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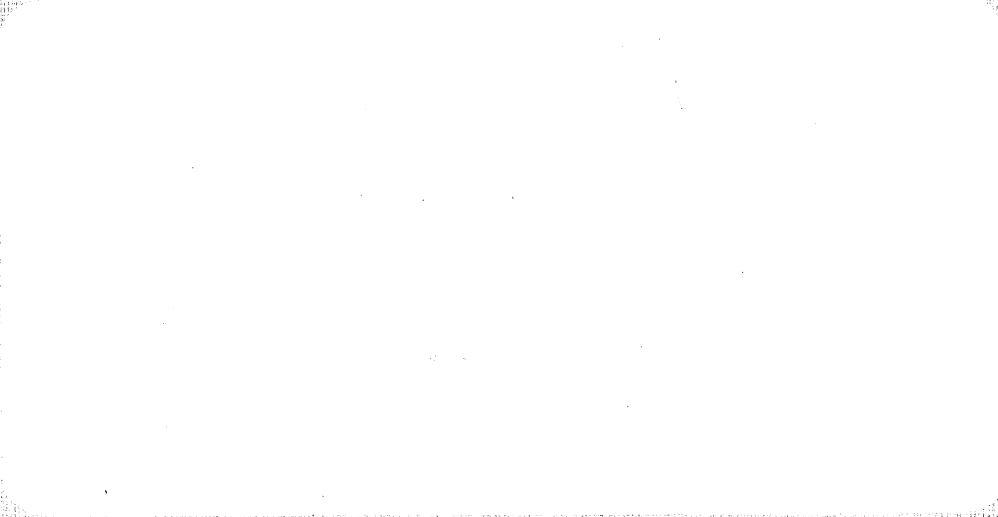
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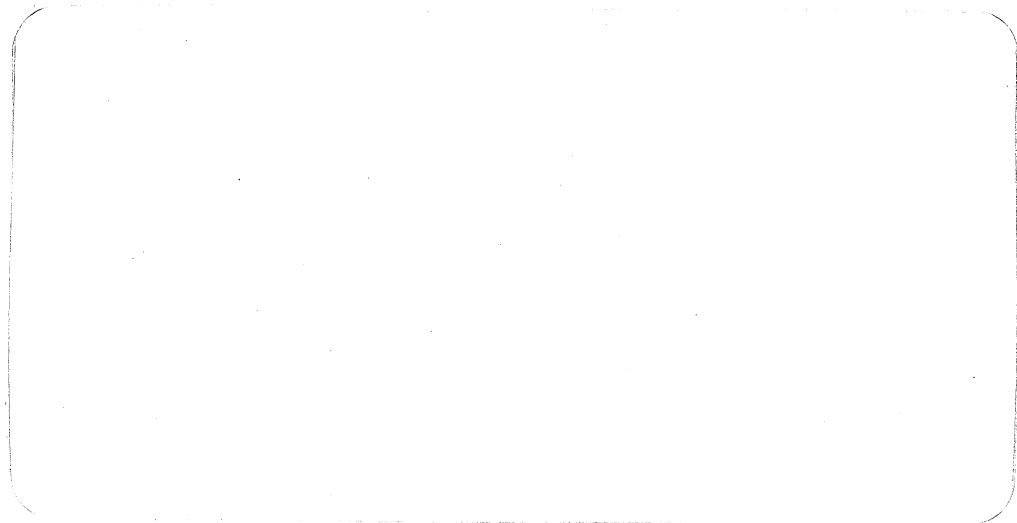
# **Discussion Paper**



**CHUNG-HUA INSTITUTION FOR ECONOMIC RESEARCH**

75 Chang-Hsing St., Taipei, Taiwan, 106

Republic of China



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# **Discussion Paper**

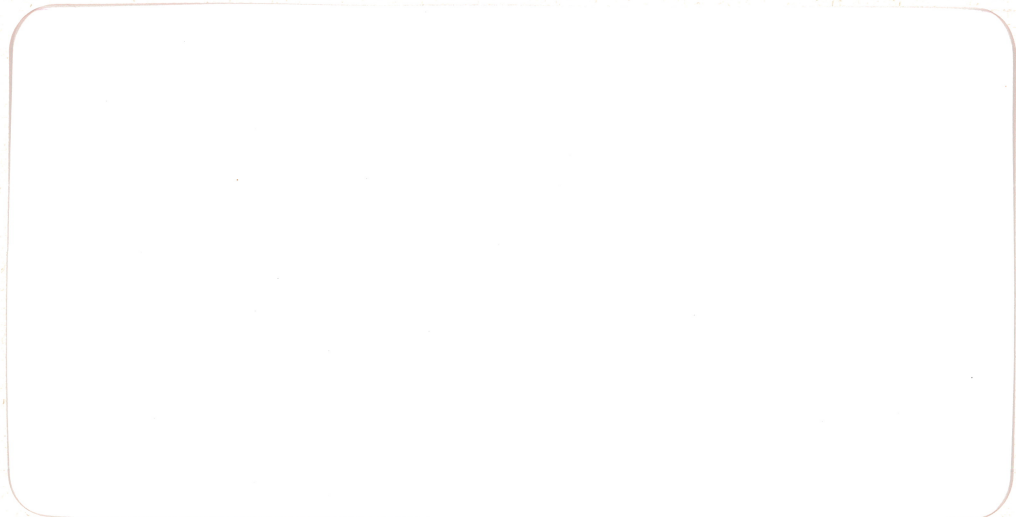


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**Labor Shortage and Foreign Workers in Taiwan**

