To this end, we represent our measure of net exports in industry *i* at time *t* by $T_{i,t}$ and calculate it as

$$T_{i,t} = \frac{E_{i,t} - M_{i,t}}{Q_{i,t} + M_{i,t}} \times 100 \qquad (10)$$

where $E_{i,t}$, $M_{i,t}$, and $Q_{i,t}$ represent gross exports, imports, and production attributed to sector *i* during year *t*. This measure ranges between +100 (if there are no imports and if all output is exported) to –100 (if there is no domestic production and no re-export of imports).[26] The intuition following from the general-equilibrium model in Section 3 of this paper loosely suggests that the United States should have a comparative advantage in industries with relatively high job acquisition rates and relatively low job destruction rates.[27] Therefore, we might expect to see a positive correlation between our proxy for the job acquisition rate and the trade index, and observe a negative correlation between job destruction rates and the trade index.

Our initial findings are shown in Table 1. In all regressions, the dependent variable is our measure of normalized net trade. The first four regressions are based upon the DHS turnover data, with the remaining four based upon the BLS turnover data. For controls, we used real capital per worker and the ratio of production workers to total employment, both of which vary by industry and by year.[28] In addition, we use a trade-weighted index of the value of the dollar, which varies by year but not by industry.[29] Since we are only interested in the signs of the turnover variables, we do not report point estimates for any of the remaining control variables or year dummies.

The results reported in Table 1 indicate a highly significant relationship between job turnover and net trade. As expected, the point estimates for the coefficient on the breakup rate are negative, and those for the coefficients on the proxy for the job acquisition rate are always positive. Moreover, they are estimated with a high degree of precision, as indicated by very low *p*-values.

In terms of magnitude, the point estimates suggest that the elasticity of the absolute value of the trade index with respect to b ranges from -0.34 to -0.53 based upon the DHS data, and -0.97 to -1.33 when based upon the BLS data. The comparable ranges for the elasticity of the absolute value of T with respect to e are much smaller, ranging from 0.04 to 0.07 when based upon the DHS data, and 0.18 to 0.22 using the BLS data.[30]

While the turnover variables are exogenous in the theoretical formulation of the simple model, it might be reasonable to suppose that they would be endogenous in a more elaborate model.[31] Moreover, there are clearly some important variables missing from our regression analysis, the most obvious being turnover rates in the rest of the world. To the extent that these rates are highly correlated with US turnover rates, we would expect our coefficients to be biased toward zero.[32] In order to handle these issues, it would be desirable to instrument for turnover. The problem in this case is that all known correlates of turnover are also variables that presumably have some impact on trade. We attempt to circumvent this problem by using $b_{i,t-1}$, $b_{i,t-2}$, $e_{i,t-1}$, and $e_{i,t-2}$ to instrument for $b_{i,t}$ and $e_{i,t}$.[33] We report the outcome from the resulting two-stage least-squares regressions in Table 2. Clearly, the qualitative results are unchanged, with all of the point estimates being of the proper sign and the coefficients being precisely measured. We note also that the magnitudes of the point estimates are larger in these regressions, a result that we might have suspected due to the nature of the unobserved variables.

6. Which Way Does it Go?

As we observed in Sections 2 and 3 of this paper, using only US data severely limits our ability to address the issue of causality. In the partial equilibrium model, the relationship between trade and turnover depends upon the origin of the shocks that cause the turnover. In the general equilibrium model, the pattern of trade cannot genuinely be predicted without reference to turnover rates in all trading partners, an issue to which we return in the next section of the paper.

For now, however, we undertake three separate analyses, the results of which appear to be more consistent with the direction of causality running from turnover to trade, rather than the reverse.

Our first analysis is based on the idea that the general equilibrium model runs off of forward-looking agents doing what is in their own self interest. Agents base their decisions on long-run characteristics of sectors, not transitory shocks. By contrast, the partial equilibrium model is all about the effect of trade shocks on changes in turnover rates. The implication is that if we regress net trade on average values of turnover $(\bar{b} \text{ and } \bar{e})$ and their (percent) deviation from the average $(\Delta b \text{ and } \Delta e)$, the point estimates for the coefficients of $\bar{b}$ should be negative and $\bar{e}$ should be positive if the general-equilibrium interpretation (turnover causes trade) holds sway, while the point estimates of the coefficients of Δb should be negative and those of Δe positive if the partial equilibrium interpretation (trade causes turnover) is more important.[34]

We report the results of this analysis in Table 3. The estimated coefficients of $\bar{b}$ and $\bar{e}$ all have the right sign under the general-equilibrium interpretation and are precisely measured. The estimated coefficient for Δb is negative, as would be expected under the partial equilibrium interpretation, but standard errors are so large that it is not reasonable to reject the null hypothesis that the true value of the coefficient is zero. The estimates for the coefficient of Δe have the expected sign when the DHS turnover data is used, and they are marginally significant as long as we do not include year dummies. However, the point estimates using the BLS turnover data have the wrong sign. Fortunately, in this case, it is not reasonable to reject the hypothesis that the true coefficient is zero.

Our second approach is closely related to the first. Here, we take advantage of the fact that we have panel data and employ an industry fixed-effects estimation. It is easy to think of unobserved factors that vary by industry, including trade barriers, workforce demographics, geographic dispersion of production facilities, rate of technological change, number of foreign competitors, degree of product differentiation, returns to scale, and so on. Some of these factors are unlikely to change dramatically over a relatively short time, and these are the factors intended to be captured with the fixed-effects approach.

