Employment Flows and Producer Turnover

Mark J. Roberts

The process of growth and development necessarily involves the replacement of outdated production methods with new technologies, the creation of new products, the opening of new markets, and the discovery of new applications for existing products. In most countries, these changes are accomplished by a continual, ongoing process of creative destruction that results in the gradual shifting of resources from contracting and failing producers to new and expanding ones.

When producers within a sector are identical, changes in demand and cost conditions lead to the shifts of resources across sectors that have been the focus of much empirical study by development economists. However, when producers within a sector vary enormously in size, input mix, and productivity, the evolutionary process also generates resource movements within sectors, even without changes in demand or cost conditions, as more profitable producers replace less profitable ones. It is these flows at the level of the individual plant or worker that are most likely to reflect both the adjustment costs associated with change and the potential benefits, such as higher productivity, more product diversity, and higher living standards.

This chapter focuses on the extent of micro-level resource reallocation in the manufacturing sectors of Chile, Colombia, and Morocco by quantifying the turnover in employment positions at the level of the individual manufacturing plant. By using plant-level panel data sets to track the employment level of individual plants over time, we distinguish the flow of jobs created in new and expanding plants from the simultaneous flow of jobs lost in plants that contract or close.

Recent studies of employment reallocation in Canada, the United States, and several European countries find that the gross flows of
employment positions resulting from the entry, expansion, contraction, and exit of plants are several times larger than the net change in employment (Dunne, Roberts, and Samuelson 1989; Davis and Haltiwanger 1990, 1992; Davis, Haltiwanger, and Schuh 1994; Baldwin, Dunne, and Haltiwanger 1994). Thus, in these industrialized countries, a substantial amount of resource reallocation is continually occurring at the micro level even when there is little change in sectoral or aggregate totals. This chapter provides complementary evidence on the extent of resource reallocation in three semi-industrialized countries.

There are reasons to expect less producer turnover in developing countries than in industrial countries. One is that government policies can directly interfere with the turnover process by subsidizing inefficient plants or industries. Government policies may also constrain the entry of new firms, through direct prohibition, credit rationing, or imperfections in capital markets that make it difficult for new firms to borrow. Trade policies that protect high-cost domestic producers or that slow the entry and expansion of new export producers also influence the process. Finally, uncertainty of future market conditions, such as can result from destabilizing macroeconomic policy, can also depress turnover in the presence of sunk entry or exit costs (Dixit 1989). Adjustments in the size of existing producers can also be affected by policy. Mandated severance payments for workers, for example, can lead to more costly adjustment and less turnover in employment. In contrast, developing countries may have higher rates of turnover than industrial countries, since a higher proportion of their employment, particularly in the manufacturing sector, is concentrated in smaller producers whose survival may be more sensitive to cyclical fluctuations.

Producer turnover can be costly if it requires the movement of workers either in and out of unemployment or between geographic regions. It can also be a beneficial source of change in sectoral and aggregate productivity if producers are not equally productive, because entry, growth, and exit alter the mix of efficient and inefficient firms. Tybout (1992) finds that the net exit of producers following the Chilean recession in the early 1980s contributed to an increase in productivity, because of the exit of inefficient plants, while the net entry of firms during the Moroccan expansion of the late 1980s contributed to a decline in productivity. Similarly, in chapter 4, Liu and Tybout find that exiting plants in Colombia are generally less efficient than incumbents, so that exit improves sectoral productivity. Finally, high turnover rates can also provide competitive pressure in markets that are characterized by a small number of producers.

The goal of this chapter is to gauge the extent of resource reallocation at the micro level and to quantify the role of plant entry and exit as a contributing factor. To that end, employment reallocations that result
from the entry and exit of plants are distinguished from employment changes that occur as continuing producers expand or contract. The focus is on employment change, the flow of new positions created by entering and expanding establishments, and the flow of positions destroyed by downsizing and exiting plants. The use of employment flows avoids the problems of differing output deflators across countries and allows direct comparison with recent studies for Canada and the United States.

The empirical findings are remarkably similar across the three developing countries and, in many ways, replicate patterns found in industrial-country data. Net changes in aggregate or sectoral employment mask large offsetting flows of new jobs created through plant entry and expansion and old jobs lost through the contraction and closing of other plants. Annual rates of job turnover are larger than comparable figures for Canada and the United States, averaging 24 to 30 percent of the manufacturing employment base in the three countries. Expansions and contractions of existing plants account for the majority of turnover in employment positions, but the entry and exit of producers are a larger component of the total in the developing countries.

Examining employment flows at the sectoral level reveals that more than 80 percent of total employment turnover occurs as a result of the entry, growth, and exit of plants *within the same industry* rather than from shifts in employment between industries. The rank correlation of industries on the basis of employment turnover rates is positive across the three countries, suggesting that technological factors, such as the magnitude of sunk entry costs or adjustment costs for existing producers, may play a large role in generating differences in average employment turnover rates among sectors. Contrary to the findings for Canada and the United States, cyclical fluctuations in the rates of job creation are larger than fluctuations in the rates of job loss, suggesting that major periods of employment restructuring are periods of high growth that are accompanied by substantial entry of new producers.

The next section defines the turnover variables that are quantified in this chapter. The following section summarizes the aggregate time-series patterns for the three countries with emphasis on the role of plant entry and exit as a source of employment turnover. The final section examines the cross-sectional and time-series patterns of turnover at the industry level.

**Measurement Issues**

Using the panel data sets for each country, which cover the population of manufacturing plants in operation in each of several years, it is possi-
ble to identify each plant as an entering, exiting, or surviving plant between each pair of years. Between year $t$ and year $t + 1$, a plant is classified as a birth if it first appears in $t + 1$, as a death if it appears in year $t$ but not in year $t + 1$, or as an incumbent survivor if it operates in both periods. For each plant, the manufacturing censuses report the total employment in each year. By summing plant employment over the plants in each of these groups, the following employment totals can be defined: $B_{t+1}$ is the number of employees in plants that begin operation in period $t + 1$. $E_t$, $E_{t+1}$ are the number of employees in periods $t$ and $t + 1$ in all surviving plants that expand employment or do not change employment between the two periods, so that $E_{t+1}$ is greater than or equal to $E_t$. $C_t$, $C_{t+1}$ are the number of employees in periods $t$ and $t + 1$ in all surviving plants that contract employment between the two periods, so that $C_{t+1}$ is less than $C_t$. $D_t$ is the number of employees in period $t$ in all plants that died in period $t$.

The level of employment ($L$) in each of the two periods is denoted $L_t$ and $L_{t+1}$ and can be defined as:

\begin{align*}
L_t &= E_t + C_t + D_t \\
L_{t+1} &= E_{t+1} + C_{t+1} + B_{t+1}.
\end{align*}

The four components of the gross flow of employment positions are defined as $B_{t+1}$ equals births; $\Delta E_t = E_{t+1} - E_t$ equals expansions; $\Delta C_t = (C_{t+1} - C_t)$ equals contractions; and $D_t$ equals deaths. These four components summarize the change in the number of occupied positions or employment opportunities within each group of plants. Because the underlying data are plant employment totals, it is not possible to tell if the actual jobs, or the individuals occupying the jobs, are the same ones over time. These components are used to define three other summary measures of employment turnover.