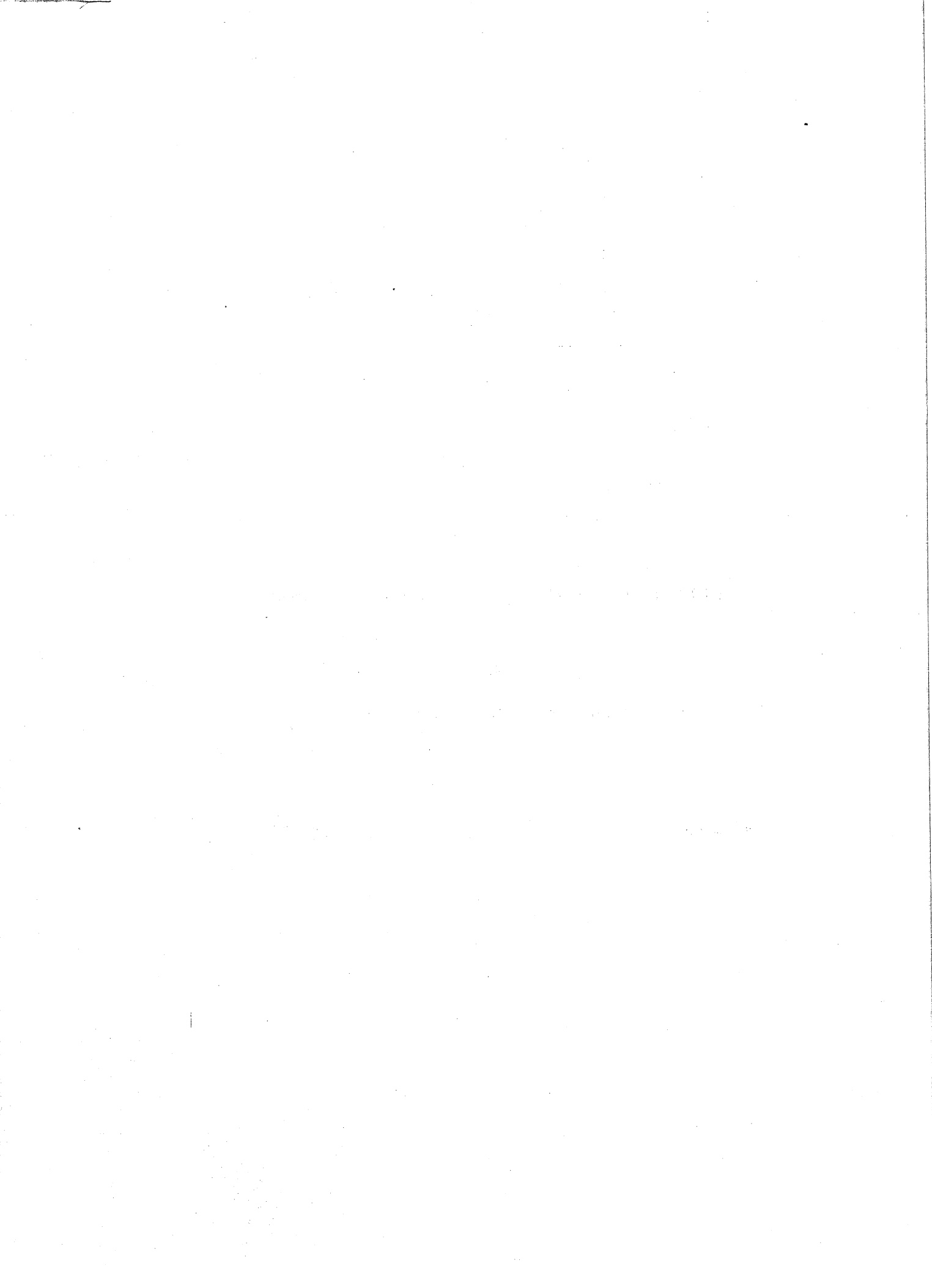
by

**Hui-Lin Wu and Ke-Jeng Lan**

***No.9109***

***October 1991***







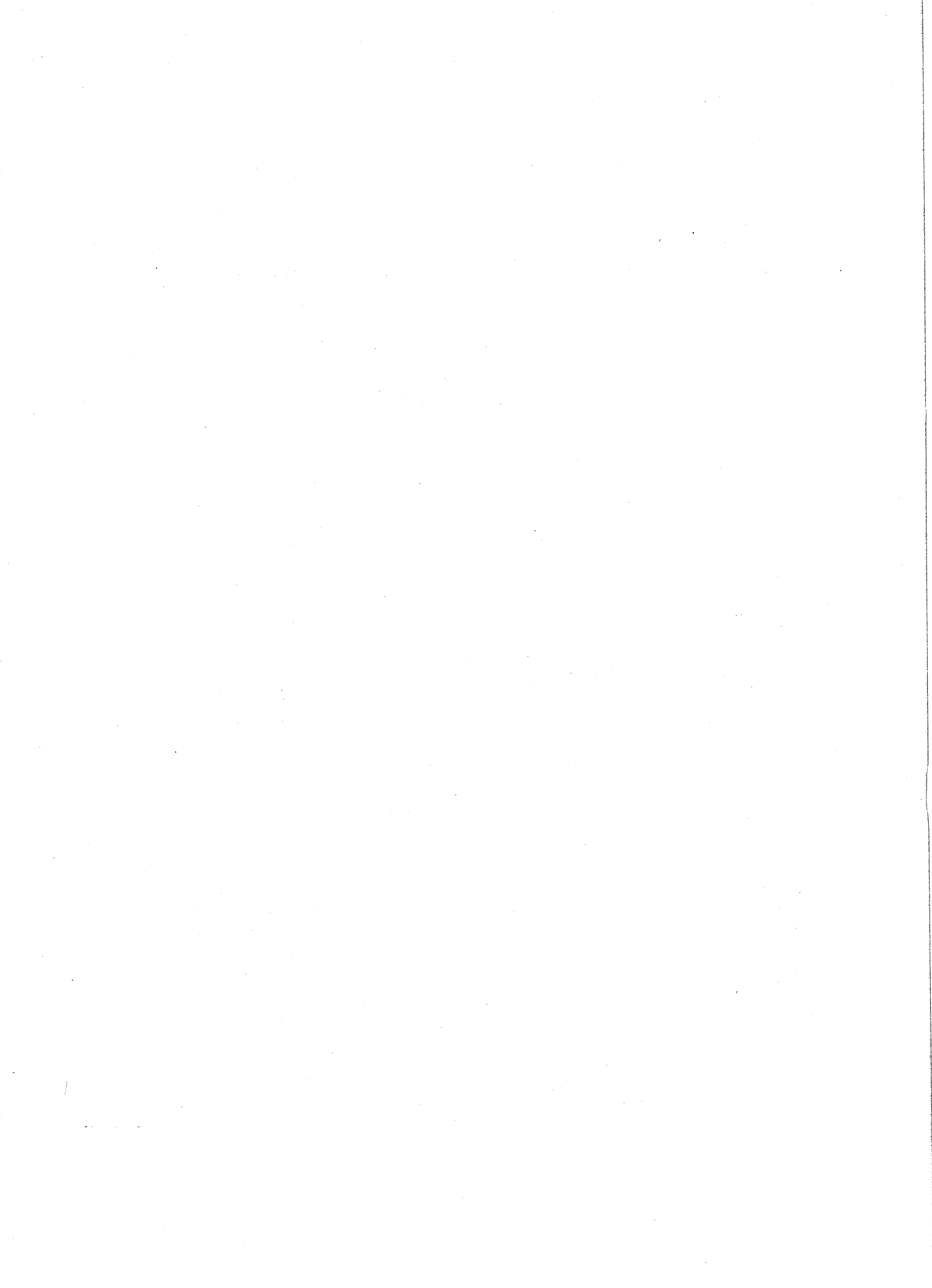
## **Labor Shortage and Foreign Workers in Taiwan**

**Hui-Lin Wu and Ke-Jeng Lan\***

October 1991

\*Research Fellow and Associate Research Fellow, respectively, at the Chung-Hua Institution for Economic Research, No. 75 Chang Hsing St., Taipei, Taiwan 106, Tel.(02) 735-6006, Fax (02)735-6035.