What should we expect of this approach? As we already observed, if the general equilibrium story is correct, implying that forward looking agents make decisions based on long-run turnover rates, then temporary deviations of the turnover rates from their long run averages should not influence trade patterns. By contrast, if the partial equilibrium approach is correct, trade shocks should cause turnover rates to deviate from their long-run averages. The fixed-effects estimation de-trends both the dependent and independent variables, leaving only deviations from the average. Therefore, we would expect that we could not reject the hypothesis of zero effect of turnover on trade if the general equilibrium hypothesis is correct, but we would see statistically significant results with breakup rates having a negative impact and job acquisition rates a positive impact on net exports.

The results of our fixed-effects estimation are shown in Table 4. In all cases, it is not reasonable to reject the hypothesis that the true coefficient of the job acquisition rate is zero. However, the point estimate for the coefficient on the breakup rate is negative in all cases and highly significant in three of the four cases based on DHS data. The evidence provided by these regressions is therefore mixed.

Our third approach exploits the intuition that trade shocks in the partial equilibrium framework ought to have an asymmetric impact on breakup rates and acquisition rates.[35] In particular, a trade shock that causes an industry to have a high breakup rate should also cause that same industry to have a low acquisition rate, and vice-versa. If we only look at industries where both turnover rates are high, or where both are low, we ought to find no correlation with trade if the partial equilibrium framework is dominant.

To implement this approach, we created a series of indicator variables that took on a value of one if the observation had *both* a low breakup rate *and* a low acquisition rate, *or* a high breakup rate *and* a high acquisition rate. We then interacted these indicator variables with the breakup and acquisition rates. The partial effect of b on T for observations where both b and e are either in the top or bottom 10 percent of their respective distributions would then be found by summing the estimated coefficients on the relevant interaction terms with the estimated coefficient on b. Our results are reported in Tables 5 and 6.

The key findings are in Table 6. While the sum of the relevant coefficients is rarely statistically significant when considering the impact of job acquisitions on trade, the sum of the relevant coefficients on job destruction are almost always negative and statistically significant regardless of how far into the tails of the distribution we look. The one exception concerns the most extreme values of turnover using the BLS data (where b and e are both in the upper or lower 10 percent of their respective distribution). In this latter case, we cannot reject the hypothesis that there is no effect of turnover on trade.

7. Additional Evidence

The three tests discussed in the previous section are informative, but certainly not conclusive. An airtight test of either the partial equilibrium or the general equilibrium model absolutely requires data from multiple countries. In the case of the partial equilibrium model, we get the expected correlations between import penetration or import prices and worker displacement only if shocks originate in the Foreign country, which is an implicitly maintained assumption of the analysis.[36] In the case of the general equilibrium model, comparative advantage depends on differences between countries. Suppose, for example, that sector 1 has a higher breakup rate than sector 2 in all countries. Since *some* country has to be a net exporter of good 1, there has to be at least one country that has a comparative advantage in the high turnover good, and data for that country would show a *positive* correlation between net exports and the breakup rate. We could add another assumption to the general equilibrium model to allow us to infer that for the United States the correlation is negative (as observed in the data), but we would be subject to the charge of *ex post* theorizing.[37]

Fortunately, we can start to address this issue head on. In their cross-country comparison of job turnover, Baldwin, Dunne, and Haltiwanger (1998) report average job creation and job destruction rates over the period 1994-1992 for nineteen 2-digit SIC industries in the United States and Canada.[38] We can combine this data with data on bilateral trade between the United States and Canada to more closely approximate a true test of the underlying theory. Roughly speaking, the theory suggests that US exports to Canada should be highest in industries where US job destruction rates are lowest relative to Canadian job destruction rates.[39] More specifically, we define the index

$$TC_{it} = \frac{EC_{it} - MC_{it}}{X_{it} + M_{it}} \times 100 \tag{11}$$

where for industry i in year t EC_{it} represents US exports to Canada and MC_{it} represents US imports from Canada. This is simply net exports to Canada normalized by the total amount of trade (between the United States and all countries) associated with industry i in year t. The theory suggests that this index should be negatively correlated with the ratio of the industry-specific averages of US job destruction relative to Canadian job destruction rates.

We regressed TC_{it} against the ratio of job destruction rates for nineteen 2-digit SIC industries for the years 1974-1994, providing a total of 399 observations. As is evident from Figure 3, there is indeed a negative relationship between (normalized) net exports from the US to Canada and the ratio of job destruction rates. The estimated slope coefficient in this Figure is highly statistically significant, with a *p*-value of 0.000 and the regression line fits the data well as suggested by $R^2 = 0.30$. While this result is certainly based on a very limited data set, we find it encouraging that it is consistent with our prior beliefs.

8. Conclusion

There are sound theoretical reasons to believe that labor market turnover is linked to international trade, though competing theories offer different mechanisms. In point of fact, these theories are not mutually exclusive, and a more encompassing model that nests the two would likely suggest that external shocks impinge on domestic labor market turnover while cross-country differences in the fundamental determinants of labor market turnover contribute to the determination of the pattern of comparative advantage.