Net employment change between $t$ and $t + 1$ is the difference between gross additions and gross losses:

\begin{equation}
\Delta L_t = B_{t+1} + \Delta E_t - \Delta C_t - D_t.
\end{equation}

employment turnover is defined as the sum of the four components:

\begin{equation}
T_t = B_{t+1} + \Delta E_t + \Delta C_t + D_t
\end{equation}

and measures the total number of employment positions added or lost between the two years. The lower bound on the amount of turnover is the net employment change between the two years ($T_t \geq \Delta L_t$). Total employment turnover can also be divided into a component due to plant
<table>
<thead>
<tr>
<th>Country and period</th>
<th>Total manufacturing job growth rate</th>
<th>Gross job additions</th>
<th>Gross job losses</th>
<th>Turnover rate</th>
<th>Volatility rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average over entire period</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Chile, 1979–86</td>
<td>−1.0</td>
<td>12.9</td>
<td>−13.9</td>
<td>26.8</td>
<td>18.4</td>
</tr>
<tr>
<td>Colombia, 1977–91</td>
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<td>−12.2</td>
<td>24.6</td>
<td>22.2</td>
</tr>
<tr>
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<td>12.1</td>
<td>30.7</td>
<td>24.2</td>
</tr>
<tr>
<td>Canada, 1973–86</td>
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<td>10.0</td>
<td>20.5</td>
<td>17.8</td>
</tr>
<tr>
<td>United States, 1973–86</td>
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<td>−10.4</td>
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<td><strong>Average during years of employment expansion</strong></td>
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</tr>
<tr>
<td>Canada</td>
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</tr>
<tr>
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<td>−7.9</td>
<td>19.0</td>
<td>15.8</td>
</tr>
<tr>
<td><strong>Average during years of employment contraction</strong></td>
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</tr>
<tr>
<td>Chile</td>
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<td>9.4</td>
<td>−17.6</td>
<td>27.0</td>
<td>18.8</td>
</tr>
<tr>
<td>Colombia</td>
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<td>11.2</td>
<td>−13.3</td>
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<td>22.4</td>
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<td>Morocco</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
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<tr>
<td>Canada</td>
<td>−3.0</td>
<td>9.1</td>
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<tr>
<td>United States</td>
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<td>7.4</td>
<td>−12.9</td>
<td>20.2</td>
<td>14.7</td>
</tr>
</tbody>
</table>

n.a. Not applicable (no periods of contraction).

Note: For the United States and Canada, the denominator in each rate is average employment in periods $t + 1$ and $t$; for developing countries, the denominator is employment at the start of each interval.

Source: For Canada and the United States, constructed from Baldwin, Dunne, and Haltiwanger 1994, table 1; for Chile, Colombia, and Morocco, author's calculations.
turnover (births plus deaths) and a component due to the turnover of positions in ongoing plants (expansions plus contractions).

Finally, the amount of employment turnover beyond that needed to account for the net change in the number of positions—referred to as the level of volatility—is defined as:

\[(2.5) \quad V_t = T_t - |\Delta L_t|.\]

In general, these summary measures are expressed as a proportion of employment in year \( t \). The measures can be constructed for the whole manufacturing sector or for individual industries.

**Aggregate Gross Flows of Employment Positions**

Average annual employment growth and turnover rates were computed for the manufacturing sector in each of the three countries and, for comparison, Canada and the United States (see table 2.1; annual gross flow components for the three developing countries are reported in table 2.2). Averages were calculated over all the available years and then for periods of net expansion and net decline of manufacturing employment. For Colombia the data cover 1977–91, which includes two periods of manufacturing sector expansion (1977–79 and 1985–91) and a long period of employment contraction (1979–85). Net employment growth averaged only 0.3 percent a year over the whole period but rose to 2.8 percent a year during the expansions and dropped to −2.2 percent a year during the contractions. Although the Colombian manufacturing sector clearly experienced cyclical fluctuations, there is no pattern of long-term secular growth or decline in employment positions.

Long-term changes in the size of the manufacturing sector are more evident in Chile, Morocco, and the United States. Employment in Chile’s manufacturing sector contracted by an average of 1.0 percent a year over 1979–86, a period encompassing both a massive recession and a subsequent expansion. Employment shrank 8.2 percent a year during the 1979–83 recession and grew 8.7 percent a year during the 1983–86 recovery. Morocco experienced positive employment growth in each sample year from 1984 to 1989. Employment growth ranged from 1.6 percent a year to 10.1 percent and averaged 6.5 percent over the period. The United States also experienced a secular decline in manufacturing employment over the 1973–86 period, averaging a loss of 1.2 percent a year. Again, cyclical fluctuations are important, with average annual employment growth rates of 3.2 percent during expansions and losses of 5.5 percent during contractions. In Canada the manufacturing sector grew at an average rate of 0.6 percent a year during 1973–86, including
Table 2.2 Gross Annual Employment Flows in Chile, Colombia, and Morocco (percentages)

