

APPENDIX A

DATA DEFINITIONS AND SOURCES FOR CHAPTER 7

Corporate Sales:

Gross operating receipts of corporations reduced by the cost of returned goods and allowances. Source: U.S. Department of the Treasury, Internal Revenue Service, *Statistics of Income, Corporations Income Tax Returns*.

Employment:

Number of workers on non-agricultural payrolls (annual average). Source: *Citibase* (1986), series LPANG, p. IX-2-1. Originally published as a monthly series by the U.S. Department of Labor, Bureau of Labor Statistics, *The Employment Situation -- Establishment Survey Employment and Earnings*.

Idle Capacity:

Unused capacity as a percentage of manufacturing capacity. [Computed as $100 - \text{Rate of Capacity Utilization (Manufacturing)}$.]

Idle-Capacity Index:

A modified index for manufacturing idle capacity between 1948 and 1985. (Computed as $\text{Idle Capacity} / 3.3$.)

Implicit GDP Deflator:

The ratio of Gross Domestic Product in current dollars (Nominal GDP) to Gross Domestic Product in constant dollars (Real GDP). 1982=1.00.

Nominal GDP:

Gross Domestic Product in current dollars. Source: *Citibase* (1986), series GAND, p. X-6-1.

Producer Price Index:

Producer Price Index for all commodities. 1967=100. Source: *Citibase* (1986), series PW, p. V-1-3. Originally published as a monthly series by the U.S. Department of Labor, Bureau of Labor Statistics, *Producer Price Indexes (News Release)*.

Private Employment:

Number of private-sector workers on non-agricultural payrolls (annual average). Source: *Citibase* (1986), series LP, p. IX-2-1. Originally published as a monthly series by the U.S. Department of Labor, Bureau of Labor Statistics, *The Employment Situation -- Establishment Survey Employment and Earnings*.

Rate of Capacity Utilization (Manufacturing):

Output as percentage of capacity (annual average). Source: *Citibase* (1986), series IPXMCA, p. VII-1-2. Originally published as a monthly series by the Board of Governors of the Federal Reserve System, *Capacity Utilization: Manufacturing, Mining, Utilities and Industrial Materials -- Statistical Release G.3 (402)*.

Rate of Unemployment:

Unemployment as a percentage of civilian labour force (annual average). Source: *Citibase* (1986), series LHUR, p. IX-1-6. Originally published as a monthly series by the U.S. Department of Labor, Bureau of Labor Statistics, *The Employment Situation -- Household Survey*.

Real GDP:

Gross Domestic Product in constant dollars, 1982=1.00. Source: *Citibase* (1986), series GAND82, p. X-6-1.

Real Private GDP:

Gross Domestic Product of private industries in constant dollars, 1982=1.00. Source: *Citibase* (1986), series GA8GWP, p. X-6-1.

Unemployment:

Number of unemployed persons, non-institutional population, 16 years and over (annual average). Source: *Citibase* (1986), series LHUEM, p. IX-1-2. Originally published as a monthly series by the U.S. Department of Labor, Bureau of Labor Statistics, *The Employment Situation -- Household Survey*.

APPENDIX B

IMPUTATION OF FOREIGN EMPLOYMENT OF M&M CORPORATIONS

Annual data on the foreign employment of U.S.-based multinational corporations are available from 'U.S. Multinational Companies' published by the U.S. Bureau of Economic Analysis (BEA) in the *Survey of Current Business*. Such estimates could have been used to compute the foreign component of M&M employment but, unfortunately, they have become available only since 1982. The BEA data are nevertheless useful as a basis for an indirect estimation which we now turn to describe.

The estimates in this appendix use data pertaining to two groups of corporations: the Fortune 500 and U.S.-based multinational firms for which the largest single line of activity is in either manufacturing or petroleum. This latter group roughly constitutes the multinational subset of our M&M sector and we label it here as MNC (for multinational corporations). Table B-1 lists the different variables used in our estimations. Data sources for these variables are given at the end of this appendix.