The evidence that we report in this paper, based on two different sources of data for labor market turnover, points to a very strong negative correlation between net exports and rates of job loss. There is also some evidence that job acquisition rates are positively correlated with net exports, but that evidence is weaker, perhaps due to the relatively imperfect measure that we have for job acquisition rates.

Taken in its entirety, we believe that the evidence presented in this paper provides sufficient grounds to encourage further research using alternative data and a sample of different countries to determine the pervasiveness and robustness of this empirical finding.[40]

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[1] See also Jagdish Bhagwati and Vivek Dehejia (1994) and Bhagwati (1998) who provide a slightly different theory of how trade affects turnover. According to their theory, dramatic reductions in transportation costs, increases in the speed of communications, and rapidly evolving research have led to a global economy where profit margins are razor thin. Thus, they argue that countries can gain or lose the competitive edge in any particular market almost instantly. In turn, this "kaleidoscopic" comparative advantage creates increased employment volatility as firms that lose their competitive edge exit the market, replaced by new industry leaders.

[2] The intuition underlying the Davidson, Martin and Matusz (DMM) assertion is based on one of the main lessons from general-equilibrium trade theory -- that comparative advantage is the result of the interaction of intersectoral differences with cross-country differences. In the Ricardian model, comparative advantage arises because labor productivity differs between countries and (for at least one country) between sectors. Comparative advantage in the Heckscher-Ohlin-Samuelson model is the result of cross-sector differences in factor intensities combined with cross-country differences in factor supplies. In the DMM world, it is differences in labor market turnover across industries and countries that drive trade patterns.

[3] Many researchers have studied the way that international competition has shaped the distribution of employment across sectors. See for example Gene Grossman (1987) and Ana Revenga (1992, 1997). This is a distinctly different line of research. As we show below, trade can be related to turnover in the labor market even when the cross-sector composition of employment does not change.

[4] Jon Haveman (1998), using a somewhat different empirical methodology, finds similar results.

[5] For simplicity, we abstract from both natural and artificial barriers to trade, so that trade equalizes the equilibrium price across markets.

[6] There are some secondary problems as well. For example, there is an implicit assumption that this is the market for a final good. If this is an intermediate good, then stiffer foreign competition might cost jobs in this sector but increase jobs in the downstream sector where costs fall. If these two "sectors" are narrowly defined so that both fit into the same classification given the data constraints, increased foreign competition would be associated with higher sector-specific employment (lower displacement). In addition, ignoring job acquisitions leads to some curious empirical puzzles. For example, Kletzer identifies some sectors that have persistently high (but relatively stable, or even declining) import-penetration ratios *and* high rates of worker displacement. Assuming that final demand is roughly constant, displacements that are not ultimately replaced ought to lead to a secular decline in domestic output and higher import-penetration ratios.

[7] Even in the event that the import-penetration ratio fell, leading to the hypothesized positive correlation, the underlying chain of cause-and-effect works from the exogenous change in domestic demand to the simultaneously-determined displacement rate and import-penetration ratio. This just re-states the endogeneity problem.

[8] The DMM model consists of two factors, allowing for diversified production over a non-degenerate range of prices.

[9] This feature of the model is consistent with the data on gross flows, as suggested by Steven Davis and John Haltiwanger (1992) and Davis, Haltiwanger, and Scott Schuh (1996).

[10] Since workers live forever, we should technically talk about income discounted over the infinite future, but this phrase seems unnecessarily awkward.

[11] See Davidson, et. al. (1999) for the derivation.

[12] Abowd and Ashenfelter (1981) find empirical support for the proposition that inter-industry wage differentials compensate for differences across industries in the risk of unemployment. In their work, they assume that a worker can choose to accept a job in a sector where there is no constraint on labor supply, or accept employment in a sector where labor supply is constrained. They assume that the expected value of the constraint is known, but the actual constraint is random. In equilibrium, worker indifference between the two sectors implies that the constrained sector must pay a higher wage. The authors use data from the Panel Study of Income Dynamics (1967-1975) to estimate the effect of unemployment uncertainty on the wage differential. They conclude that the compensating differentials ranged from less than one percent in industries where there was relatively little anticipated unemployment, to as much as fourteen percent in industries where there was a relatively large amount of anticipated unemployment.

[13] In that our work is motivated by an assumption of cross-country differences in the pattern of labor market turnover, our work is related to the recently growing literature in which a variety of authors have argued that cross-country differences in labor market structure can have interesting and important implications for a host of issues. For example, Richard Layard, Stephen Nickell, and Richard Jackman (1991) have investigated the implications of such differences for macroeconomic stability while Richard Freeman (1994) has explored how such differences affect the pattern of job training. Paul Krugman (1994) has argued that the different manner in which recent changes in technology and trade patterns have filtered through economies can be linked to the differences in their labor market structures. He points out that the United States, with its flexible, high turnover labor market has been characterized by a dramatic change in the distribution of income while European countries, with their rigid, relatively low turnover labor

markets, have been characterized by a dramatic increase in unemployment among low skilled workers. Donald Davis (1998) makes a similar point when he shows how countries with downwardly rigid wages may be insulated from trade shocks if their trading partners have flexible labor markets that allow them to absorb such shocks. See also the recent paper by Olivier Blanchard and Augustin Landier (2001) who relate turnover (a labor market outcome) with French institutional reform undertaken in the 1980s that provided firms with wider leeway in hiring workers under fixed term contracts (rather than standard contracts of indefinite term). In turn, this has allowed firms more flexibility in terminating workers since firms are permitted to more easily terminate workers who were employed on fixed term contracts. However, firms are subject to a substantially higher level of firing costs in the event that workers are kept on beyond the duration of the contract. Blanchard and Landier argue on theoretical grounds that this sort of policy could set up perverse incentives for firms to terminate workers on fixed term contracts even when the quality of the match appears good, thus creating higher turnover. They provide empirical evidence that this has indeed been the case.