## I. INTRODUCTION

Taiwan lacks natural resources, yet has a relatively abundant supply of human resources, not only in terms of quantity, but also in terms of quality.<sup>1</sup> Labor, moreover, has been one of the key factors to the rapid growth of the Taiwanese economy.

According to the general perception, Taiwan's government follows an export-oriented and import-restricted policy, which has encouraged the adoption of labor-intensive production methods from the beginning. Over the past 40 years, the increment in the demand for labor gradually outpaced the growth in the supply of labor and the returns to labor services also climbed in a step-by-step manner. Eventually, "labor shortages" began to prevail in many industries. In the past few years, we have frequently heard businessmen complaining about how hard it is to find workers. Even when they raise their wages and improve working conditions, they have been unable to find a sufficient number of workers. Hence, the number of voices asking for the legal introduction of "foreign workers" has increased. Some firms have even moved their operations to other South-East Asian countries or to mainland China, where there is cheaper labor. Some even blame the delays in the building of public infrastructure and the decline in private investments, to some extent, on the difficulty of hiring workers.

Taiwan's labor is no longer cheap, which has weakened the price competitiveness of Taiwanese products. Additionally, the increase in foreign workers across industries has had both positive as well as negative impacts. However, whether the phenomena of high wages and the increase in foreign workers in Taiwan imply a "labor shortage" or not is a matter of much debate. If the introduction of "foreign workers" is inevitable, how its negative impact can be minimized is an important question. Therefore, this paper plans to analyze the labor shortage phenomenon theoretically, explore the status of the labor shortage in Taiwan, and provide some policy suggestions in section II. Then, the problem of foreign workers will be examined in section III. The background of the problem will be reviewed, and then the impacts of foreign workers will be discussed theoretically, so as to ascertain



the reasons behind the emergence of the phenomenon. A proposal for an excellent method with which to introduce foreign workers into Taiwan will also be explained. The last section provides some conclusions of this research.

## II. LABOR SHORTAGE IN TAIWAN

### 1. Labor Shortage in Theory

"Labor Shortage" means that job vacancies cannot be filled sufficiently by applicants. That is, under the current wage rate and working conditions, the quantity of labor supplied is less than the quantity of labor demanded. This is expressed by the segment  $\overline{ab}$  under wage rate  $W_1$  in Figure 1. In this context, the labor shortage can be eliminated by raising the wage rate from  $W_1$  to  $W^*$ , or by decreasing the demand for labor from  $L^D$  to  $L^D$  above point a, or by increasing the supply of labor from  $L^S$  to  $L^S$  above point b.

Raising the wage rate to effectively eliminate the labor shortage depends upon the determinants of the wage function, that is, depends on whether they are affected on the demand side, the supply side or both, and the ease in which the quantity of labor supplied and demanded responds to change in the wage rate.<sup>2</sup> The greater the difference between  $W_1$  and  $W^*$  is, the more difficult it will be to use this strategy in practice because producers will be affected much more severely.

The shifting of  $L^D$  to the left would depend upon the willingness and ability of producers to do so. Factors, such as the structure of the product markets, the prices of other inputs, and the method of production--for example, the feasibility of automation--are required to be taken into account. As for the outward shift of  $L^S$ , one would need to understand the behavior of labor suppliers, which involves looking at the growth and composition of the population and the labor force participation rate.

The above-mentioned solutions are interdependent and theoretically sound. However, before a suitable policy can be proposed, we have to make sure that there is, in fact, a

labor shortage in Taiwan.

## 2. Does Taiwan Have a Labor Shortage?

To explore the labor shortage requires discussing the method of measurement. From Figure 1, one may use the difference between the quantity demanded and the quantity supplied at a certain point of time to test if a labor shortage exists. In general, the quantity supplied is the sum of employed and unemployed persons, that is, the total labor force, while the quantity demanded is the sum of employed persons and job vacancies. Hence, labor shortage is the value of vacancies minus unemployed person.

However, the quantity of labor supplied can only be looked at from viewpoint of the whole economy because unemployment cannot be segregated by industry, though employment can. Furthermore, although job vacancies can be segregated by industry, the data is not available. Nevertheless, since the number of unemployed persons changes inversely with job vacancies (Dicks-Mireaux and Dow, 1959, Hansen, 1970), we may use the former as a substitute for the latter. Moreover, starting from 1964, the Department of Civil Employment Services has provided job application and vacancy registration services. Even though the number of registrants is not huge and most jobs listed are low-skill positions, the vacancies/applications ratio is used to detect the status of the labor shortage in the whole economy. In order to comprehend the status of the labor shortage in each industry, we additionally use the data from a survey of firms in specific industries to observe where the labor shortage prevails and which industry the worst situation is found.

### (1) Unemployment Rate Over Time

According to the official statistics, as collected in Table 1, starting from 1965, the unemployment rate in Taiwan has consistently been less than 4%, half of the 1960s had a rate of less than 4%; starting from 1968, however, with the exception of 1975 and 1982-1986, every year has had a figure of less than 2%. Hence, Taiwan could be judged as having had full-employment for a quarter of a century.

Moreover, Wu (1985) shows that the real wage in Taiwan before 1965 was



determined according to the average labor productivity in the agricultural sector--the subsistence level--which is consistent with having had a labor surplus.

Hence, one may believe that the labor surplus situation in Taiwan disappeared in the second half of the 1960s. From then on, the labor market has become increasingly more tight. Examining the tightness of the structure by age group, Table 2 shows that the unemployment rate declines with age until the age of 45, and that the 15-19 and 20-24 age groups have had an unemployment rate larger than 4% since 1982, which indicates that the labor shortage of youths is not severe, perhaps this is a result of compulsory military requirement and the fact that the youths are mostly new entrants to the labor market. Looking into the tightness of the labor market in terms of level of education, the unemployment rate of those with an educational level of 9th grade or below is the lowest (see also Table 2). The rate of those with an educational level of 6th grade or below is even lower and the rate of those who never had any schooling is close to zero. Education is usually used as an index of labor quality, the lower a person's level of education is, the lower their labor skills are. Therefore, the shortage of those with an elementary school education is relatively severe, which has encouraged the emergence of foreign workers into Taiwan's labor market.

Though the unemployment rate can sketch the condition of the labor shortage, it gives only the supply-side story. We, therefore, discuss the demand-side conditions using the data on vacancies and applications.

## (2) Variations of Vacancies and Applications

Before 1968, the available data (see the last column of Table 1) shows that the number of vacancies was less than the number of applications; the ratio of vacancies/applications is less than 1, which is consistent to saying that it corresponds to the labor surplus era in Taiwan, as described in the previous section. On the other hand, the number of vacancies was larger than the number of applications since 1968, the ratio of vacancies/applications was 1.29 in 1968 and increased over the 1970s. But the ratio declined to below 2 (1.94) in 1980, to less than 1 in 1985, and climbed to 1.70 in 1986, 2.69 in 1987,

and 2.88 in 1988. Hence, the data reveals a general condition of tightness in the labor market and verifies the existence of the labor shortage.