Table B-1 Variable definitions and names

	<u>M&M Multinational Corporations (MNC)</u>		
	Fortune 500	Worldwide	Foreign Affiliates
Assets	<i>FA</i>	<i>MNCA</i>	<i>MNCA</i> _{foreign}
Employment	<i>FE</i>	<i>MNCE</i>	<i>MNCE</i> _{foreign}
Assets per Employee (Assets/Employment)	<i>FAE</i>	<i>MNCAE</i>	<i>MNCAE</i> _{foreign}

In order to impute the foreign component of M&M employment ($MNCE_{\text{foreign}}$), consider the value of assets per employee for the group of M&M multinational corporations. Given the diverse activities of this group, both in the United States and abroad, it seems reasonable to suppose that there

exist a fairly stable linear relationship between the value of its assets per employee in foreign operations ($MNCAE_{\text{foreign}}$) and the corresponding ratio for its worldwide operations ($MNCAE$), such that

$$(1) \quad MNCAE_{\text{foreign}} = \alpha MNCAE ,$$

where α is a relatively stable time variable. During the period between 1982 and 1988 for which data are available, the average value for α was 0.73, fluctuating randomly between a low of 0.68 and high of 0.78, with a standard deviation of 0.035.

The most significant subset of the M&M multinational group is the Fortune-500 cluster of corporations. In the 7 years between 1982 and 1988 for which comparable data are available, the Fortune 500 accounted for about 85 percent of all employment by M&M multinational corporations and for over 65 percent of its total assets. (These distributive shares are given by the ratios of $FE/MNCE$ and $FA/MNCA$, respectively.) The Fortune-500 corporations probably account for an even larger share of the *foreign* employment and assets of these multinational firms. Given this pivotal role of the Fortune 500, and provided that there is indeed a stable linear relationship between the value of assets per employee in the foreign and worldwide activities of M&M multinational corporations, we can conjecture that

$$(2) \quad MNCAE_{\text{foreign}} = \beta FAE ,$$

where β is a relatively stable time variable. The validity of this proposition can be assessed for the period between 1982 and 1988, by using comparable data for the Fortune 500 and the M&M multinational corporations. Based on Equation (2), we can express β as

$$(3) \quad \begin{aligned} \beta &= MNCAE_{\text{foreign}} / FAE \\ &= (MNCA_{\text{foreign}} \div MNCE_{\text{foreign}}) / (FA \div FE) . \end{aligned}$$

Over the 1982-88 period, the values of β computed on the basis of Equation (3) were indeed relatively stable, fluctuating around an average of 0.92, with a low of 0.83, a high of 1.02 and a standard deviation of 0.06.

Based on these arguments, we could have tried to impute the foreign employment of M&M multinational corporations ($MNCE_{\text{foreign}}$) by rewriting Equation (3), such that

$$(4) \quad MNCE_{\text{foreign}} = (1/\beta) MNCA_{\text{foreign}} (FE/FA)$$

and then substituting the estimated average of 0.92 for β . Unfortunately, data for $MNCA_{\text{foreign}}$ are also available only from 1982 onward. This is not an unsurmountable obstacle, however. We can plausibly assume that the foreign assets of M&M multinational corporations account for a more or less fixed proportion of all U.S. private assets abroad ($USPAA$), such that:

$$(5) \quad MNCA_{\text{foreign}} = \gamma USPAA .$$

Indeed, for the 1982-88 period, the estimated value for γ fluctuated only moderately around an average of 0.59, with a low of 0.57, a high of 0.64 and a standard deviation of only 0.025. Thus, by substituting Equation (5) back into Equation (4), we obtain

$$(6) \quad MNCE_{\text{foreign}} = \delta USPAA (FE/FA),$$

where $\delta = \gamma/\beta$. For the period of 1982-1988, the average value of δ was 0.65 (fluctuating between a low of 0.59 and a high of 0.7 with a standard deviation of 0.041). Since we have no reason to assume that either β or γ exhibit any pronounced time trend, we can also assume that their ratio, δ , is a fairly stable variable. We hence substitute 0.65 as a reasonable estimate for δ and use Equation (6) to impute $MNCE_{\text{foreign}}$ as an approximation for the foreign employment of M&M corporations over the entire 1954-88 period.