[14] Of course, we normalize our trade variables to account for size variation across sectors.

[15] It is perhaps worth noting that we might expect turnover to exert an independent influence on the costs of production, and hence on the pattern of comparative advantage, even in the absence of the general-equilibrium effects that were formally modeled in Davidson, et. al. (1999). The reason is that turnover itself is costly. Presumably, firms need to expend resources to train newly hired employees and to find and recruit replacements for those who leave. Holding all else constant, higher turnover is more costly.

[16] We are happy to provide all of our data along with the Stata “do file” to anyone wishing to further explore our results.

[17] Of course the authoritative (and complete) description of the DHS dataset is provided in the Appendix to their book.

[18] Recently, Michael Klein, Scott Schuh, and Robert Triest (2002, 2003) have used the DHS data to examine the impact of exchange rate movements on turnover. Davis, et. al. (1996, p. 175) explicitly looked for a link between turnover and the degree of import penetration or export performance and found "…no systematic relationship between the magnitude of gross job flows and exposure to international trade." However, theirs was a very superficial analysis, consisting of a simple cross-tabulation, dividing industries into quintiles (based on import penetration ratios on the one hand, or the share of output devoted to exports on the other) and then reporting the weighted average job destruction and creation rates of 4-digit SIC sectors within each quintile. They do not undertake any sort of formalized hypothesis testing.

[19] In this context, an establishment is a plant employing (generally speaking) five or more workers.

[20] Establishments rotated in and out of the sample at 5-year intervals.

[21] DHS report the annual employment-weighted job creation rates for the US in Table 2.1.

[22] The BLS data was classified according to 1967 SIC codes prior to 1978, and discontinued after 1981. Note, however, that the 1981 data is reported in the March 1982 issue of *Employment and Earnings*.

[23] See Davis and Haltiwanger (1998) for a lucid discussion of the differences between worker flows and job flows, along with a description of the available data for each.

[24] See Feenstra (1996, 1997) for a description of the trade data.

[25] This data is maintained by Eric Bartelsman, Randy Becker, and Wayne Gray and is available from the National Bureau of Economic Research. A description of this data is provided in Bartelsman and Gray (1996).

[26] The qualitative nature of our results are substantially unaffected if instead we were to use either import penetration or exports as a share of output as our dependent variable.

[27] This is only a loose interpretation since what really matters for the pattern of trade is differences in the pattern of job destruction rates *across countries*. Our data only applies to the United States, so we do not have a direct test of this hypothesis. We return to this issue in the conclusion of the paper.

[28] By including these variables, we are in no way attempting to test the factor endowment basis for trade. Indeed, it has been well known at least since Leamer's (1984) work that such regressions are not appropriate tests of that model. Our only intent is to control for some obvious factors that might be correlated with the trade index to see if we can still observe any correlation with respect to job turnover rates.

[29] The exchange rate index is from the *Economic Report of the President* and is the G-10 index.

[30] We evaluated all elasticities at the mean value of the data. The mean value of $|T|$ is 8.7 in the DHS data, and 8.4 in the BLS data. The mean value of b is 11.1 in the DHS data and 3.7 in the BLS data. The mean value of e is 0.2 in the DHS data and 0.9 in the BLS data.

[31] Even in a more elaborate model, however, one would imagine that some element of turnover would remain exogenous. For example, we typically assume that production technology is exogenous. In the case of turnover, we might assume that there exists a matching technology and that this technology is exogenous, even if the particular point along the function is endogenous.

[32] In the most extreme case, turnover rates would not be an independent source of comparative advantage if industry-specific turnover rates were the same in all countries.

[33] We thank both Richard Disney and an anonymous referee for this suggestion.

[34] We thank David Hummels for suggesting this approach.

[35] We thank John McLaren for suggesting this insight.

[36] Of course, if the shocks originate in the Foreign country, then analysis of the Foreign data ought to show the opposite correlations between import share and worker displacement.

[37] For example, if the rank order of breakup rates is the same in all countries, but the dispersion is higher in the US, then (abstracting from differences in acquisition rates) it is easy to show that the US will have the comparative advantage in industries characterized by the lowest breakup rates.

[38] The data is reported in their Table 2. The reason that there are only nineteen industries is that they combine industries 38 (instruments) and 39 (miscellaneous products). They note in a footnote that there are slight discrepancies in industry definitions across countries.

[39] Lacking appropriate data to weight values of job creation, it is not possible to construct a proxy for job acquisition and therefore we cannot use a comparison of US and Canadian job creation data in our analysis.