<table>
<thead>
<tr>
<th>Country and year</th>
<th>( L(t) )</th>
<th>( B / L )</th>
<th>( \Delta E / L )</th>
<th>( \Delta C / L )</th>
<th>( D / L )</th>
<th>( \Delta L / L )</th>
<th>( T / L )</th>
<th>( V / L )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chile</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1979–80</td>
<td>310.1</td>
<td>0.022</td>
<td>0.083</td>
<td>-0.084</td>
<td>-0.087</td>
<td>-0.065</td>
<td>0.277</td>
<td>0.212</td>
</tr>
<tr>
<td>1980–81</td>
<td>289.9</td>
<td>0.032</td>
<td>0.064</td>
<td>-0.090</td>
<td>-0.078</td>
<td>-0.072</td>
<td>0.264</td>
<td>0.192</td>
</tr>
<tr>
<td>1981–82</td>
<td>269.1</td>
<td>0.021</td>
<td>0.033</td>
<td>-0.159</td>
<td>-0.066</td>
<td>-0.171</td>
<td>0.279</td>
<td>0.109</td>
</tr>
<tr>
<td>1982–83</td>
<td>233.3</td>
<td>0.043</td>
<td>0.076</td>
<td>-0.075</td>
<td>-0.065</td>
<td>-0.021</td>
<td>0.260</td>
<td>0.239</td>
</tr>
<tr>
<td>1983–84</td>
<td>218.5</td>
<td>0.078</td>
<td>0.120</td>
<td>-0.055</td>
<td>-0.041</td>
<td>0.102</td>
<td>0.294</td>
<td>0.192</td>
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<tr>
<td>1984–85</td>
<td>240.9</td>
<td>0.026</td>
<td>0.109</td>
<td>-0.050</td>
<td>-0.021</td>
<td>0.064</td>
<td>0.206</td>
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<tr>
<td>1985–86</td>
<td>256.3</td>
<td>0.047</td>
<td>0.149</td>
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<td>-0.054</td>
<td>0.095</td>
<td>0.297</td>
<td>0.201</td>
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</tr>
<tr>
<td>1977–78</td>
<td>458.2</td>
<td>0.083</td>
<td>0.079</td>
<td>-0.057</td>
<td>-0.079</td>
<td>0.027</td>
<td>0.298</td>
<td>0.271</td>
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<tr>
<td>1978–79</td>
<td>470.5</td>
<td>0.101</td>
<td>0.077</td>
<td>-0.053</td>
<td>-0.091</td>
<td>0.034</td>
<td>0.322</td>
<td>0.288</td>
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<td>1979–80</td>
<td>486.6</td>
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<td>0.059</td>
<td>-0.063</td>
<td>-0.073</td>
<td>-0.002</td>
<td>0.270</td>
<td>0.269</td>
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<tr>
<td>1980–81</td>
<td>485.8</td>
<td>0.069</td>
<td>0.052</td>
<td>-0.072</td>
<td>-0.078</td>
<td>-0.029</td>
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<td>1981–82</td>
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<td>0.057</td>
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<td>-0.026</td>
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<td>0.052</td>
<td>-0.081</td>
<td>-0.047</td>
<td>-0.023</td>
<td>0.232</td>
<td>0.209</td>
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<tr>
<td>1983–84</td>
<td>448.9</td>
<td>0.042</td>
<td>0.061</td>
<td>-0.069</td>
<td>-0.050</td>
<td>-0.017</td>
<td>0.222</td>
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<tr>
<td>1984–85</td>
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<td>0.051</td>
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<td>-0.036</td>
<td>0.239</td>
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<td>0.023</td>
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<td>0.077</td>
<td>0.247</td>
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<td>0.064</td>
<td>-0.070</td>
<td>-0.055</td>
<td>-0.020</td>
<td>0.231</td>
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</tr>
<tr>
<td>1988–89</td>
<td>459.6</td>
<td>0.047</td>
<td>0.065</td>
<td>-0.052</td>
<td>-0.040</td>
<td>0.020</td>
<td>0.204</td>
<td>0.185</td>
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<td>0.004</td>
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<td>1990–91</td>
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<td>0.045</td>
<td>0.073</td>
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<td>0.007</td>
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<td></td>
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<tr>
<td>1984–85</td>
<td>220.8</td>
<td>0.071</td>
<td>0.098</td>
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<td>-0.027</td>
<td>0.016</td>
<td>0.322</td>
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<td>0.078</td>
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<tr>
<td>1988–89</td>
<td>274.4</td>
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<td>0.101</td>
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</tbody>
</table>

*Source: Author's calculations.*

an average growth rate of 2.4 percent during expansions and a loss of 3.0 percent during contractions. Except for Morocco, each country experienced modest average changes in employment overall, varying from -1.2 to 0.6 percent a year, while also experiencing periods of more substantial growth and decline in employment.

Of primary interest to this study is the amount of micro-level turnover or reallocation in employment positions that lies behind these net changes in employment. Average rates of gross additions and losses of
positions for the three developing countries show, as do all empirical studies for industrial countries, that the gross flows of positions were many times larger than the net change in employment (table 2.1, columns 2 and 3). There were large flows of new jobs even during periods of overall manufacturing contraction and large flows of jobs lost during periods of substantial growth. The average annual rate of new job creation during Chile's massive recession of 1979–83 was 9.4 percent, although total manufacturing sector employment fell 8.2 percent a year. Morocco's overall manufacturing sector expansion of 6.5 percent a year was accompanied by an average annual job loss of 12.1 percent.

There are some differences in the rates of job creation and destruction between developing and industrial countries. For Canada and the United States, gross job additions and losses averaged approximately 10 percent a year. For Chile and Colombia, they averaged 12.2 to 13.9 percent a year; for Morocco, they were higher still. The main source of difference between the two groups of countries is the rate of gross job additions during expansionary periods, which averaged 11.1 and 11.4 percent a year for the United States and Canada, respectively, but varied from 13.7 to 18.6 percent a year for the three developing countries. Throughout this chapter, the sensitivity of the job creation process to cyclical fluctuations is one of the main sources of difference between the industrialized and semi-industrialized countries.

**Turnover and Volatility**

Combining gross additions and losses yields average turnover in employment positions, which is the proportion of initial-year employment positions added through plant openings or expansions plus those lost through plant closings or cutbacks (table 2.1, column 4). Employment turnover rates were large for all five countries, but the three developing countries had underlying rates of plant-level employment reallocation that were some 25 to 50 percent larger than those found in Canada and the United States. The same pattern holds for expansionary and contractionary periods as well. In addition, there is little difference in the average rate of employment turnover for each country between growing and contracting periods. Employment turnover rates were always smallest in the United States and Canada, averaging 19.6 percent in the United States and 20.5 percent in Canada during both expansions and contractions. For Colombia and Chile, average turnover rates were 24.7 and 26.6 percent, respectively, during periods of employment growth and 24.5 and 27.0 percent during periods of contraction. For Morocco, which had no contractionary periods, the turnover rate averaged 30.7 percent.

An important and much discussed finding for the United States concerns the cyclical pattern of total employment reallocation. Davis and
Haltiwanger (1992) show that employment reallocation in the U.S. manufacturing sector is countercyclical, with higher rates of job turnover occurring during recessions. The simple correlation between the net growth rate and the turnover rate is $-0.56$. This occurs because the time-series variation in job destruction rates is much larger than the time-series variation in job creation rates. Baldwin, Dunne, and Haltiwanger (1994) report that the ratio $\frac{\text{Var}(\Delta C + D)}{\text{Var}(B + \Delta E)}$ equals 2.17 in the United States. This implies that job loss is much more sensitive to the business cycle than is job creation, so that recessions are periods of increased job destruction, with a much smaller decrease in job addition rates, while expansions are periods of decreased job destruction, with a much smaller increase in job addition rates. Baldwin, Dunne, and Haltiwanger (1994) also find a negative correlation between net change and turnover for the Canadian manufacturing sector, but the magnitude is smaller at $-0.25$ and not significantly different than 0. The ratio of the variance of job destruction to job creation in Canada is 1.54. These findings are consistent with the view that recessions are times of cleansing of the production structure as employers close or scale back inefficient plants.\(^8\)

A countercyclical pattern of employment reallocation is not evident in the three developing countries. The simple correlation between net employment change and turnover is 0.21 in Colombia, $-0.03$ in Chile, and 0.01 in Morocco.\(^9\) Corresponding to this, the ratio of the variance of job destruction to job creation is 0.65 in Colombia, 1.04 in Chile, and 0.995 in Morocco. Two of the three countries show no evidence of cyclical employment reallocation, while the third, Colombia, has a procyclical pattern. The pattern for Colombia arises primarily from the large variation in plant births over time and from the positive correlation between births and expansions. This suggests that the major periods of employment reallocation were not recessions, as in Canada and the United States, but rather periods of high growth that were accompanied by substantial entry of new producers.