To analyze further, by education and age group, one can see from Table 3 that, even before 1986, when high school and above graduates had applications which totalled more than vacancies, those of 9th grade or below had a ratio of vacancies/applications larger than 1, and those of 6th grade or below had a value greater than 3. The corresponding figure for those with 6th grade or below in 1988 was strikingly up to 14.7, which, combining with their low unemployment rate, proved that the labor shortage of low-skill workers was relatively severe. The ratio of vacancies/applications by age group does not indicate a consistent trend, perhaps implying that workers are not segregated by age.

We may conclude at the present time that, after the mid-1960s, the general labor market in Taiwan had transferred from a labor-surplus to labor-shortage condition and that the shortage is more severe in the area of low-skill workers. However, does each industry face the same situation? Or in some industries is the situation more severe while in others being more balanced? To understand these questions, let's explore the questionnaire results of our industry-firm surveys.

### (3) Surveys on the Labor Shortage

#### a. Employees Movements and Status Survey

The Directorate-General of Budget, Accounting and Statistics (DGBAS) of the Executive Yuan started to conduct the "Employees Movement and Status Survey in the Taiwan Area" in 1975 to collect data on new entrants and those leaving the job market and on the decision of each firm to increase or decrease its number of employees.

The results are reported in Table 4. Relatively speaking, the percentage of firms in the Mining & Quarrying Industries facing a labor shortage is not significantly increasing, while other industries show an intensifying of the labor-shortage problem since 1982. For example, the percentage of firms in the Manufacturing Industry facing a labor shortage was 19.25%, 15.56%, 30.31%, 52.48%, and 55.53% of those surveyed in 1981, 1982, 1983, 1984, and 1987 respectively. Among the manufacturing sectors, Textiles, Wearing Apparel &



Accessories had relatively high ratios, which is consistent with the news reports. However, the condition in the Construction Industry was not particularly severe, though a labor shortage did exist there.

Starting from 1988, the survey collects information of whether firms were short of workers or not, the number of workers that they were short, reasons for the shortage, reasons for the difficulties hiring workers, their strategy responses and the kinds of government policy that they would like to see implemented in this area.

At the end of 1988, 24.55% of the firms in the industrial and services sectors were short of workers (column(1) of Table 5)--by a total number of 321,482 (column(3) of Table 5). However, regular turnovers (frictional unemployment) should not be counted towards the number of workers that constitute the labor shortage; hence, they have to be subtracted from the total. So the net "shortage of workers" was actually around 252,000 at the end of 1988 (column (4) of Table 5). In terms of industry, the Manufacturing Industry had the largest shortage (163,879), the Construction Industry was next (41,827), the Commercial Industry was third (30,491), and the rest of the industries had minor shortage(15,392 in total). In terms of firm size, the smaller the firm is, the more severe the shortage is. Perhaps a smaller firm is in a relatively disadvantage position in attracting and keeping workers. In terms of location, the north area of Taiwan was the worst location, which may be due to the relatively high density of firms to labor supply.

In terms of the vacancies/applications ratio, the sum of the industrial and services sectors was 7.10% (column (6) of Table 5), and net of the regular turnovers was 5.66% (column (7) of Table 5). Among the various industries, the Construction Industry had the highest net ratio (9.92%), the Manufacturing Industry was next (6.82%), the Commerce Industry was third (4.02%), and the rest of the industries had a minor shortage.<sup>3</sup> Observing the vacancies/applications ratio by firm size, it is found to be declined with the increase in firm size. By location, the vacancies/applications ratio in the northern Taiwan area was the highest, but the shortage in southern Taiwan was also relatively high.

Concerning the degree of difficulty in hiring workers, Table 6 reveals that 93.75%

of the firms with a shortage of workers admitted some difficulties in hiring. This implies that the labor shortage is not a transitory phenomenon. As for the reasons for these difficulties, "no applicant" was the most conspicuous reason, the next was "interest did not match" and then wages asked too high, which shows a discrepancy in the employment information gathered from employers and that from employees.

To explore the labor shortage by occupation, Table 7 reports the surveyed results of 1981 and 1984 for the Manufacturing and the Construction Industries. For the Manufacturing Industry, in 1981, out of the firms that were short workers (19.25%), 12.43% responded that they were short of production operators and 3.81% technical workers. In 1984, out of the firms that were short workers (52.49%), 30.73% responded that they were short of production operators and 12.54% technical workers. In the two most serious 2-digit industries that have had a shortage of workers, Textile Industries and Wearing Apparel & Accessories had a shortage of production operators in 1981 and 1984. For the Construction Industry, in 1981, out of the firms that were short workers (21.53%), 13.43% lacked of technical workers and 2.90% lacked production operators. In 1984, out of the firms that were short workers (30.13%), 16.20% lacked of technical workers and 5.92% lacked both laborers and service workers.

b. Special Survey of October 1987

Due to prevalent claims of a labor shortage, the DGBAS of the Executive Yuan surveyed more than 900 firms in the Manufacturing and the Construction Industries by correspondence to try to gain a better understanding of the status and impact of the labor shortage on them; the report was published in October 1987. The results are summarized in Table 8. In Manufacturing, 65.85% of the firms were short labor. Out of the twenty 2-digit categories, Wearing Apparel & Accessories, Fabricated Metal Products, Electrical & Electronic Machinery & Equipment, and Precision Instruments were short the most workers. Textiles were not particularly worse off than other industries. In the Construction Industry, 76.96% of the firms were short labor, which was higher than the figure in the Manufacturing Industry.



In terms of the number of workers that the firms were short, the Manufacturing Industry was short 200,000 workers, in which Textiles, Wearing Apparel, Plastics, and Electrical Products were at the top of the list being short 20,000 or more workers. The Construction Industry was short 124,000 workers, in which Basic Civil Structure and House Construction were short the most 108,000 workers in total.

As a further step to comprehend labor-shortage situation in Taiwan, we calculate a shortage ratio by dividing the number of workers that an industry was short by the sum of their total employees and the number of workers that they were short. The ratio is 7.75% in the Manufacturing Industry and 25.38% in the Construction Industry (see the last column of Table 8). If we subtract the regular turnover rate from the ratio, then the figures decrease to 4.3% and 20.2% for the Manufacturing and the Construction Industries respectively. Obviously, the labor shortage problem in the Construction Industry is more severe.

The same survey also asks firms about the degree of their difficulty in hiring workers, which is summarized in Table 9. It shows that 43.79% of firms in the Manufacturing Industry felt that they had a very difficult time in hiring; the corresponding figure in the Construction Industry is even higher (51.59%). As for the reasons for the difficulties in hiring workers, the firms in the Manufacturing Industry responded that "no applicant" (39.26%) and "interest did not match" (36.58%) were the primary two major reasons while the firms in the Construction Industry responded that "payment was too low" (51.46%) and "no applicant" (33.15%) were their primary two reasons. Hence, the Construction Industry may have to raise wages to attract workers.