During the 1982-88 period, the values of the imputed $MNCE_{\text{foreign}}$ series were remarkably close to the actual numbers published by the BEA and that lends some support to our estimation procedure. According to BEA figures reported in a *Special Survey of U.S. Multinational Companies, 1970* (see, *Statistical Abstract of the United States, 1977*, Table 920, p. 564), the actual value for $MNCE_{\text{foreign}}$ in 1970 was 2.5 million, which is only marginally lower than our own imputation of 2.64 million. While it may be difficult to assess the accuracy of our imputations for earlier periods, it should be noted that the effect of any potential inaccuracies on the *overall* figures for M&M employment during such periods could not have been very great: M&M firms have increased their foreign operations more or less continuously since the early part of this century, but it was only since the 1970s that these operations started to account for a *considerable* share of their overall activity.

Definitions and Sources for Variables used in Appendix B

U.S.-based Multinational Corporations:

MNCA: Total assets of U.S.-based multinational corporations whose major activity is in either manufacturing or petroleum (\$ billions).

$MNCA_{\text{foreign}}$: Total foreign assets (affiliates' assets) of U.S.-based multinational corporations whose major activity is in either manufacturing or petroleum (\$ billions).

MNCE: Total employment of U.S.-based multinational corporations whose major activity is in either manufacturing or petroleum (millions).

$MNCE_{\text{foreign}}$: Total foreign employment (affiliates' employment) of U.S.-based multinational corporations whose major activity is in either manufacturing or petroleum (millions).

SOURCE: U.S. Bureau of Economic Analysis, 'U.S. Multinational Companies,' in the *Survey of Current Business*, 1983 through 1989.

Fortune-500 Corporations

FA: Total assets of Fortune-500 firms (\$ billions)

FE: Total employment of Fortune-500 firms (millions)

SOURCE: 'Fortune 500,' *Fortune*, 1955 through 1990.

Other Data

USPAA: Total U.S. private assets abroad (\$ billion)

SOURCE: U.S. Department of Commerce, Bureau of the Census, *Historical Statistics of the United States. Colonial Times To 1970*, Part 2, series U27, pp. 868-9 and *Statistical Abstract of the United States*, 1984 through 1990.

APPENDIX C

SOURCES OF EMPLOYMENT GROWTH IN THE M&M UNIVERSE OF FIRMS

The purpose of this appendix is to estimate the various components which contribute to changes in the average number of employees per firms -- both for the M&M universe as a whole, as well as for the Fortune-500 and 'Others' groups. Employment per firm in each category could be decomposed into *domestic* and *foreign* components, as listed in the upper part of Table C-1. The variables denoting the sources of change in these components are given in the lower part of the table. At a general level, we could hence separate for each category of firms its domestic from foreign growth. At a more detailed level, we are interested in distinguishing between *domestic internal growth* which involves the net creation of new jobs, *domestic external growth* which arises from the 'reallocation' of employees between different groups as a result of mergers and acquisitions, and *domestic compositional growth* which arises when the number of small firms and the number of large firms change at different rates.