[40] In a separate paper, written with Christopher Magee, we find empirical support for another result implied by the structural model presented in our 1999 paper. Namely, we show theoretically that the impact of trade on the welfare of factors of production that are employed in a particular sector depends on the rates of labor market turnover associated with that sector. At one extreme, with no turnover, the model behaves identically to a Ricardo-Viner specific-factors model. At the other extreme, with infinite turnover, the model behaves identically to a

Heckscher-Ohlin model with Stolper-Samuelson effects. More generally, the impact of trade on worker welfare is a weighted average of the two effects, with the relative weight given to each determined by the degree of turnover. We find substantial support for this relationship using data on political contributions to Congress, Congressional voting patterns, and job destruction. See Magee, Davidson, and Matusz (2003).

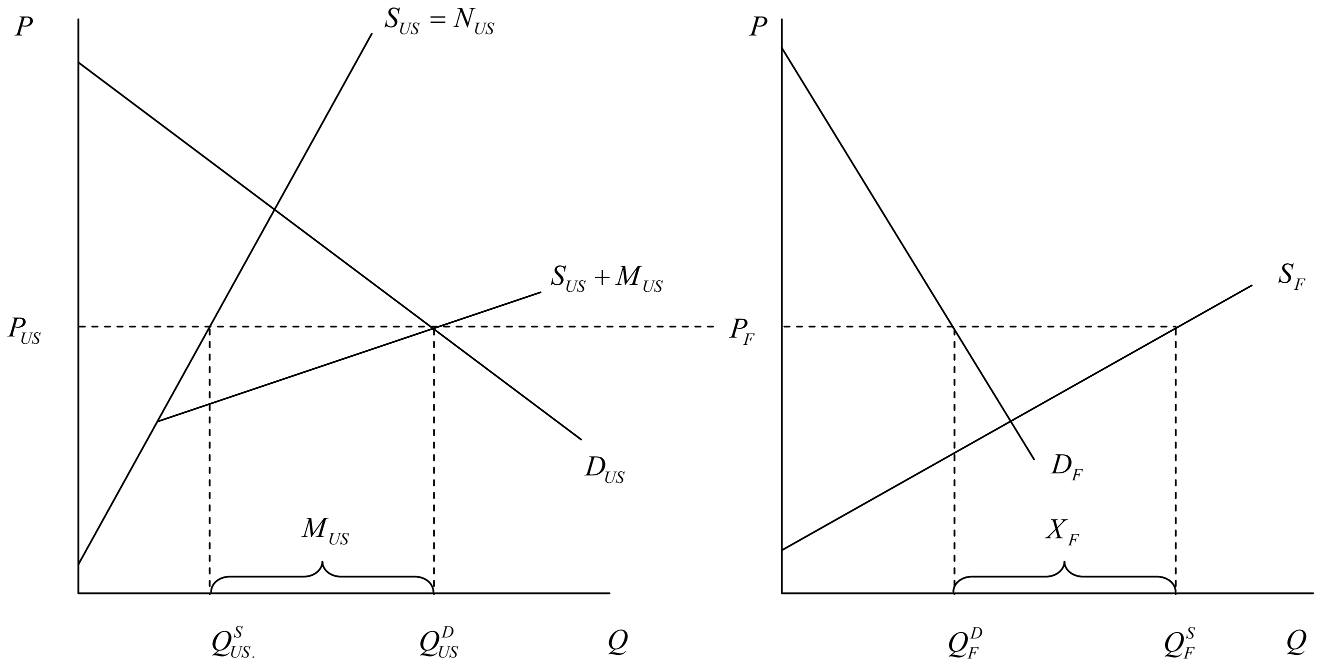

Figure 1. Relating Domestic Import Penetration and Employment to Foreign Supply and Demand Conditions