One reason for the differences in cyclical patterns of the industrial and developing countries may be the differences in the size and age distribution of producers between the countries.\(^{10}\) Davis and Haltiwanger (1992) and Davis, Haltiwanger, and Schuh (1994, section 4.3) provide some evidence for the United States on the sources of cyclical variation by plant type. They find that smaller, younger plants have higher rates of job turnover than larger, older plants and that they are also much less cyclically sensitive. The countercyclical reallocation pattern in the United States is driven by the adjustment, particularly the downsizing during recessions, of large, old manufacturing plants. The patterns observed in the three developing countries are much more similar to those found for small, young plants in the United States.
The final summary measure of employment flows presented in table 2.1 is the volatility rate. Because the net employment change in manufacturing is generally considerably smaller than the turnover rate, most of the micro-level employment reallocation observed in the three developing countries cannot be attributed simply to changes in the size of the manufacturing sector. As a result, the aggregate volatility rates parallel the turnover rates, and the rankings of the countries are the same (table 2.1, column 5). For Chile and Morocco, however, the large annual changes in employment did contribute to an increase in the magnitude of employment turnover. When measured by the volatility rate, employment reallocation in Morocco drops to the level for Colombia, approximately 24.0 percent, and that for Chile, at 18.4 percent, drops close to the level observed in the United States.

Overall, aggregate flows for the three countries reveal high turnover of positions, with average turnover rates that differ more across countries than between periods of growth and contraction within a country. The rate of turnover in employment positions is larger in Chile, Colombia, and Morocco than in Canada and the United States, a difference that persists even after controlling for the larger rates of net employment change in the developing countries. This suggests that country-specific factors such as the mix of industries and plant sizes, among other things, may have contributed to the differences in turnover. The three developing countries apparently do not have the countercyclical pattern of aggregate employment turnover that characterizes Canada and the United States but do have the cyclical patterns that characterize the subset of small, young producers in the industrial countries.

**Contribution of Plant Entry and Exit**

The turnover rates reported above represent a combination of size adjustments among ongoing establishments ($\Delta E_{it}$ and $\Delta C_{it}$) and the entry and exit of establishments ($B_{it}$ and $D_{it}$). The heavier concentration of industrial-country manufacturing employment in large, capital-intensive plants and in durable goods industries is likely to result in differences across industrial and developing countries in the importance of the sunk costs of entry and exit relative to the adjustment costs incurred in changing plant output. This, in turn, should result in differences in the relative importance of plant entry and exit versus changes in the scale of continuing establishments as a source of employment turnover. If adjustment costs are small and sunk costs of entry are large, as is likely when the technology used is very capital intensive, most variation in demand should be met by changes in the size of continuing plants. Large or permanent increases in demand would be required to boost profits sufficiently to cover the sunk costs of entry and thus to induce entry.
Table 2.3  Employment Reallocation Arising from Plant Entry and Exit and Expansion and Contraction (percentages)

<table>
<thead>
<tr>
<th>Country and period</th>
<th>Net change</th>
<th></th>
<th></th>
<th>Turnover</th>
<th></th>
<th></th>
<th>Volatility</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Entry and exit</td>
<td>Expansion and contraction</td>
<td>Entry and exit</td>
<td>Expansion and contraction</td>
<td>Entry and exit</td>
<td>Expansion and contraction</td>
<td></td>
</tr>
<tr>
<td>Average over entire period</td>
<td></td>
<td>-2.0</td>
<td>1.1</td>
<td>9.8</td>
<td>17.1</td>
<td>6.5</td>
<td>11.6</td>
<td></td>
</tr>
<tr>
<td>Chile, 1979–86</td>
<td></td>
<td>0.2</td>
<td>0.1</td>
<td>11.6</td>
<td>13.0</td>
<td>10.7</td>
<td>10.9</td>
<td></td>
</tr>
<tr>
<td>Colombia, 1977–91</td>
<td></td>
<td>4.3</td>
<td>2.2</td>
<td>8.9</td>
<td>21.8</td>
<td>4.6</td>
<td>18.5</td>
<td></td>
</tr>
<tr>
<td>Morocco, 1984–89</td>
<td></td>
<td>-1.1</td>
<td>-0.1</td>
<td>3.7</td>
<td>15.9</td>
<td>2.7</td>
<td>11.8</td>
<td></td>
</tr>
<tr>
<td>United States, 1973–86</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average during years of</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>employment expansion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chile</td>
<td></td>
<td>1.1</td>
<td>7.6</td>
<td>8.9</td>
<td>17.6</td>
<td>7.3</td>
<td>10.1</td>
<td></td>
</tr>
<tr>
<td>Colombia</td>
<td></td>
<td>0.6</td>
<td>2.2</td>
<td>11.9</td>
<td>12.8</td>
<td>10.8</td>
<td>10.6</td>
<td></td>
</tr>
<tr>
<td>Morocco</td>
<td></td>
<td>4.3</td>
<td>2.2</td>
<td>8.9</td>
<td>21.8</td>
<td>4.6</td>
<td>18.5</td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td>-0.8</td>
<td>4.0</td>
<td>3.5</td>
<td>15.5</td>
<td>2.7</td>
<td>11.6</td>
<td></td>
</tr>
<tr>
<td>Average during years of</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>employment contraction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chile</td>
<td></td>
<td>-4.4</td>
<td>-3.8</td>
<td>10.4</td>
<td>16.6</td>
<td>6.0</td>
<td>12.8</td>
<td></td>
</tr>
<tr>
<td>Colombia</td>
<td></td>
<td>-0.2</td>
<td>-2.0</td>
<td>11.3</td>
<td>13.2</td>
<td>10.6</td>
<td>11.3</td>
<td></td>
</tr>
<tr>
<td>Morocco</td>
<td></td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td>-1.4</td>
<td>-4.1</td>
<td>4.0</td>
<td>16.3</td>
<td>2.6</td>
<td>12.1</td>
<td></td>
</tr>
</tbody>
</table>

n.a. Not applicable (no periods of contraction).

Source: For the United States, constructed from Baldwin, Dunne, and Haltiwanger 1994, table 1; for Chile, Colombia, and Morocco, author’s calculations.
Conversely, if marginal adjustment costs increase rapidly with changes in plant size, then entry and exit should play a larger role as a source of changes in supply.

To assess the importance of plant entry and exit relative to the size adjustments of ongoing establishments, measures of net change, turnover, and volatility are constructed using employment flows from entering and exiting plants ($B_t$ and $D_t$) and are then compared with comparable figures for continuing plants ($\Delta E_t$ and $\Delta C_t$).