Table C-1 Variable definitions and names

Variable Definition	Variable Name		
	All M&M Firms	Fortune 500	"Others"
<u>Employment per Firm</u>			
Total	<i>MEZ</i>	<i>FEZ</i>	<i>OEZ</i>
Domestic	<i>MEZ.D</i>	<i>FEZ.D</i>	<i>OEZ.D</i>
Foreign	<i>MEZ.F</i>	<i>FEZ.F</i>	<i>OEZ.F</i>
<u>Changes in Employment per Firm</u>			
All Sources	ΔMEZ	ΔFEZ	ΔOEZ
Domestic	$\Delta MEZ.D$	$\Delta FEZ.D$	$\Delta OEZ.D$
Internal	$\Delta MEZ.DI$	$\Delta FEZ.DI$	$\Delta OEZ.I$
External	---	$\Delta FEZ.DE$	$\Delta OEZ.E$
Compositional	$\Delta MEZ.DC$	---	---
Foreign	$\Delta MEZ.F$	$\Delta FEZ.F$	---

Consider the 'Others' group of the M&M sector. In any year t , the overall number of employees in this group is given by

$$(1) \quad OE_t = OEZ_t \cdot ONUM_t,$$

where OEZ_t is the average number of employees per firm and $ONUM_t$ is the number of 'Other' firms. The overall annual change in the number of employees is hence:

$$(2) \quad \Delta OE_t = OEZ_{t-1} \cdot \Delta ONUM_t + \Delta OEZ_t \cdot ONUM_{t-1} + \Delta OEZ_t \cdot \Delta ONUM_t,$$

where Δ denotes first difference from the preceding year. Provided that $\Delta OEZ_t \cdot \Delta ONUM_t$ is sufficiently small, we could write ΔOE_t , such that

$$(3) \quad \Delta OE_t \approx OEZ_{t-1} \cdot \Delta ONUM_t + \Delta OEZ_t \cdot ONUM_{t-1},$$

where $OEZ_{t-1} \cdot \Delta ONUM_t$ is the 'number effect,' denoting the change in overall employment arising from changes in the total number of 'other' firms, and $\Delta OEZ_t \cdot ONUM_{t-1}$ is the 'size effect,' designating the increase or decrease attributed to changes in the average employment size of such firms. Consider now Figures C-1a and C-1b. In the first of these figures, we chart the historical evolution of OEZ and $ONUM$. In the second diagram, we have the annual levels of OE and below them the annual values for the 'size' and 'number' effects. The data point out that, until 1970, the decline in overall employment for the 'Others' was dominated by the generally negative 'size effect' which more than outweighed the mostly positive 'number effect.' After 1970, there was a change in relative influence. The 'size effect' became more or less neutral and, with a generally positive 'number effect,' overall employment for the 'Others' followed an upward trend.

In order to look further into the possible causes affecting the level of OE , it is convenient to decompose the 'Others' group into two distinct categories: one containing the small firms which typically employ no more than a few dozen workers, and another with the larger corporations which could have