#### c. Survey of Industrial Associations

In 1988, the Ministry of Economic Affairs surveyed 20 industrial associations in the top ten industries in the industrial sector as judged by the number of their employees, to understand the status of the labor shortage in them. It found that only the Industries of Artificial Fabrics and Daily Chemical Sanitary Products did not have a labor shortage, while the Industries of Candies & Biscuits, Tires, and Plastic Products were short workers at a

level of 15%, the Industries of Canned Food, Animal Feeds, Wearing Apparel, Wool Textiles, Clothing Manufacturing, Rubber Products, Furniture, Machinery, Electronic Equipment, and Sports Products were short workers at a level of 20%-35%, the Toy Industry was short workers at a level between 20% and 50%, the Knitting Industry was short workers at a level between 30% and 40%, and the Shoe Manufacturing and Construction Industries were short workers at a level of 40%.

From the above description, we are now more sure that labor shortage problem in Taiwan has increased since 1980. The Industries of Textiles, Wearing Apparel & Accessories and Construction have been hit the worst.<sup>4</sup> And production operators and technical workers, that is, elementary labor, are the major categories of workers where the shortage has been found. This phenomenon is consistent with the functioning of the principle of comparative advantage in the theory of economic development.

### 3. Policy Suggestions on the Labor Shortage

This sub-section will first describe the reactions of those firms that have felt the pressure of the labor shortage and then suggest some alternatives based on our objective statistical data.

#### (1) Reactions of the Firms

##### a. Employees Movement and Status Survey

The survey inquired into the reactions of the firms that faced labor shortages beginning in 1987. For the whole Manufacturing Industry, 59.18% of the firms raised wages and benefits to attract workers, 53.51% of the firms improved production techniques or procedures to save on labor, and 42.25% of the firms tried to hire workers elsewhere. Firms in the Textile Industry were hit the worst by the labor shortage, and also adopted these three methods. In 1988, the primary reaction was to raise wages and benefits (67.69%); other reactions were to improve production techniques or procedures, entrust or transfer contracts to other firms, and install automated equipment.

Observing the Construction Industry, which was crying out about the labor shortage

the most and whose firms in 1987 often tried to hire workers from elsewhere (55.93%), primarily entrusted or transferred contracts to other firms (45.04%), and raised wages and benefits (37.59%). They did not emphasize improving production techniques or procedures; this option was only adopted by 17.61% of the firms. In 1988, the major reaction was to raise wages and benefits (56.09%); other important strategies included entrusting or transferring contracts to other firms, trying to hire workers from elsewhere, strengthening the connection of the firm with the employment assistance service network.

In sum, raising wages and benefits and trying to hire workers from elsewhere are the two major strategies adopted by firms when facing labor shortages, but the first one is preferred by the firms of the Manufacturing Industry and the second one is preferred by the firms of the Construction Industry. The different priority of strategies is related to the different characteristics and the structure of labor demand of each industry. The Manufacturing Industry has a relatively fixed level of employment, hence its firms would rather to raise wages and benefits to attract workers first, while the Construction Industry depends heavily on the employment of temporary workers since its labor demand fluctuate based on the nature of its contracts; hence, it would first like to try to hire workers from elsewhere and, therefore, foreign labor is an important source to meet their demands.

#### b. Survey of Industrial Associations

The survey was conducted by the Ministry of Economic Affairs in 1988, as described in section II 2(3)c. In responding to how the government may help businessmen to battle the labor-shortage problem, 18 out of 20 associations replied that they would like to get help from the government to introduce foreign workers, 8 out of 20 wanted to enlarge their firm size and introduce automated equipment, 4 out of 20 wanted to strengthen "social" education and that on the responsibility of a worker; two separate groups of three associations in the survey wished to strengthen school education and nourish a philosophy which would foster respect for work in Taiwan's youth and suppress the speculative atmosphere; three separate groups of two associations also respectively wished that the government would assist labor-intensive industries moving overseas and strengthen job



training, balancing theory and application.

This information shows that the firms eagerly wanted the government to increase the labor supply, in particular by legalizing the introduction of foreign workers, while they would use other substitute inputs to reduce the demand for labor in a coordinated effort. The strategies are consistent with the results described in the previous section, i.e., to increase the labor supply directly on the one hand and to raise labor earnings so as to ease labor demand and increase the participation rate on the other.

## (2) Messages from Objective Statistical Data

The description of Section II,2,(1) shows that the labor shortage in Taiwan is a result of a combination of changes in labor supply, labor demand, and labor earnings. All of them have increased over the past 40 years, but the increment of increase in the rate of labor supply has slowed down (Wu and Chang, 1989). In fact, Taiwan's labor shortage is a direct result of its economic development: moving from a stage of labor surplus to that of partial labor shortage and finally to that of labor shortage under a competitive labor market structure (see Wu, 1985, 1987, Chang and Wu, 1983). In the process, labor shortage boosts labor earnings and creates more job opportunities. Under the philosophy behind the market mechanism, the government should keep its hands off as usual and let the suppliers (the labor) and the demanders (the employers) adjust by themselves. In this regard, trying to improve working conditions through the Labor Standards Law is not legitimate. Moreover, the government needs to eliminate those policies that might potentially interrupt the Laissez-Faire nature of the labor market. Therefore, faced with a labor shortage, the policy should only concentrate itself on the increase in the labor supply so as to ease the pressure.

The increase of the labor supply is related to the growth of the labor force, which depends upon changes in the size and makeup of the population, and the labor force participation rate (LFPR). Available data (see Wu and Chang, 1989, for details) reveals that the growth in the size of the population has been more important to the growth in the labor force in the past 40 years. However, the growth in the size of the population is a

long-run factor. With the rapid growth of the economy, changes in people's attitudes, and increases in education, this growth has been reduced and might become negative in the future just as the developed countries have experienced. Since the population density in Taiwan is too high, a policy to encourage the fertility rate is not expected. So the only feasible policy is to encourage an increase in the LFPR.

Compared to the data of the U.S. and Japan, Taiwan's LFPR has been relatively low and stable over time. The male's LFPR has slightly declined while the female's has increased (see Table 10). The female's LFPR was lower in 1989 than it was in 1988, which deserves closer future examination. In addition, it is important to explore why a potential worker stays out of the labor market. These two aspects relate to the problem of so-called "working willingness." Nowadays, some advocate attracting this potential labor force into the labor market. However, if the government follows suit, it has to take account of the costs of attracting these people and the negative impact it would have on the distortion of wages. Before implementing the policy, the government needs to evaluate the proposal using cost-benefit analysis. This is an important topic, one that has to be seriously examined. Moreover, extracting every worker's best effort in his/her work, achieving efficient use of labor, and improving labor productivity are all interesting subjects for future study.

