



# 行政院國家科學委員會專題研究計畫成果報告

## 產業間工作創造、減少的動力

### Inter-industry Job Reallocation in Taiwan

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#### 一、中文摘要

本計畫之實證研究發現：台灣的產業間工作創造與消滅率在過去二十年間逐漸遞減。產業間工作創造與消滅的動力為對不同產業之需求轉移。

**關鍵詞：** 工作創造與消滅

#### Abstract

The rate of employment restructuring in Taiwan was found to be reducing, rather than intensified in the past two decades. Econometric results in this paper find that preference shifts play an important role in the movements in job reallocation in Taiwan.

**Keywords:** Job creation and job destruction

#### 二、緣由與目的

This paper intends to assess the relative importance of aggregate and allocative shocks in driving employment growth and job reallocation in Taiwan. In other words, this paper answers the following question: Can shocks that alter the distribution of optimal allocation of labor (and capital) raise unemployment rate? Shifts in labor demand have been cited in the press and by the government to be the reason for structural

unemployment. For example, on April 24th, 2000, DGBAS (Directorate general of budget, accounting and statistics), the government organization which is responsible for collecting and analyzing the nation's labor market data, claimed that rapid structural change in the distribution of job opportunities have been the main reason for the persistent increase in the country's unemployment rate in recent years<sup>1</sup>. This current paper utilizes the industry-level employment data published every month by DGBAS in the construction of the inter-industry job creation and destruction rate. Following the methodology proposed by Davis and Haltiwanger (1990), between-industry job creation is measured by summing the number of jobs newly created in expanding sectors. Between-industry job destruction is defined as the sum of jobs vanished in sectors that have negative employment change. Job creation and destruction rates constructed this way can then be used to investigate the relevance of shifts in labor demand between sectors in employment growth. Econometric evidences show that allocative shocks are an important source of fluctuations in job reallocation but not a major driving force of net employment growth in Taiwan. Furthermore, this paper

<sup>1</sup> See [www.unnnews.com.tw](http://www.unnnews.com.tw) April, 24th 2000.

provides new evidence on the connection between employment restructuring and the business cycle. The stylized facts about between industries job flows in Taiwan presented in this current paper may improve the evaluation of theories of countercyclical job reallocation.<sup>2</sup> The concentration of job reallocation in recessions is a very robust feature of the U.S. economy. Haltiwanger and Schuh (1999) found that between industries job reallocation in the U.S. is strongly countercyclical. In sharp contrast to their finding, this current paper finds that between-industry job reallocation is actually mildly *procyclical* in Taiwan. This finding contradicts to the prediction of models that argue allocative disturbances drive aggregate fluctuations and recessions are times of "cleansing and restructuring".

### 三、結果與討論、

This section describes the basic facts about between industries job flows in Taiwan.

The monthly time series (1980:03-1999:09) of between industries job creation and destruction rates are constructed following the methodology described in the previous section. The "flow" variables, i.e., job creation and destruction flows of the total economy,  $C_t$  and  $D_t$  are seasonally adjusted using U.S. Census X11 procedure before they are used to construct between industry job flow rates (POS, NEG).

#### 1 Magnitude

Between industries job flows are large. Table 1 shows that on average, six in 1000 jobs

(0.58%) was newly created in an expanding industry and 4.2 in every 1000 jobs (0.42%) were destroyed in a shrinking industry each *month*. Expressed at annual rates, the monthly job flows are even larger. About seven in every 100 jobs in Taiwan were newly born in an expanding industry and about five jobs in every 100 jobs in Taiwan were scrapped in a contracting industry. The average monthly employment growth rate in Taiwan is only 0.15 percent.

#### 2 Cyclicality

Since almost all theories that aimed at accounting for the correlation of job flows with business cycles base their models on stylized facts of U.S. job flows, is important to compare the connection between job flows and business cycle in the two countries so that the universality of these theories can be assessed. One of the remarkable features of job flows is that job creation is procyclical and job destruction is countercyclical. This is a common trait of job flows in the two countries. Note, however, that the correlation of job flows and employment growth is a lot weaker in Taiwan. Correlation of creation (destruction) and employment growth is only 0.616 (-0.555), lower than the 0.86 (-.97) calculated from U.S. quarterly data.