Figure C-1a Trends in employment per firm and the number of 'Other' firms

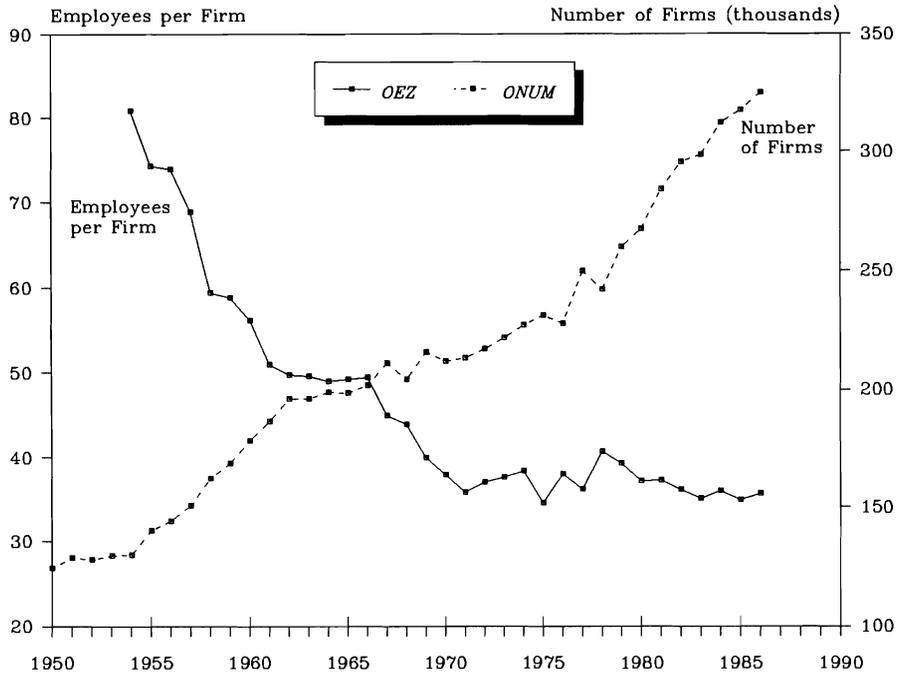
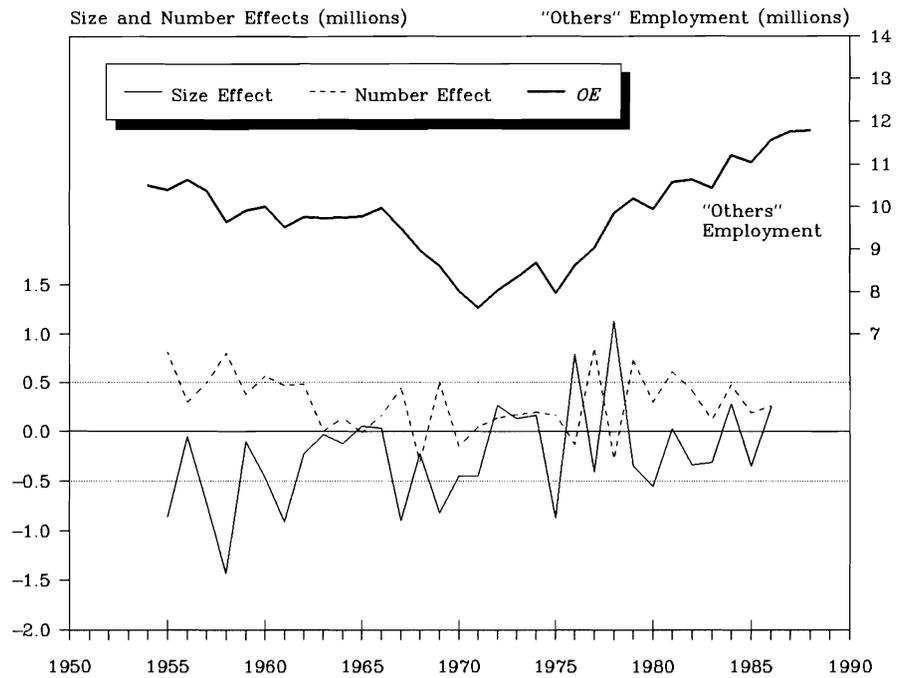


Figure C-1b The Size and Number Effect on 'Others' employment



up to a few hundred employees, but which are still insufficiently large to be included in the Fortune-500 listing. Each of these categories affect *OE* in a somewhat different way. The first category of firms is responsible for much of the change in *ONUM*: macroeconomic growth tends to have the effect of swelling the number of such small firms, while recession usually brings those numbers down. The second category has a relatively negligible effect on the number of 'other' firms, but a disproportionate impact on their average employment size *OEZ*. The reason is that, while both the small and larger firms experience internal changes in employment, it is mostly the latter which are involved in external expansion or contraction. When Fortune-500 corporations take over 'other' companies, they tend to acquire the relatively large firms in that group; similarly, when one Fortune-500 firm is absorbed by another, its place is filled with a large 'other' firm which previously occupied the 501st position in the M&M universe; or, when a Fortune-500 firm sells one of its divisions to one of the 'other' firms, the acquirer is commonly a large firm in its own right. Now, since the average size of the large 'other' firms far exceeds *OEZ*, the effect of such inter-group 'redistributions' of employees is to lower *OEZ* when workers are moved out of the 'Others' group, and to raise it when they are added to that group.