In Colombia, which experienced virtually no net employment growth over the whole period, the net change in employment positions was approximately 0.0 on average both for plant entry and exit and for adjustment in continuing plants (see table 2.3). In Chile and the United States, however, the net decline in manufacturing positions was accompanied by the loss of a substantial number of positions through plant exit. On average, the entry and exit of plants were responsible for a 2.0 percent decline in positions in Chile and a 1.1 percent decline in the United States per year. Similarly, the net growth in manufacturing employment in Morocco was accompanied by the creation of a substantial number of positions through plant entry. The net entry of new plants was responsible for a 4.3 percent average annual increase in positions. Somewhat surprisingly, over the entire period for all four countries, entry and exit apparently contributed more to the net change in positions than did the expansion and contraction of continuing plants. However, by disaggregating the years into those with positive and negative net growth, it can be seen that this result is driven by the periods of enormous economic change—the continuing economic expansion in Morocco throughout the sample period, accompanied by substantial new entry, and the large recession in Chile in the early part of the sample period, when plant exit was enormous.\textsuperscript{12} For the other countries (Colombia and the United States) or time periods (Chilean expansion), continuing plants contributed a larger proportion of the net change in positions. The conclusion to be drawn from these simple time period averages is that plant entry and exit increase in importance as a source of the net change in positions during periods with large changes in demand.

In all four countries, expansions and contractions in continuing plants were the major source of turnover in the number of positions (table 2.3, columns 3 and 4), although in Colombia plant entry/exit and the expansion/contraction of existing plants were much closer than in the other countries.\textsuperscript{13} The average turnover rates reveal a systematic difference in the importance of entry and exit in the developing countries relative to the United States: in both the expansionary and contractionary periods, plant entry and exit were responsible for a larger proportion of total turnover in the three developing countries. The ratio of entry/exit
turnover to expansion/contraction turnover over all time periods (table 2.3, column 3 divided by column 4) was 0.41 for Morocco, 0.57 in Chile, and 0.89 in Colombia, compared with 0.23 for the United States.

The volatility rates indicate a substantial amount of reallocation in employment positions within each of the two groups of plants. Two of the volatility measures stand out. One is the high volatility rate generated by entering and exiting plants in Colombia. For reasons explained in detail in chapter 10, the tracking of individual plants over time is most problematic in the Colombian data set, and the high volatility rate suggests the presence of errors in the time-series linkages. If plants are not accurately followed over time in the panel data, breaks in a plant's data are counted as the exit of an existing plant and the entry of a new plant. In addition, if the plant's employment is stable across the two years, little net change in positions is generated by this incorrectly identified exit/entry pattern. This measurement error then results in an upward bias in all the turnover measures, with the largest effect likely to be on the volatility rate of entering and exiting plants. The second unusual observation is the volatility rate of 18.5 percent for continuing plants in Morocco. The other three countries had rates between 10.9 and 11.8 percent overall and between 10.1 and 12.8 for expansionary and contractionary periods. The likely cause of the high rate for Morocco was the simultaneous expansion of one subset of manufacturing industries and contraction of another.

Based on the disaggregation in table 2.3, the entry and exit of manufacturing plants clearly played a larger role as a source of employment fluctuations in the three developing countries than in the United States. They accounted for a larger proportion of total employment turnover in both expansionary and contractionary periods. They were also responsible for the majority of net employment growth during periods of substantial structural change in Chile and Morocco.

**Sectoral Gross Flows of Employment Positions**

The aggregate flows described in the preceding section can also arise from expansion in some industries and simultaneous contraction in others, from employment shifts across geographic areas, and from changes within a sector or geographic region. Using U.S. manufacturing data, Dunne, Roberts, and Samuelson (1989) find that shifts in the sectoral or geographic mix of plants contribute little to the overall flows of employment positions, while plant-level changes within the same sector and geographic region account for 74 percent of the gross flows of positions. To examine the relative importance of within- and across-industry job flows in Chile, Colombia, and Morocco, aggregate turnover (7) was decom-
posed following the method used by Dunne, Roberts, and Samuelson (1989):

\[ T_i = |\Delta L_t| + [\Sigma_j (|\Delta L_{jt}| - |\Delta L_{it}|)] + \Sigma_j [T_{jt} - |\Delta L_{jt}|]. \]

\( L \) is the level of employment, \( j \) is the industry subscript, and \( t \) is the time period. The first term at the right side of the equation is the net change in manufacturing sector employment. The second term is the employment turnover arising from shifts across industries minus the employment turnover resulting from the net change in manufacturing employment and is referred to as across-industry turnover. The final term is the sum of the industry-level volatility or the excess of turn-over above the net change in sectoral employment and is referred to as within-industry reallocation. Because of substantial differences in the net growth of manufacturing sector employment among the three developing countries, decomposition of the volatility rate is likely to be more informative about the importance of within- and across-industry reallocations than is decomposition of aggregate turnover. The aggregate volatility rate can be decomposed into across-industry and within-industry components by subtracting the absolute value of aggregate net employment change from both sides of equation 2.6:

\[ V_i = [\Sigma_j (|\Delta L_{jt}| - |\Delta L_{it}|)] + \Sigma_j [T_{jt} - |\Delta L_{jt}|]. \]

For all three countries, the largest contribution to the average aggregate turnover rate came from plant-level shifts within the same industry—from 59.4 percent to 78.0 percent—rather than from the net change in the size of the manufacturing sector or shifts of positions across sectors (see table 2.4). Decomposition of the volatility rate shows an even more striking similarity across countries. Once the net change in the level

<table>
<thead>
<tr>
<th>Country and period</th>
<th>Turnover</th>
<th>Volatility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Net change</td>
<td>Across industry</td>
</tr>
<tr>
<td>Chile, 1979–86</td>
<td>31.1</td>
<td>9.5</td>
</tr>
<tr>
<td>Colombia, 1977–91</td>
<td>09.9</td>
<td>12.1</td>
</tr>
<tr>
<td>Morocco, 1984–89</td>
<td>21.3</td>
<td>13.5</td>
</tr>
</tbody>
</table>

Note: Data are for sixty-nine four-digit industries in Chile, seventy-three in Colombia, and sixty-one in Morocco.

Source: Author's calculations.
of manufacturing employment is accounted for, some 83.1 to 87.8 percent of total turnover in employment positions arose within the same industry.

Thus, as in industrial countries, the vast majority of job flows in these three developing countries was the result of the entry, expansion, contraction, and closing of plants within the same industry. But what accounts for the fact that while some producers in an industry were entering or expanding employment, others in the same industry were contracting or shutting down? Simple explanations based on the response of homogeneous producers to common shocks to sectoral demand are clearly not consistent with this pattern of simultaneous expansion and contraction in the same industry. In recent years, several theoretical models of industry-level dynamics have been developed that rely on underlying producer heterogeneity in demand or cost structures combined with a market selection process that sorts inefficient from efficient producers. Of particular interest for developing countries is whether the selection process successfully isolates and rewards the efficient, more productive plants. Liu and Tybout (chapter 4) report evidence on differences in productivity among continuing and exiting plants that are consistent with differences in efficiency that affect turnover.