In sharp contrast to the finding that job reallocation rate (REALL) is concentrated in recessions in the U.S. (correlation of reallocation and employment growth equals -0.76), job reallocation in Taiwan is acyclical, or, at most, mildly procyclical ( $\rho(REALL_t, EMPG_t) = 0.13$ ). Excess reallocation is only mildly countercyclical ( $\rho(EXREALL_t, EMPG_t) = -0.363$ ). Therefore, countercyclical job reallocation, the most important feature of U.S. job flows that recent theories are trying to explain, is absent in Taiwanese data.

Another contrasting result is that job destruction is less variable than creation in Taiwan. The variance ratio<sup>3</sup> in Taiwan is only 0.65, whereas it is found to be 3.97 in U.S. quarterly data. In other words, job destruction rate is less volatile than job creation rate in Taiwan. During recessions, job creation decreases more than job destruction increases. However, job

<sup>2</sup> Since Davis and Haltiwanger's seminal work on job reallocation, a few models have been developed to explain the fact that U.S. job reallocation is countercyclical. For example, Caballero and Hammour (1994), Mortenson and Pissarides (1994), David Andolfatto (1996).

<sup>3</sup> Variance ratio is defined to be the ratio of the time series variance of job destruction to the time series ratio of job creation.

destruction is about 4 times as variable as job creation in the U.S. The cyclical asymmetry of job creation and destruction in Taiwan is not as striking as it is in the U.S. In fact, the pattern of asymmetry is reversed.

The comparison of job flows in Taiwan and those in the U.S. shows that the cyclical patterns of job flows of the two countries are very different. Do the two countries really differ in the nature of job flows? If so, which structural differences of the economies cause the attributes to be so different? This is an interesting question that I plan to investigate in the future. However, before the investigation of the structural differences of the economies, it is necessary to first determine whether these discrepancies arise from the different frequency of the data used or from the differences in the classifications of industries. Note that the between industries job flows in Taiwan is constructed from monthly employment data on 29 manufacturing and service industries, whereas U.S. job flows is constructed from quarterly data on 450 detailed manufacturing industries.

### *3 Persistence*

Between industries job flows are quite persistent. Two-year persistence rate for job creation is 82% and two-year persistence rate for destruction is 60%. Persistence of job flows fluctuates only moderately over the business cycle. Both job creation persistence and job destruction persistence are countercyclical. Jobs created or destroyed during recessions tend to be more permanent than those created and destroyed during periods of economic expansion. In conclusion, job reallocations are mostly permanent. Eighty-two percent of job creation and 60 percent of job destruction last more than two years. Moreover, industry employment changes during periods of aggregate employment expansion is more likely to be transitory than employment changes during periods of employment contraction. Jobs created during periods of high unemployment rate are more likely to be permanent and jobs destroyed when unemployment rate is high is more likely to be temporary.

## *5. VAR Results*

### A. Variance Decompositions

In sum, allocative shocks are important driving forces behind job reallocation fluctuations. Allocative shocks account for more than

90 percent of the variance of the forecast error of job reallocation rate at 1 through 36-step horizons in all identifications except identification 5, which violates the weak qualitative assumption that  $a_{ns} > 0$ . On the contrary, aggregate shocks play the dominant role in driving the net employment growth. They account for more than 95 percent of the variance of the forecast error of employment growth at 1 through 36-step horizons in identifications 1 through 4.

### B. Impulse Response Functions

The level of employment remained lower than its beginning level for 6 periods after the shock and then becomes higher than its beginning level for 10 periods and then declined back to levels lower than its beginning level for 15 more periods. The level of employment does not recover permanently until 32 periods after the shock. The level of employment dropped immediately and kept decreasing for 16 periods. Aggregate shocks have permanent effect on the level of employment. Both job creation and destruction increased substantially and permanently after the allocative shock. Recessionary shocks resulted in increased job destruction and reduced job creation. This is also why the level of employment was permanently reduced after a negative aggregate shock in Figure 5.

### C. Historical Decompositions

Aggregate shocks play a dominant role in the fluctuation of employment growth. In particular, the negative employment growth in 1997-99 are contributed by negative aggregate shocks rather than allocative shocks. This finding contradicts to the conventional wisdom that the increase in unemployment rate in recent years is

a result of rapid changes in the distribution of labor demand across sectors. Allocative shocks are the major driving force of job reallocation. Aggregate shocks play only trivial role in job reallocation fluctuations.

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#### 四、計畫成果自評

Since this paper utilizes industry-level data, whereas most other work on job reallocation focus on plant-level job reallocation, it is worthwhile redoing this paper with plant-level data so that a comparison can be made between Taiwan and the rest of the world.

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