These considerations serve to explain how *ONUM* and *OEZ* could move in opposite directions. A sustained increase in the demand for industrial commodities leads to internal growth -- both through the establishment of new firms which raises *ONUM*, as well as through an increase in employment of existing firms which increases *OEZ*. It is indeed highly unlikely for there to be an ongoing long-term increase in the number of 'other' firms when such firms continuously lay off workers. The most conceivable explanation for how *OEZ* could fall rapidly when *ONUM* is rising, is that the decrease in *OEZ* stems from *external* contraction; that is, from the taking-over of large 'other' firms by Fortune-500 corporations (or non-M&M companies) and the consequent exclusion of their employees from the 'Others' group.¹ This 'redistribution' of employees between the 'Others' and the Fortune-500 group is

¹ An opposite movement for *OEZ* and *ONUM* could occur also without an external 'redistribution' of employees. In principle, an increase in *ONUM* which raises the number of smaller firms faster the number of larger firms in the 'Others' group, will cause *OEZ* to fall even without there being any change in the actual size of such firms. However, the extent of such compositional shifts is not likely to be very large. Whereas the number of very small firms increases through incorporation, the number of larger firms in the 'Others' group tends to rise as medium-size companies hire more workers. For example, according to data published by the U.S. Bureau of the Census in its *County Business Patterns*, between 1974 and 1982, the number of establishments employing less than 20 workers rose by 11 percent, while the comparable rate of increase for establishments employing between 250 and 499 workers was 10 percent (U.S. Bureau of the Census, *Statistical Abstract of the United States, 1985*, Table 874, p. 518).

especially significant and, although there are no available statistics on it, the data could be imputed with some reasonable confidence.

Let us begin by classifying the sources of employment growth for the Fortune 500 and the 'Others.' In terms of employment *levels*, we have for the Fortune 500:

$$(4) \quad FE_t = FE.D_t + FE.F_t,$$

where FE_t is overall Fortune-500 employment, $FE.D_t$ is Fortune-500 employment in *domestic* operations within the United States, and $FE.F_t$ is the number of people employed by Fortune-500 subsidiaries abroad. The 'Others' have only negligible foreign operations, so for practical purposes, we could assume that

$$(5) \quad OE_t = OE.D_t,$$

where overall employment for the 'Others' is equivalent to their domestic employment $OE.D_t$.

Moving to *changes* in employment, we have for the Fortune 500:

$$(6) \quad \begin{aligned} \Delta FE_t &= \Delta FE.D_t + \Delta FE.F_t, \\ &= (\Delta FE.DI_t + \Delta FE.DE_t) + \Delta FE.F_t, \end{aligned}$$

where $\Delta FE.DI_t$ is domestic internal growth stemming from the creation of new employment or the elimination of existing jobs by the Fortune 500 within the United States, $\Delta FE.DE_t$ is the domestic external growth attributed to the transfer of employees to and from the Fortune-500 group, and $\Delta FE.F_t$ is foreign growth which combines the internal and external employment expansion of Fortune-500 subsidiaries abroad. For the 'Others,' assuming that the change in employment occurs only domestically,

Since most 'other' firms have only a single establishment, we could expect the compositional shifts between those firms to be equally negligible.

we have

$$(7) \quad \Delta OE_t = \Delta OE.I_t + \Delta OE.E_t ,$$

where $\Delta OE.I_t$ and $\Delta OE.E_t$ are respectively the internal and external growth of 'Others' employment within the United States.

Within the domestic arena, external employment growth could occur in two different ways: (1) through intra-M&M acquisitions/divestitures which 'redistribute' employees between the Fortune-500 group and the 'Others,' and (2) *via* inter-sectoral transaction -- either when Fortune-500 or 'other' firms acquire non-M&M companies, or when firms from outside the M&M universe take-over M&M corporations. If this latter inter-sectoral part is sufficiently small, we could assume that for practical purposes,

$$(8) \quad \Delta FE.DE_t = -\Delta OE.E_t .$$

Let us now turn to impute this 'reallocation' flow.