Of course, introducing foreign workers is a way to increase the labor supply and is zealously anticipated by firms. However, due to the social costs of foreign workers, as experienced in the developed countries, most people are inclined to continue to prohibit it completely. The arguments of the debate need some solid theoretical and empirical analysis. If it is difficult to obtain relevant data, then the case studies of other countries should be reviewed in order to formulate a better policy. Given the severe labor shortage in Taiwan, study of the problem of foreign workers is necessary.

### III. FOREIGN WORKERS IN TAIWAN

## 1. Background Description

Before 1986, some foreigners had already been working in Taiwan. Most of them were professional and technical workers, such as foreign advisers, managers of firms that came along with foreign investment, foreign language teachers, and exchange scholars. Today, the number of these advanced foreign workers has expanded, but because of their high quality and large contribution to production, they are welcomed by the local people.

Since 1986, the inflow of nonskilled or low-skilled foreign workers has gradually been getting attention. Most of them work in the Manufacturing Industry and the Service Sector. Originally, only Thai workers and Philippine housekeepers were reported in the news papers. By the end of 1987, however, a series of reports on foreign workers, the majority of whom had come from South-East Asia countries--the Philippines, Thailand, Malaysia, Indonesia, and even some mainlanders holding Thailand passports, appeared in the news. The estimates of the number of foreign workers in Taiwan vary from 10,000 to 300,000.

Most public opinion, officers, and scholars object to the introduction of foreign workers. Their arguments include:

- (1) Foreign workers will substitute for domestic workers and then raise the unemployment rate,
- (2) Cheap labor will allow declining industry to survive, which will then deter the upgrading of the local industrial structure,
- (3) Nonskilled foreign workers will drag down the wages of domestic nonskilled workers and then deteriorate the income distribution,
- (4) The external social costs of foreign workers, such as social tension, disharmony, and higher crime rate, would have to be shared by all people,
- (5) The inflow of foreign workers will increase the population density of Taiwan, which will, in turn, increase the costs of public facilities expenditures,
- (6) Cheap labor would strengthen the price competitiveness of Taiwanese products, accumulate more foreign exchange, so as to intensify the pressure for appreciation of local currency,



- (7) If foreign workers earn less, criticism of exploitation and discrimination may arise, and allowing foreign workers to organize unions to fight against adverse treatments may hurt the existing harmonious management-labor relationship.

At first glance, these arguments seem stimulating. Nevertheless, whether they are solid or not in theory and consistent empirically deserve our further examination. If they are sustainable, one should know their impact and how to minimize the resulting negative influence.

On the other hand, some welcome the introduction of foreign workers. For example, most firms wish the government would open the door to foreign workers for it being in their own interest; moreover, some scholars also support the introduction of foreign workers to reduce the speed of investment overseas; some officers intend to legalize the introduction of contracted foreign workers on a case-by-case basis, particularly for the public construction projects, in the hope of avoiding any external costs. Before we make any judgement on these viewpoints, let's first analyze the impact of foreign workers in terms of economic theory.

## 2. Economic Analysis of Foreign Workers

### (1) Short-Run Effects on Homogeneous Workers

Assuming that workers are homogeneous across the country and human and physical capital are fixed, two viewpoints of the impact of foreign workers on domestic employment exist. One is the theory of "substitution," which claims that allowing a foreign worker to work locally will decrease the job opportunities for the domestic workers. Another is the theory of "segregation," which claims that local employers usually hire a foreign worker for a job that is not wanted by domestic workers or where they cannot find a domestic worker who can handle; therefore, the employment of foreign workers will not interfere with the employment opportunities for domestic workers.

These theories represent the two extremes, the reality is usually a question of "price."

With the exception of a few jobs requiring skills, most jobs taken by foreigners can be handled by domestic workers; as for whether a domestic worker will take the job depends upon if the wage is good enough. On the other hand, whether hiring of foreign workers decreases the number of jobs available locally depends upon the elasticity of the domestic labor supply which is often less than 100%. Theoretically, through an efficient means of taxation and subsidies, foreign workers may boost the welfare of domestic employers and employees. In this regard, prohibiting foreign workers is an inefficient policy.

### (2) Short-Run Effects of Heterogeneous Labor

The assumption of homogeneous labor conflicts with the theory of "segregation" in concept, because those that can be segregated must be heterogeneous labor. On the other hand, it seems like that "high level," "technical," "professional," and "scientific" foreign "experts" and "scholars" are welcomed by all people, while only low-skill foreign workers are generally scorned; this phenomena is not consistent with the assumption of homogeneous workers, yet it can be analyzed with the assumption of heterogeneous workers.

Assuming that there are only two types of workers, one being nonskilled workers and the other being skilled workers. In the short-run, where capital is fixed, to import a certain type of workers will influence that type of workers domestically as described in the previous section, and affect the other type of workers according to their complementary or substitutionary relationship. If both types of workers are complements, then the increase in foreign nonskilled workers will increase the demand for domestic skilled workers such that skill workers' wages and employment level increase simultaneously. If both types of workers are substitutes, the opposite effect will arise.

### (3) Effects on the Variation of Capital and Technology

Foreign workers may not only cause complementary or substitutionary effects on the different types of workers, but also may have prolonged influence on the level of capital and technology. Capital can be differentiated either as physical or human. Generally, when nonskilled workers are relatively scarce, wages are relatively high, firms will then use more machines to replace labor, thus upgrading the industrial structure from labor-intensive to

capital- and technology-intensive. Yet putting aside whether "technology promotion" must be pursued in each stage of economic development, the upgrading procedure is not a certainty. Otherwise, economies with relatively scarce population supplied should have become the economies with the most advanced technology.

When nonskilled (or skilled) workers are not sufficient, investment may be halted because of the lacking of labor inputs that match the production process. The decision to invest more (including to substitute capital for labor using the same technology, or increasing the investment on technology to utilize relatively more sufficient skilled workers) or not to invest domestically (including to consume instead of investment and invest overseas to take advantage of the relatively abundant supply of labor there) primarily depends upon the demand for products, that is, profitability, and cannot be determined purely from the variation in the labor market. When domestic businesses would rather take the trouble (monetarily and legally) of introducing foreign workers, one may guess that profits do exist. Suppose the government suppress their behavior, then their reaction would be probably to invest overseas.

If businessman must choose between introducing foreign workers and investing overseas, then the former strategy will benefit more to the domestic workers through complementary features because to invest overseas is, in a sense, exporting the country's labor demand while introducing foreign workers at least increases the job opportunities for management personal. In the era of labor surplus, introducing "foreign capital" (including advanced-skilled workers, who are usually referred as capital or technology) is to help in the employment of domestic nonskilled workers (e.g., export processing zones) and to expand technology. In the era of a nonskilled workers shortage, where capital is relatively abundant, wouldn't it be a good policy to introduce foreign nonskilled workers, keeping capital in the production sector, rather than letting it go into money games, whereby providing employment opportunities for domestic skilled workers?