**Differences in Turnover Patterns across Sectors**

The last section demonstrated that most of the turnover in manufacturing employment positions occurs within industries, as one group of producers is replaced by another. The level of turnover in an industry will be determined by the interaction of market-level demand and cost shocks, plant-specific demand or productivity shocks, and underlying technological conditions, such as the capital intensity of the production process, the magnitude of sunk entry or exit costs, and the ease with which output levels of continuing producers can be adjusted. Each of these forces will contribute to both cross-industry and time-series variation in turnover rates. If technological conditions vary across industries but change only slowly over time for a given industry, they will generate permanent, systematic cross-sectional differences in turnover. Industries with low sunk entry costs, for example, should have higher turnover rates than industries with high sunk costs (Hopenhayn 1992).

In this section, we examine the turnover patterns by industry and year in the three developing countries for common industry-level factors. Several robust patterns have been noted in firm entry, growth, and exit data for industrial countries. One of the most common findings is that entry and exit are positively correlated at the industry level—industries with higher-than-average entry rates also have higher-than-average exit rates, and thus turnover rates tend to vary systematically across industries.
To examine this issue, average gross flow rates were computed for each industry in each country over time, and rank correlations were calculated for average industry-level values (see table 2.5). The rank correlation between employment growth due to plant births and employment loss due to plant deaths is high (from 0.565 for Morocco to 0.802 for Colombia), indicating that industries with high rates of employment creation from plant entry also have high rates of employment loss from plant exit.

This finding suggests that technological factors such as the magnitude of sunk entry costs are more important than changes in demand for understanding the average rates of industry-level entry and exit. If shifts in demand were the driving force behind the changes in industrial employment, we would expect to see high average rates of entry and low average rates of exit during periods of industry growth and the reverse pattern during periods of industry contraction. This would not produce the strong positive correlation observed in the data. In contrast, the positive correlation between birth and exit rates observed in the data could be produced by a combination of some industries with low entry costs, small-scale, non-capital intensive technologies—making both entry and exit relatively easy—and some industries with larger-scale, capital-intensive production methods and high entry costs—making entry and exit harder.

This technology-based explanation can be taken one step further. If the cost of adjusting production and employment levels varies systematically across industries, high rates of employment expansion and contraction would be expected in industries with low adjustment costs and low rates in industries with high adjustment costs. Positive rank correlations from 0.206 in Chile to 0.507 in Morocco among average rates of industry expansion (ΔE) and contraction (ΔC) in all three countries support that supposition (see table 2.5, column 2). Again, differences in production technologies across industries appear to be a major contributor to these patterns. In addition, reflecting the patterns of entry and exit and expansion and contraction already discussed, rank correlations between rates of gross job creation and gross job loss are strongly posi-

<table>
<thead>
<tr>
<th>Country</th>
<th>Entry and exit</th>
<th>Expansion and contractions</th>
<th>Gross job additions and gross job losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chile</td>
<td>0.644</td>
<td>0.206</td>
<td>0.546</td>
</tr>
<tr>
<td>Colombia</td>
<td>0.802</td>
<td>0.449</td>
<td>0.711</td>
</tr>
<tr>
<td>Morocco</td>
<td>0.565</td>
<td>0.507</td>
<td>0.535</td>
</tr>
</tbody>
</table>

Source: Author’s calculations.
tive in all three countries (table 2.5, column 3). In each country, industries with the highest average rates of job creation have the highest average rates of job loss.\(^{19}\)

If these average industry-level patterns are driven by technological differences, and if the technology for each industry is similar across countries, the ranking of industries with high and low turnover should be consistent in the three countries. More precisely, average industry-level rates of net employment change, turnover, and volatility should systematically reflect different combinations of changes in demand and differences in technology. If rates of sectoral demand growth are not highly correlated across countries, while technologies are, there should be different patterns of correlation in the three variables across countries.

The average rate of net employment growth in an industry is likely to reflect long-term changes in demand for the industry’s output and should show the lowest correlation across countries. Turnover rates also reflect long-term changes in demand but, as discussed above, are also likely to reflect differences in entry costs and the capital intensity of the production process and thus should be more highly correlated across countries than rates of net employment growth. Finally, an industry’s volatility rate nets out the employment turnover needed to account for the net employment change in the industry and thus is the most likely to reflect differences in technology.

The rank correlations for these three variables show this expected pattern: for each pair of countries, the rate of net employment change has the lowest correlation, the volatility rate has the highest, and the turnover rate falls in between (see table 2.6). Although this pattern of correlations is consistent with the fact that entry and adjustment costs differ with an industry’s technologies, the magnitude of the correlations is not as high as the correlations within each country (reported in table 2.5). This difference is not surprising, since a large number of country-specific factors can affect an industry’s pattern of base turnover, including credit market constraints and trade or industrial policies that affect specific sectors. The correlations for each of the variables are also highest between Chile and Colombia, which have the most similar industrial sectors among the three countries.\(^{20}\)

**Time-Series Patterns of Turnover within Sectors**

The previous section identified several empirical regularities in the patterns of average gross flows and turnover across industries and countries. This section examines variations in employment reallocation within individual sectors over time. These would be expected to show a more prominent role for fluctuations in demand of the type, for example, that might arise from variations in trade policy. The interesting question is
Table 2.6 Rank Correlations of Average Industry Variables across Countries

<table>
<thead>
<tr>
<th>Variable</th>
<th>Chile and Colombia</th>
<th>Colombia and Morocco</th>
<th>Chile and Morocco</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of net employment change</td>
<td>0.310</td>
<td>-0.115</td>
<td>0.080</td>
</tr>
<tr>
<td>Rate of employment turnover</td>
<td>0.444</td>
<td>0.197</td>
<td>0.134</td>
</tr>
<tr>
<td>Rate of employment volatility</td>
<td>0.549</td>
<td>0.429</td>
<td>0.403</td>
</tr>
</tbody>
</table>

Note: Data are for 1979–86 in Chile, 1977–91 in Colombia, and 1984–89 in Morocco. Source: Author’s calculations.

the effect of cyclical fluctuations in industry-level demand on the magnitude and source of employment reallocations.

To isolate the time-series variation and remove the effect of differences in technology, each variable was expressed as a deviation from its industry-country mean over time. This normalization removes all industry- and country-specific effects that are fixed over time and thus controls for much of the likely variation in technology across sectors. Then the standard deviation—summarizing the time-series variation in the industry-level measures—was computed for gross job additions and losses and for four components of gross flows.

The main finding is that the variance of gross job additions exceeded the variance of gross job losses in all three countries (see table 2.7). The ratio \( \frac{\text{Var}(\Delta C + D)}{\text{Var}(B + \Delta E)} \) equals 0.642, 0.411, and 0.232 for Chile, Colombia, and Morocco, respectively. This implies that, at the industry level, net employment expansion was positively correlated with turnover, so that total industry-level employment turnover was procyclical. This finding is contrary to that for industrial countries and is a much stronger pattern than found in the aggregate data discussed above. It suggests that as industry-level employment fluctuated over time, the amount of new job creation was the main source of variation, whereas job losses due to plant contraction and exit were relatively stable.