Consider the following definitions for *domestic* employment per firm. For the Fortune 500, we have

$$(9) \quad FEZ.D_t = FE.D_t/500 ,$$

while for the 'Others,' which operate only domestically, the definition is

$$(10) \quad OEZ_t = OE_t/ONUM_t .$$

The rates of growth of domestic employment per firm are hence given by the following equations. For the Fortune 500, we have

$$\begin{aligned}
(11) \quad fez.d_t &= \Delta FE.D_t / FE.D_{t-1} \\
&= \Delta FE.DI_t / FE.D_{t-1} + \Delta FE.DE_t / FE.D_{t-1} \\
&= fez.di_t + fez.de_t,
\end{aligned}$$

where $fez.di_t$ is the rate of increase in domestic employment per firm due to internal growth and $fez.de_t$ is the corresponding rate attributed to external growth.

For the 'Others,' the rate of growth of domestic employment per firm is given by

$$(12) \quad oez_t \approx \Delta OE_t / OE_{t-1} - \Delta ONUM_t / ONUM_{t-1}.$$

Decomposing further, we could write

$$(13) \quad oez_t \approx (\Delta OE.I_t + \Delta OE.E_t) / OE_{t-1} - (\Delta ONUM.I_t + \Delta ONUM.E_t) / ONUM_{t-1},$$

where $\Delta OE.I_t$ and $\Delta OE.E_t$ denote the overall change in 'Others' employment due to internal and external growth, respectively, $\Delta ONUM.I_t$ is the change in the number of firms associated with internal growth (i.e., the incorporation of new firms which create new capacity and hire new workers, net of shut-downs) and $\Delta ONUM.E_t$ is the change in the number of 'other' firms due to external growth (mergers and acquisitions). This could be rearranged to get

$$\begin{aligned}
(14) \quad oez_t &\approx (\Delta OE.I_t / OE_{t-1} - \Delta ONUM.I_t / ONUM_{t-1}) + (\Delta OE.E_t / OE_{t-1} - \Delta ONUM.E_t / ONUM_{t-1}) \\
&\approx oez.i_t + oez.e_t,
\end{aligned}$$

where $oez.i_t$ and $oez.e_t$, are the portions of oez_t arising from internal and external growth, respectively.

Narrowing our focus just to external growth, we have

$$(15) \quad oez.e_t = (\Delta OE.E_t / OE_{t-1} - \Delta ONUM.E_t / ONUM_{t-1}).$$

Since the value of $\Delta ONUM.E_t/ONUM_{t-1}$ is liable to be very small, let us ignore it and assume that, for practical purposes

$$(16) \quad oez.e_t \approx \Delta OE.E_t/OE_{t-1}$$

Rearranging terms, we get:

$$(17) \quad \Delta OE.E_t \approx OE_{t-1} \cdot oez.e_t .$$

Based on Equation (14), this could be written as

$$(18) \quad \Delta OE.E_t \approx OE_{t-1} \cdot (oez_t - oez.i_t) .$$

Now, because Fortune-500 and 'other' firms operate under the same domestic macroeconomic conditions, we may reasonably expect the internal rates of growth of their domestic employment per firm to be similar. Provided that internal growth generates no significant compositional shifts in the size-structure of 'other' firms, this means that

$$(19) \quad oez.i_t \approx fez.di_t ,$$

and based on equations (6), (8) and (11), this gives

$$(20) \quad oez.i_t \approx \Delta FE.DI_t/FE.D_{t-1} \\ \approx (\Delta FE.DI_t - \Delta FE.DE_t - \Delta FE.F_t) / FE.D_{t-1} \\ \approx (\Delta FE.DI_t + \Delta OE.E_t - \Delta FE.F_t) / FE.D_{t-1} .$$