Furthermore, the saying that foreign workers will deter the development of technology is also questionable. Firms use more advanced machinery equipment indicates



technological progress , but investment in human capital is another important source of technology. Henceforth, we believe that the introduction of foreign workers may not guarantee that capital owners will upgrade equipments, yet the fact that foreign workers would make the wages of nonskilled workers relatively lower will encourage the investment on human capital due to the larger rates of returns. In other words, foreign workers, as they affects the domestic wage structure, help to nourish physical investment in the short-run and human capital investment in the long-run.

#### (4) Economic Justice

Though "justice" has no generally acceptable criterion, everyone would probably agree that justice has deteriorated if the income level of nonskilled workers (who are in the lower segment of the income scale) declined. Suppose foreign workers are comprised of nonskilled workers then, unless economies of scale are strong, the income of domestic nonskilled workers would be threatened. On the contrary, employers, who usually are in high income category, gain more in profits from the employment of foreign workers. Thus, the income distribution would become worse.

The result of income inequality may be the most striking difference in the economic impacts between introducing "foreign labor" and introducing "foreign capital." Introducing foreign capital into a country with an insufficient supply of capital would lower the price of capital there and provide employment opportunities such that the improvement of the income distribution would be accompanied by economic growth. The secondary impact would be to increase the returns to investment, which would further expand employment opportunities, as long as the relative input price is not severely distorted. On the contrary, introducing low-skill foreign workers would only benefit employers while hurt the domestic low-income workers.

Nevertheless, the disadvantage of income redistribution is not an inevitable outcome. Theoretically, since foreign workers contribute to the net increment of social welfare, the government may use taxation and subsidies to compensate the affected domestic low-skill workers. Thus, the effects of the income inequality would be minimized and the investment

in human capital could be actively improved.

(5) External Effects and Noneconomic Effects

The fact that ownership and consumption cannot be separated is another difference between foreign workers and foreign capital. When foreign workers use the local public facilities, possibly enjoy various welfare benefits, some external costs may exist. In addition, foreign workers are less mobile than capital, some even become pertinent immigrants and create noneconomic effects.

As for use of public facilities, or pure public goods, such as national defense, which have a marginal cost of zero, free consumption of these by foreign workers does not involve any external costs. If foreign workers pay taxes, as they are required to by law, then there are even external benefits. Yet when the consumption of public goods is at its maximum level, then there are congestion costs with adding consumption by foreign workers. The added consumption by foreign workers would reduce the utility of local consumers and result in external costs. Hence, whether foreign workers using public facilities has any external effects and which type depends upon population density and if foreign workers pay their fair shares of taxes. The lower the population density is and the more widespread foreign workers paying taxes are, the larger external benefits there are and the smaller external costs are.

Actually, the most possible costs that foreign workers may give rise to relies on the level of social welfare programs, such as social insurance expenditure and education subsidies. Since currently Taiwan does not expend huge amounts of money on social welfare, foreign workers are usually young and strong, neither taking advantage of mandatory education, nor demanding much in the way of medical insurance, and immigration has yet to become a problem, so the external costs of foreign workers at the present time are not much and can be ignored.

In spite of that, foreign workers might get more used to the environment of Taiwan and try to immigrate here in the future. Immigration provides opportunities for amalgamation of different people and different cultures. Yet, the negative impact in terms

of culture struggles, race conflicts, education subsidies for the second generation, and the support of old age relatives will cause serious economic and noneconomic effects just as experienced by the U.S. and European countries.

### 3. Reasons Behind the Appearance of Foreign Workers

From the analysis of previous sections, we may conclude that the positive economic effects caused by foreign workers seem bigger than the negative effects. The worst negative impact arise when foreign workers immigrate. Suppose we can eliminate the possible negative effects, then to introduce foreign workers would be better than to prohibit them thoroughly, not to mention that we actually would not be able to prohibit them completely. If, however, prohibition were to be followed, we would have to understand the reasons behind the appearance of foreign workers.

The appearance of foreign workers is similar to the workers movement within a country. The difference is that the former is harder to deal with. Everyone measures his/her own ability and constraints, the opportunities and differences among the different regions, and moving costs to decide whether to move or not. Two basic powers influence the behavior of movements: one is the "pushing" force, another is the "pulling" force. The pushing force comes from the source country, which has relatively worse living or working conditions and push labor force out. The pulling force originates in the host country, which has relatively attractive conditions and pulls the foreign workers in. The magnitude of the pushing and pulling forces is related to individual preferences and viewpoints. Of course, the moving costs also have to be considered. In general, there are explicit and implicit moving costs. Explicit moving costs include higher rent, cost of living, and cost of transportation in the host country; implicit moving costs are those related to suffering as a result of staying away from home. Any worker ready to move must have already taken account of the various costs and benefits and still thought that it was worth while, otherwise, why would he/she bother to move?

In this regard, we can better understand the inflow trend of foreign workers to



Taiwan using per capita GNP as a measure of the pushing and pulling forces of the different regions. As we mentioned earlier, the source countries of foreign workers now in Taiwan are primarily Thailand, the Philippines, and Malaysia. In 1988, the per capita GNP of Taiwan was US\$6,333, while that of Thailand was US\$1,048, that of the Philippines was US\$666, and that of Malaysia was US\$1,925. In short, Taiwan's was 6 times that of Thailand, 9.5 times that of the Philippines, and 3.3 times that of Malaysia. This index supports the push-pull theory.<sup>5</sup>

Looking at another aspect, the rapid economic growth of Taiwan, which is consistent with the principle of comparative advantage of international trade by developing labor-intensive exporting industries, has resulted in an intensified demand for labor. Though the supply of labor is also increasing, its magnitude is relatively insufficient when compared to the increase in labor demand. Hence, the wages have climbed fast; on an annual average, the rate of increase has been 7.15% over the period 1977-1988. As wages have improved, the number of job opportunities with high wages and better working conditions has also expanded, so the jobs with low wages and worse working conditions have been vacant for a long time. Moreover, the workers' improved quality of life has promoted the demand for workers' rights, which is threatening to the traditional operation of businesses. Under such circumstances, employers are inclined to hire cheap, hard working, and passive foreign workers, if available.

What we try to emphasize here is that the economic development in Taiwan has already moved to the stage where it is attracting low-skill foreign workers. If domestic businessmen feel that it is worth while to hire them and foreign workers feel that it is worth while to move to Taiwan for a job, then the effectiveness of prohibitive laws is questionable, especially when the costs of policing them would be high. Illegal foreign workers, therefore, won't be eliminated. If this is the case, the government had better legalize foreign workers, with some suitable constraints, to minimize the negative impact of foreign workers on the Taiwanese economy.