Table 2.7 Variance of Within-Industry Employment Flows in Chile, Colombia, and Morocco

<table>
<thead>
<tr>
<th>Rate</th>
<th>Chile</th>
<th>Colombia</th>
<th>Morocco</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross job additions</td>
<td>0.0173</td>
<td>0.0112</td>
<td>0.0246</td>
</tr>
<tr>
<td>Gross job losses</td>
<td>0.0111</td>
<td>0.0046</td>
<td>0.0057</td>
</tr>
<tr>
<td>Birth rate</td>
<td>0.0069</td>
<td>0.0090</td>
<td>0.0144</td>
</tr>
<tr>
<td>Death rate</td>
<td>0.0066</td>
<td>0.0036</td>
<td>0.0016</td>
</tr>
<tr>
<td>Expansion rate</td>
<td>0.0088</td>
<td>0.0020</td>
<td>0.0096</td>
</tr>
<tr>
<td>Contraction rate</td>
<td>0.0042</td>
<td>0.0015</td>
<td>0.0037</td>
</tr>
</tbody>
</table>

Source: Author’s calculations.
Disaggregating gross job creation and job loss into their entry, exit, expansion, and contraction components shows clearly that both plant turnover and change in the size of continuing plants contributed to the procyclical turnover in job positions (Table 2.7). The variance of job creation due to plant entry exceeds that of job loss due to plant exit, and the variance of the rate of job expansion exceeds that due to contraction for all the countries. Only in the case of Chile, which experienced a major recession and partial recovery, does the time-series variation for job losses due to plant exit approach that for job creation due to plant entry. These numbers suggest that in all three countries, the job losses due to plant contraction and failure were relatively stable compared with the job gains due to plant expansion and entry, and they reinforce the conclusion from the aggregate data that job creation played a major role in restructuring employment.

Conclusions

In many ways, the patterns of employment gains and losses resulting from the entry, growth, and exit of manufacturing plants are remarkably similar for Chile, Colombia, and Morocco, although these three developing countries experienced very different patterns of growth in the manufacturing sector. First, as has been found in all studies for industrial countries, the net change in manufacturing employment between any two time periods masks substantial offsetting flows of new jobs created through plant entry and expansion and old jobs lost through plant contraction and closing. The annual rate of turnover in employment positions averaged between 24.6 and 30.7 percent of the total number of positions in the three countries, which is substantially higher than turnover figures for Canada and the United States. Second, there is no evidence at the aggregate level, as there is for Canada and the United States, of countercyclical employment turnover in the three developing countries. Chile and Morocco had no cyclical pattern, and Colombia had procyclical turnover, arising primarily from high variability in the rate of job creation. Third, employment flows arising from the entry and exit of plants were more important as a source of employment turnover in the developing countries than in the United States. This is true in both expansionary and contractionary periods.

The findings are also very similar for the three countries at the sectoral level. By far the largest share of the turnover in employment positions occurred within industries as plants entered, grew, contracted, and exited rather than across industries as demand, cost, and production patterns changed. Once the net change in the size of the manufacturing sector is controlled for, between 83.1 and 87.8 percent of annual employment
turnover, on average, resulted from the turnover of positions within the same industry. This process of simultaneous entry and exit and expansion and contraction of plants is inconsistent with the view of homogeneous producers adjusting production in response to common demand shocks. Rather, it emphasizes the importance of producer heterogeneity, on either the demand or the cost side, in the adjustment process.

Several similarities in the magnitude of sectoral employment turnover across countries suggest that common technological factors, such as the importance of sunk entry costs, the capital intensity of the technology, or the extent of adjustment costs, played a large role in explaining differences in employment turnover at the industry level. This pattern closely mirrors findings for industrial countries. In contrast to the findings for Canada and the United States, however, there are strong patterns of procyclical turnover at the industry level. Industries with high rates of total job growth had higher rates of job turnover because of the increased magnitude of job creation by both new and existing plants. The overall picture is one of a relatively stable process of job loss with a more cyclically sensitive process of job creation.

The findings that producer turnover was a common phenomenon in these three developing countries and that it arose primarily from the simultaneous entry, growth, and exit of producers within the same industry are consistent with underlying heterogeneity in the costs or demands faced by individual producers. Once this within-industry heterogeneity is recognized, it is clear that policies that attempt to reduce turnover, by preventing exit for example, are likely to slow the process by which inefficient producers are replaced by more efficient ones. Particularly relevant here are policies that raise the fixed costs of entry or exit for producers. Theoretical results by Dixit (1989) illustrate that the presence of fixed entry or exit costs, particularly when combined with uncertainty about future market conditions, has a significant depressing effect on entry and exit and requires much larger shifts in market conditions to generate structural adjustment. In simulation exercises that emphasize the importance of producer heterogeneity and fixed exit costs, Hopenhayn and Rogerson (1993) illustrate that an increase in mandated severance payments to laid off workers actually reduces employment and labor productivity by distorting the turnover process.

Caballero and Hammour (1994b) provide a basis for examining the efficiency of the job reallocation process. In a model with fixed creation (or entry) costs, continual technological improvement embodied in new jobs, and cyclical demand fluctuations, they show that an efficient economy concentrates both job fluctuations and destruction, and hence turnover, in recessions, because the opportunity cost of reallocation is lowest in periods of low demand. In contrast, labor market imperfections, which they model as resulting from bargaining between the worker and the
firm, reduce the incentives to scrap outdated production units, resulting in too little turnover and an inefficient "decoupling" of the processes of job creation and destruction. The empirical implication of their model is that the efficient reallocation process results in a positive time-series correlation between gross job creation and destruction. The correlation for both Canada and the United States is negative, primarily resulting from high rates of job loss but low rates of job creation in recessions (Baldwin, Dunne, and Haltiwanger 1994, table 1). Caballero and Hammour (1994a) interpret this as reflecting cleansing of the production structure in recessions rather than increased reallocation activity.\(^\text{23}\)

At the sectoral level, the correlation between gross job creation and destruction is also negative for two of the three developing countries, -0.361 for Chile and -0.148 for Morocco, but 0.044 for Colombia. The first two cases suggest a nonsynchronized process of creation and destruction, while the positive correlation for Colombia is consistent with a process that is more likely to reemploy labor resources quickly following job destruction.\(^\text{24}\)

A common belief about developing countries is that their small, highly concentrated domestic markets, frequent use of restrictive commercial policy, and poorly developed credit markets are likely to constrain the dynamic reallocation of resources from old to new products or production techniques or from inefficient to efficient producers. The empirical results presented here do not support a view of a stagnant manufacturing sector in any of the three countries but rather indicate substantial micro-level reallocation of employment among producers with levels of turnover that exceed those found in Canada and the United States.