Substituting back to Equation (18), we get

$$(21) \quad \Delta OE.E_t \approx OE_{t-1} \cdot [oez_t - (\Delta FE.DI_t + \Delta OE.E_t - \Delta FE.F_t) / FE.D_{t-1}] .$$

Solving for $OE.E_t$ yields:

$$(22) \quad \Delta OE.E_t \approx OE_{t-1} \cdot (FE.D_{t-1} \cdot oez_t - \Delta FE_t + \Delta FE.F_t) / (FE.D_{t-1} + OE_{t-1}) ,$$

Since we assumed that $\Delta OE.E_t = -\Delta FE.DE_t$, Equation (22) gives us a reasonable approximation for the overall annual movement of employees between the Fortune-500 group and the ‘Others.’ This imputation is necessarily inaccurate to some extent, firstly because the internal rate of growth of employees per firm in these two groups need not be exactly the same; secondly, because employment per firm for the ‘Others’ may be subject to some compositional shifts, whereas in the Fortune-500 group the fixed number of firms excludes that possibility; and, lastly, because we have ignored the potential disparity between the inter-sectoral employment movements for the two groups. However, given that we are concerned only with the *overall* magnitudes of the different flows, these possible inaccuracies should not be a matter for concern.

With these qualifications in mind, the sources of change in employment per firm in each category could be computed with available data. The basic variables used in these computations are employment (FE , OE and ME , as described in Section 9.4), employment in the foreign subsidiaries of M&M firms ($ME.F$, computed as $MNCE_{foreign}$ in Appendix B), the number of firms in each category (500 , $ONUM$ and $MNUM$, described in Section 9.4) and, finally, the number of reallocated employees between the Fortune 500 and the ‘Others’ ($\Delta FE.DE$ and $\Delta OE.E$, as estimated by Equation [22] above). The computations for sources of employment growth listed in Table C-1 are given below.

Fortune 500

$$(23) \quad \Delta FEZ_t = FEZ_t - FEZ_{t-1} = FE_t/500 - FE_{t-1}/500$$

$$(24) \quad \Delta FEZ.D_t = \Delta FEZ_t - \Delta FEZ.F_t$$

$$(25) \quad \Delta FEZ.DI_t = \Delta FEZ.D_t - \Delta FEZ.DE_t$$

$$(26) \quad \Delta FEZ.DE_t = \Delta FE.DE_t/500$$

$$(27) \quad \Delta FEZ.F_t = \Delta ME.F_t/500$$

'Others'

$$(28) \quad \Delta OEZ_t = OEZ_t - OEZ_{t-1} = OE_t/ONUM_t - OE_{t-1}/ONUM_{t-1}$$

$$(29) \quad \Delta OEZ.I_t = \Delta OEZ_t - \Delta OEZ.E_t$$

$$(30) \quad \Delta OEZ.E_t = \Delta OEZ_{t-1} \cdot oez.e_t = \Delta OEZ_{t-1} \cdot (\Delta OE.E_t/OE_{t-1})$$

$$(31) \quad \Delta OEZ.D_t = \Delta OEZ.I_t + \Delta OEZ.E_t$$

M&M

$$(32) \quad \Delta MEZ_t = MEZ_t - MEZ_{t-1} = ME_t/MNUM_t - ME_{t-1}/MNUM_{t-1}$$

$$(33) \quad \Delta MEZ.D_t = \Delta MEZ_t - \Delta MEZ.F_t$$

$$(34) \quad \Delta MEZ.DI_t = (OEZ.I_t \cdot ONUM_{t-1} + \Delta FEZ.DI_t \cdot 500)/MNUM_{t-1}$$

$$(35) \quad \Delta MEZ.DC_t = \Delta MEZ.D_t - \Delta MEZ.DI_t$$

$$(36) \quad \Delta MEZ.F_t = \Delta MEZ.F_t - \Delta MEZ.F_{t-1} = ME.F_t/MNUM_t - ME.F_{t-1}/MNUM_{t-1}$$