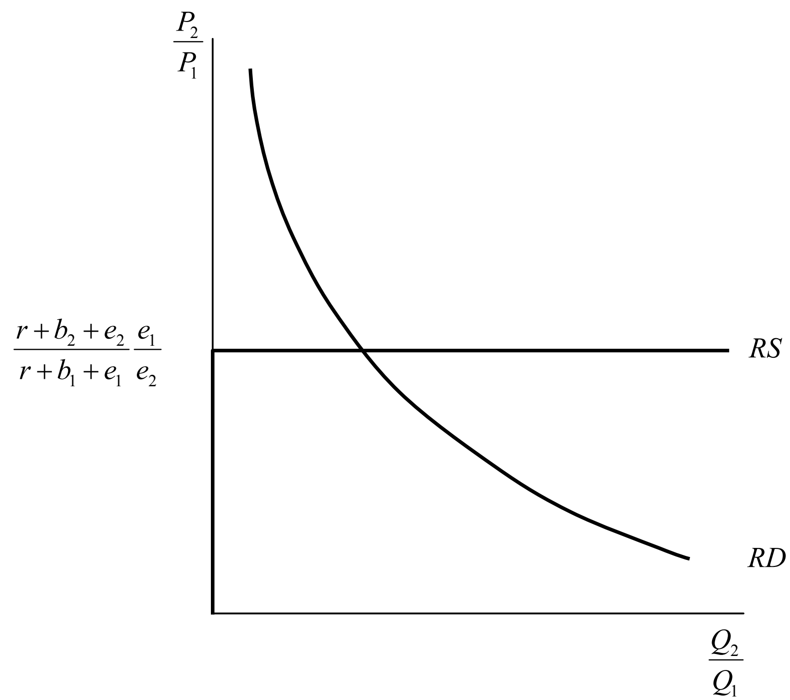

Figure 2. Relating Autarkic Relative Price to Labor Market Turnover

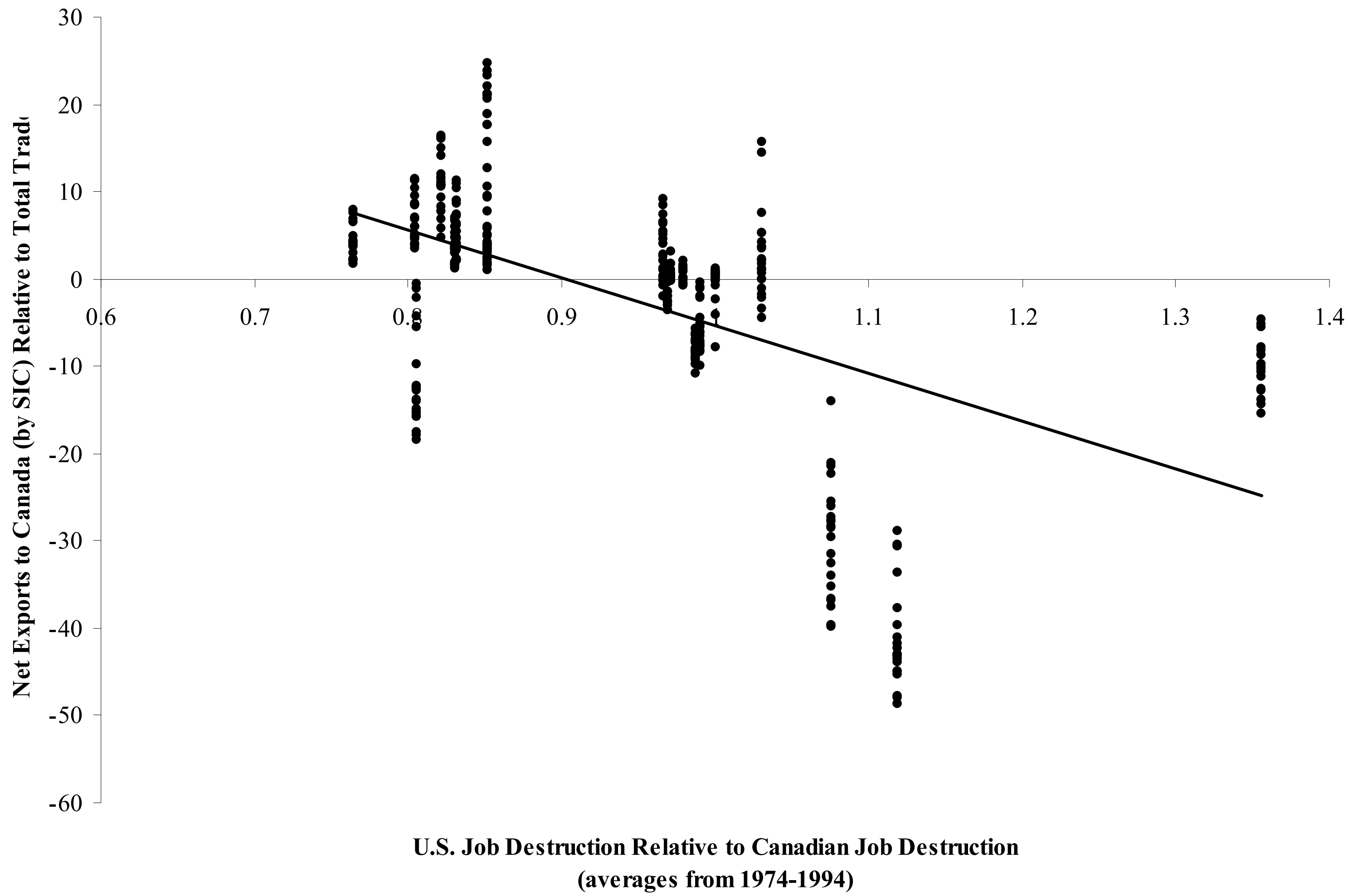

Figure 3. Correlating US-Canada Trade With Cross-Country Differences in Labor Market Turnover

Independent Variables	DHS 4-Digit SIC Turnover Data (1)	(2)	(3)	(4)	BLS 4-Digit SIC Turnover Data (5)	(6)	(7)	(8)
$b_{i,t}$	-0.360 (0.000)	-0.267 (0.000)	-0.415 (0.000)	-0.322 (0.000)	-3.013 (0.000)	-2.205 (0.000)	-3.023 (0.000)	-2.209 (0.000)
$e_{i,t}$	2.941 (0.000)	1.853 (0.000)	2.872 (0.000)	1.820 (0.000)	2.029 (0.000)	1.690 (0.002)	2.036 (0.000)	1.692 (0.002)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Year Dummies	No	No	Yes	Yes	No	No	Yes	Yes
R^2	0.0424	0.1300	0.0737	0.1499	0.2360	0.2819	0.2375	0.2827
N	6258	6258	6258	6258	530	530	530	530

The dependent variable is $T_{i,t}$, normalized net exports. Estimated coefficients are in the body of the table, with *p*-values in parentheses.