What remains to be examined in future research is how this turnover translates into benefits, such as the productivity gain from replacing inefficient with efficient producers, or generates costs, such as longer spells of unemployment or geographic relocation. Initial evidence on the productivity gains, presented in chapter 4, suggests that output reallocations among incumbents in Colombia have had little long-run effect on sectoral productivity. Productivity differences among entering, incumbent, and exiting plants do exist, however, so that significant benefits may accrue only after new producers have had sufficient time to grow and become a substantial source of sectoral output. This suggests that, although the costs of producer turnover may be felt in the short run, the benefits may only become evident over longer time horizons.

Notes

1. A related body of literature in industrial organization has focused on the patterns of net entry and gross entry and exit (Dunne, Roberts, and Samuelson 1988; Baldwin and Gorecki 1991; Geroski and Schwalbach 1991).
2. In contrast, however, market share reallocations among incumbent producers in Colombia appear to contribute little to changes in sectoral productivity. Baily, Hulten, and Campbell (1992) report that market share reallocations are an important source of productivity improvement in the U.S. manufacturing sector.

3. Since the micro data sets generally cover all manufacturing plants with ten or more employees in a given year, plant births and deaths will be generated by plants crossing the ten-employee threshold as well as by plants entering or exiting. The data for Colombia include several years in which all plants were surveyed, and we find that, because plants with fewer than ten employees account for so little employment, their exclusion has no effect on the gross flow rates for those years.

4. This measure is used by Dunne and Roberts (1991) in their study of entry and exit in U.S. manufacturing industries. It is equivalent to “excess employment reallocation” in Davis and Haltiwanger (1990, 1992).


6. For Chile and Morocco, some of this difference may arise because of the large net growth rates during expansionary periods, but for Colombia, the average growth rate during expansions is similar to that in the United States.

7. The \( \text{Cov}(\Delta L, T) = \text{Var}(B + A E) - \text{Var}(A C + D) \), so that if job additions due to births and expansions have a larger time-series variance than job losses, the correlation will be positive; if the variance is smaller, the correlation will be negative.

8. Caballero and Hammour (1994a) explain these findings using a model of producers with heterogeneous technologies, increasing marginal entry costs, and cyclical demand movements. The need to smooth entry results in job loss as the important margin on which demand fluctuations, particularly sharp declines in demand, are accommodated. Thus recessions result in a cleansing of outdated production units.

9. These correlations are based on very few time-series observations: fourteen in Colombia, seven in Chile, and five in Morocco, so the conclusions must be carefully qualified. It is most accurate to say that there is no evidence of the countercyclical effect in these data. The next section examines the time-series patterns at the industry level, where a wider range of demand fluctuations are present.

10. The country studies for Chile and Colombia (chapters 9 and 10) summarize the size distribution of manufacturing plants with 10 or more employees. In Chile, approximately 85 percent of these plants have fewer than 50 employees, and only 4 percent have more than 200 employees. The corresponding numbers for Colombia are approximately 70 percent and 7.5 percent. In contrast, the size distribution of manufacturing plants in the United States is characterized by much larger plants. Of the approximately 162,000 U.S. plants with 10 or more workers in 1977, 62 percent had fewer than 50 employees and 9 percent had more than 250 employees. Also although extremely large plants, those with more than 1,000 employees, are rare in Chile and Colombia, in the United States they account for approximately 3.5 percent of plants with more than 10 employees. This gives large manufacturing plants a much more significant role as a source of employment flows in the United States than in Chile or Colombia.

11. Hause and DuRietz (1984) examine this tradeoff using Swedish manufacturing data and find that the share of employment attributable to entering plants is an increasing quadratic function of the industry’s growth rate. Thus entrants
are responsible for a larger share of employment in industries with high growth rates.

12. Tybout (chapter 9) summarizes the magnitude of plant exit during the Chilean recession.

13. It is important to recognize that continuing plants are responsible for most employment positions in any year. If the gross flow of positions from plant deaths between years $t$ and $t+1$ is 6 percent, then 94 percent of the positions in year $t$ are in plants that will survive until $t+1$. Thus the finding that continuing plant turnover was higher than entry and exit turnover is not surprising.

14. Volatility resulting from entering and exiting plants is defined as $V_t = (B_{t+1} + D_t) - [B_{t+1} - D_t]$. Note that only the absolute value of net employment change from entering and exiting plants is subtracted. Employment volatility resulting from continuing plants is defined analogously using $AE$ and $AC$ in place of $B$ and $D$, respectively.

15. The magnitude of the problem is difficult to determine. In chapter 10, I find that plant exit rates decline systematically with increases in plant age and size, as many other empirical studies have found. If the matching errors, which are unlikely to be related to plant size or age, were pervasive, then these size and age patterns would be obscured.

16. As with the overall volatility rates reported in table 2.1, the differences across expansionary and contractionary regimes appear small when compared with the differences across countries or plant types. For this reason, I do not discuss the time-series variation in detail.

17. Although regional reallocation is often discussed as a reason for job flows in the United States, it is unlikely to be of much consequence in the three developing countries over time. In all three countries, manufacturing production is highly concentrated in a small number of major cities, and the geographic distribution of employment changes little over time. Even in the United States, Dunne, Roberts, and Samuelson (1989) find that regional shifts account for very little of the total job flows.

18. Theoretical models have adopted a number of sources of producer heterogeneity including innate abilities (Jovanovic 1982), productivity of new investment (Pakes and Ericson 1990), idiosyncratic productivity shocks (Hopenhayn 1992), knowledge of demand (Jovanovic and Rob 1987), and vintage of capital stock (Lambson 1991).

19. Baldwin, Dunne, and Haltiwanger (1994) also report high rank correlations between an industry’s gross job additions and gross job losses. For the United States, the correlation is 0.672, and for Canada, it is 0.831.

20. In a similar exercise, Baldwin, Dunne, and Haltiwanger (1994) compare patterns of industry-level turnover at the two-digit standard industrial code level for the United States and Canada and find that the high- and low-turnover industries are very similar in the two countries. They report that the rank correlation between the U.S. and Canadian industry-level turnover rates is 0.815, suggesting that differences in technology are important in explaining differences in turnover across industries and that the United States and Canada have very similar industrial structures. They also find that, unlike the pattern for the three developing countries, industry-level net employment growth is also highly correlated across the two countries with a rank correlation of 0.778. This suggests, not surprisingly, that sectoral demand shocks are much more highly correlated in Canada and the United States than in Chile, Colombia, and Morocco.
21. The total number of industry-year observations is 876 for Colombia, 483 for Chile, and 312 for Morocco.

22. The correlation between net change and turnover at the industry level is 0.235, 0.416, and 0.629 in Chile, Colombia, and Morocco, respectively.

23. Caballero and Hammour (1994b) also discuss the policy options available to a country with inefficiently low turnover resulting from labor market imperfections. They show that production subsidies alone do not restore the incentive to scrap outdated technologies but that, when combined with creation subsidies, such as tax credits for investment, they can restore efficiency to the reallocation process.

24. Unfortunately, it is also consistent with measurement error in the matching of plants over time.

References