Table 1. Baseline Regressions Relating Normalized Net Exports to Labor Market Turnover

Independent Variables	DHS 4-Digit SIC Turnover Data				BLS 4-Digit SIC Turnover Data			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$b_{i,t}$	-1.678 (0.000)	-1.220 (0.000)	-1.591 (0.000)	-1.278 (0.000)	-3.531 (0.000)	-2.856 (0.000)	-3.535 (0.000)	-2.867 (0.000)
$e_{i,t}$	3.832 (0.000)	2.554 (0.000)	3.814 (0.000)	2.661 (0.000)	2.439 (0.001)	2.136 (0.005)	2.441 (0.001)	2.142 (0.005)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Year Dummies	No	No	Yes	Yes	No	No	Yes	Yes
2SLS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	5364	5364	5364	5364	318	318	318	318

The dependent variable in the second stage regression is $T_{i,t}$, normalized net exports. Estimated coefficients from the second stage are in the body of the table, with *p*-values in parentheses. One-period and two-period lags of $b_{i,t}$ and $e_{i,t}$ were used as instruments in the first stage.

Table 2. Two Stage Least Squares Regressions Relating Normalized Net Exports to Turnover

Independent Variables	DHS 4-Digit SIC Turnover Data (1)	(2)	(3)	(4)	BLS 4-Digit SIC Turnover Data (5)	(6)	(7)	(8)
$\bar{b}_i$	-1.393	-1.144	-1.393	-1.126	-3.314	-2.572	-3.314	-2.573
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$\Delta b_{i,t}$	-0.003	-0.001	-0.002	-0.003	-0.003	-0.004	-0.005	-0.006
	(0.332)	(0.789)	(0.574)	(0.310)	(0.917)	(0.905)	(0.884)	(0.855)
$\bar{e}_i$	3.803	2.496	3.803	2.511	2.218	1.906	2.218	1.906
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)
$\Delta e_{i,t}$	0.007	0.006	0.003	0.004	-0.016	-0.013	-0.014	-0.011
	(0.058)	(0.085)	(0.410)	(0.293)	(0.652)	(0.712)	(0.702)	(0.751)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Year Dummies	No	No	Yes	Yes	No	No	Yes	Yes
R^2	0.1329	0.1818	0.1604	0.1955	0.2591	0.2943	0.2600	0.2948
N	6258	6258	6258	6258	530	530	530	530

The dependent variable is $T_{i,t}$, normalized net exports. Estimated coefficients are in the body of the table, with *p*-values in parentheses.

Table 3. Average Labor Market Turnover, Deviations from Average, and Trade

Independent Variables	DHS 4-Digit SIC Turnover Data (1)	(2)	(3)	(4)	BLS 4-Digit SIC Turnover Data (5)	(6)	(7)	(8)
$b_{i,t}$	-0.053 (0.000)	-0.011 (0.261)	-0.036 (0.000)	-0.040 (0.000)	-0.069 (0.674)	-0.278 (0.124)	-0.050 (0.763)	-0.301 (0.110)
$e_{i,t}$	0.343 (0.486)	0.649 (0.156)	0.524 (0.228)	0.617 (0.156)	-0.870 (0.199)	-0.762 (0.259)	-0.894 (0.183)	-0.750 (0.266)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Year Dummies	No	No	Yes	Yes	No	No	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.0422	0.0238	0.0375	0.0057	0.0086	0.0061	0.0058	0.0025
N	6258	6258	6258	6258	530	530	530	530

The dependent variable is $T_{i,t}$, normalized net exports. Estimated coefficients are in the body of the table, with *p*-values in parentheses.

Table 4. Regressions Controlling for Sector-Specific Fixed Effects

Independent Variables	DHS 4-Digit SIC Turnover Data (1)	(2)	(3)	(4)	BLS 4-Digit SIC Turnover Data (5)	(6)	(7)	(8)
$b_{i,t}$	-0.378 (0.000)	-0.300 (0.000)	-0.429 (0.000)	-0.347 (0.000)	-3.733 (0.000)	-3.005 (0.000)	-3.758 (0.000)	-3.029 (0.000)
$I(10)_{i,t} \times b_{i,t}$	-0.169 (0.352)	-0.111 (0.523)	-0.106 (0.554)	-0.063 (0.712)	2.346 (0.032)	2.381 (0.026)	2.321 (0.035)	2.374 (0.027)
$I(20)_{i,t} \times b_{i,t}$	0.121 (0.222)	0.171 (0.071)	0.098 (0.317)	0.151 (0.108)	1.431 (0.036)	1.524 (0.024)	1.483 (0.031)	1.547 (0.023)
$I(33)_{i,t} \times b_{i,t}$	0.067 (0.268)	0.058 (0.321)	0.068 (0.260)	0.060 (0.298)	-0.519 (0.359)	-0.747 (0.177)	-0.496 (0.382)	-0.721 (0.194)
$I(50)_{i,t} \times b_{i,t}$	0.037 (0.345)	0.032 (0.392)	0.022 (0.577)	0.021 (0.568)	0.717 (0.081)	0.634 (0.115)	0.744 (0.071)	0.638 (0.114)
$e_{i,t}$	3.273 (0.000)	1.281 (0.038)	3.176 (0.000)	1.266 (0.038)	2.111 (0.005)	1.515 (0.041)	2.182 (0.004)	1.556 (0.037)
$I(10)_{i,t} \times e_{i,t}$	1.813 (0.669)	0.524 (0.897)	-0.002 (1.000)	-0.750 (0.852)	-4.103 (0.198)	-4.402 (0.156)	-3.868 (0.227)	-4.303 (0.167)
$I(20)_{i,t} \times e_{i,t}$	-1.249 (0.679)	-1.348 (0.639)	-0.953 (0.749)	-0.973 (0.733)	-0.286 (0.905)	-0.406 (0.862)	-0.540 (0.822)	-0.533 (0.821)
$I(33)_{i,t} \times e_{i,t}$	-0.930 (0.631)	0.255 (0.890)	-0.903 (0.636)	0.244 (0.894)	1.659 (0.443)	2.171 (0.303)	1.674 (0.440)	2.137 (0.312)
$I(50)_{i,t} \times e_{i,t}$	-1.118 (0.376)	0.221 (0.855)	-0.824 (0.508)	0.316 (0.792)	-3.454 (0.036)	-2.869 (0.076)	-3.606 (0.030)	-2.920 (0.072)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Year Dummies	No	No	Yes	Yes	No	No	Yes	Yes
R^2	0.0442	0.0893	0.0355	0.1527	0.3086	0.3502	0.3119	0.3512
N	6258	3080	3080	6258	530	530	530	530

The dependent variable is $T_{i,t}$, normalized net exports. Estimated coefficients are in the body of the table, with *p*-values in parentheses. Estimated coefficients are in the body of the table, with *p*-values in parentheses. The variable $I(z)_{i,t}$ equals one if $b_{i,t}$ and $e_{i,t}$ *both* lie in the lower or upper *z*-percent of their respective distributions, zero otherwise.

Table 5. Intermediate Regression Results Used in Constructing Table 6

Coefficients	DHS 4-Digit SIC Turnover Data (1)	(2)	(3)	(4)	BLS 4-Digit SIC Turnover Data (5)	(6)	(7)	(8)
β_{100}	-0.378 (0.000)	-0.300 (0.000)	-0.429 (0.000)	-0.347 (0.000)	-3.733 (0.000)	-3.005 (0.000)	-3.758 (0.000)	-3.029 (0.000)
$\beta_{100}+\beta_{50}$	-0.341 (0.000)	-0.268 (0.000)	-0.407 (0.000)	-0.326 (0.000)	-3.005 (0.000)	-2.371 (0.000)	-3.014 (0.000)	-2.391 (0.000)
$\beta_{100}+\beta_{50}+\beta_{33}$	-0.274 (0.000)	-0.211 (0.000)	-0.34 (0.000)	-0.266 (0.000)	-3.524 (0.000)	-3.118 (0.000)	-3.51 (0.000)	-3.112 (0.000)
$\beta_{100}+\beta_{50}+\beta_{33}+\beta_{20}$	-0.153 (0.087)	-0.04 (0.642)	-0.242 (0.067)	-0.115 (0.177)	-2.093 (0.002)	-1.594 (0.004)	-2.027 (0.000)	-1.565 (0.005)
$\beta_{100}+\beta_{50}+\beta_{33}+\beta_{20}+\beta_{10}$	-0.322 (0.047)	-0.15 (0.330)	-0.347 (0.029)	-0.178 (0.243)	0.242 (0.795)	0.787 (0.410)	0.294 (0.674)	0.809 (0.399)
γ_{100}	3.273 (0.000)	1.281 (0.038)	3.176 (0.000)	1.266 (0.038)	2.111 (0.005)	1.515 (0.041)	2.182 (0.004)	1.556 (0.037)
$\gamma_{100}+\gamma_{50}$	5.086 (0.054)	1.805 (0.160)	2.352 (0.033)	4.426 (0.136)	-1.343 (0.373)	-1.354 (0.358)	-1.424 (0.347)	-1.365 (0.356)
$\gamma_{100}+\gamma_{50}+\gamma_{33}$	3.837 (0.437)	0.457 (0.244)	1.449 (0.353)	4.67 (0.222)	0.316 (0.839)	0.816 (0.595)	0.25 (0.873)	0.772 (0.616)
$\gamma_{100}+\gamma_{50}+\gamma_{33}+\gamma_{20}$	2.907 (0.993)	0.712 (0.867)	0.496 (0.845)	3.697 (0.725)	0.03 (0.987)	0.41 (0.815)	-0.29 (0.873)	0.239 (0.893)
$\gamma_{100}+\gamma_{50}+\gamma_{33}+\gamma_{20}+\gamma_{10}$	1.789 (0.597)	0.933 (0.772)	0.494 (0.882)	0.103 (0.974)	-4.072 (0.122)	-3.991 (0.119)	-4.158 (0.115)	-4.063 (0.114)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Year Dummies	No	No	Yes	Yes	No	No	Yes	Yes
R^2	0.0442	0.0893	0.0355	0.1527	0.3086	0.3502	0.3119	0.3512
N	6258	3080	3080	6258	530	530	530	530

The dependent variable is $T_{i,t}$, normalized net exports. Estimated coefficients are in the body of the table, with *p*-values in parentheses. The sum of estimated coefficients are in the body of the table, with *p*-values in parentheses. The coefficient β_{100} is the coefficient of $b_{i,t}$, β_{10} is the coefficient of $I(10)_{i,t} \times b_{i,t}$, and so on. Analogously, γ_{100} is the coefficient of $e_{i,t}$, and so on.

Table 6. High (Low) Job Destruction Combined with High (Low) Job Creation and Net Exports