#### 4. A Suggested Policy on Foreign Workers

Currently, it is impossible for Taiwan to totally open its doors to foreign workers. But to prohibit them absolutely is not feasible either and may even hurt the dignity of the laws as well as their economic efficiency. The Council of Labor Affairs of the Executive Yuan has announced repeatedly that foreign workers will not be allowed on the one hand, but tacitly has turned its eyes as firms have hired foreign workers under the names of training and touring. The government has also permitted foreign workers to work on government construction projects on a contracted basis, as a special case, on the other hand. The damage to the government's reputation and the creation of unfair standards among firms in the same industry cannot continue.

A perfect means the government can consider to solve this inconsistency is to auction off a limited number of quotas on the hiring of foreign workers and use the auction revenues to subsidize workers' training programs. This practice solves the problem of income redistribution and the decrease in welfare of the domestic low-skill workers simultaneously and improves workers' quality.

This auction is not the same as an auction of slaves, because the hiring of foreign workers is a voluntary behavior. Since the bidders are firms, the criticism of being unfair to the low-income earners, as observed in the auction of immigration right, does not exist. There are auctions in Taiwan for special telephone numbers and license plates, for example, so this proposal is quite feasible.

The merits of this auction proposal are obvious:

- (1) It is the most direct, fairest, and cheapest taxation method. Part of the profits created by the businessmen who hire foreign workers can be shared by the whole society. And the policing costs of taxation can be minimized.
- (2) The highest bidder would be the firms with the highest level of productivity; therefore, auctioning foreign workers would be efficient.
- (3) Since firms have to pay a fee to obtain the right of hiring foreign workers, the increased costs of hiring foreign workers would reduce the impact of foreign workers

on domestic workers.

- (4) Utilizing auction revenues to subsidize the training programs for low-skill workers can avoid the problem of identifying who are the victims of the inflow of foreign workers. Additionally, training itself is a kind of human capital investment, which can improve the workers' level of skill directly and make them more valuable through their own effort.

Taiwan's economy has already moved from the stage of capital shortage and of labor surplus to the stage of capital sufficiency and of labor shortage. One of the earlier policies of industrial development was to introduce foreign capital, including foreign direct investments and the establishment of export processing zones, which contributed significantly to the past development of the economy, of increased employment, of decreased unemployment, and even improved income distribution. Today, Taiwan faces another totally different challenge. Capital is sufficient; labor is in short supply; overseas investments are easier to make with the elimination of foreign exchange controls; and some private sectors have hired foreign workers illegally. The decision makers have to face reality and design and implement feasible policies to tackle these phenomena, from the standpoint of the whole society, as soon as possible. To auction the right to hire foreign workers and use the revenues to subsidize training programs for low-skill workers is an ideal policy that has taken into consideration the interests of every related party.

Of course, the experience of introducing foreign workers in other countries can be used as reference. We shall not expect the government to prohibit foreign workers completely forever. The problems of foreign workers must also be taken into account seriously. The best path is to take the current precautionary policies and turn the negative impacts into positive effects.

#### IV. CONCLUSION



According to our analysis, no matter whether looking at the problem from an objective statistical data or a firm reaction point of view, it is almost sure that Taiwan has encountered a labor shortage. This phenomenon may boost labor earnings and the living standard. What the government can do is to remove any related policies that may throw impediments in the way for people to participate in the labor market. Moreover, the labor shortage has brought with it the problem of foreign workers. However, good government policy on this phenomenon can allow the economy to benefit more than it suffers as a result of it. Our proposal to auction off a limited number of quotas on the hiring of foreign workers is an ideal policy to be considered.

### Notes

1. The current total population in Taiwan is around 20 million, the total labor force is approximately 8.4 million; the literacy rate for the population aged 15 and over was 91.6% in 1988, and the average education, in years, of those older than 30 was 8.52 in 1989.
2. The higher the elasticities (flatter) of the  $L^D$  and  $L^S$  curves are, the smaller the wage rate hike that is required is. The lower the elasticities (steeper) of the  $L^D$  and  $L^S$  curves are, the higher the wage rate hike that is required is.
3. The 2-digit industries that were significantly short workers include the Wearing Apparel & Accessories (11.36%), Wool & Bamboo Products & Non-Metallic Furniture (10.98%), Fabricated Metal Products (9.61%), Textile Industries (8.43%), House Construction (11.04%), Basic Civil Structure (10.21%), and Painting & Mounting & Matting(9.83%).
4. A dynamic consideration on the inflow and outflow of workers across industries would certainly provide a better understanding of the labor shortage, however, there is no such data available in Taiwan.
5. If we add expenditure for social welfare, the attraction power of Taiwan would be even more obvious.

## Reference

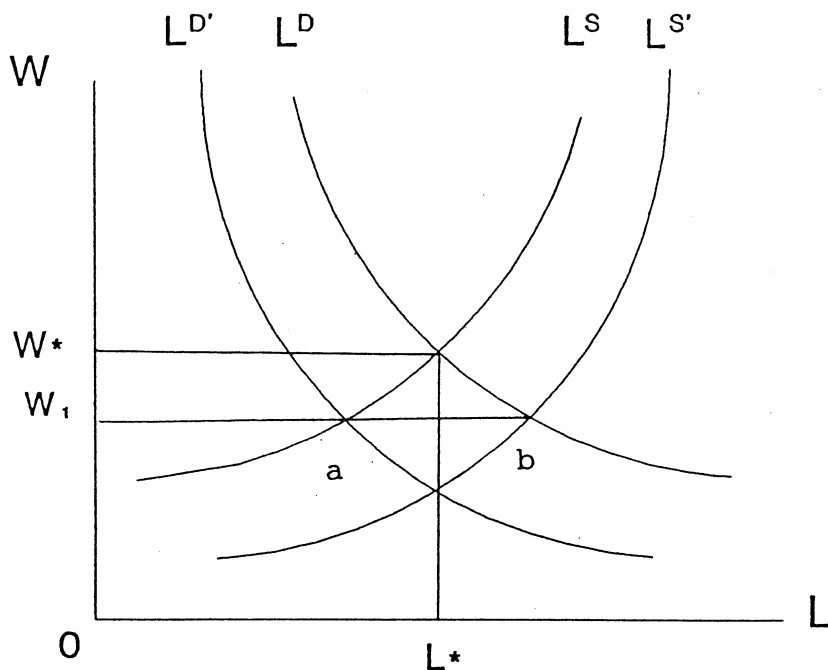
- Becker, Gary S., (1987): "Why Not Let Immigrants Pay for Speedy Entry?" Business Week, March 2.
- Chang, Ching-hsi, (1988): "An Economic Analysis of Guest Workers in Taiwan," paper presented at the Conference on Labour and Economic Development, Dec. 21-23, Taipei.
- \_\_\_\_\_, (1989) "A Study on the Labor Market in Taiwan," paper presented at the 1989 Joint Conference on the Industrial Policies of the R.O.C. and the R.O.K., Feb. 15-19.
- Chang, Ching-hsi and C.C. Wu, (1983): "From Wage Variations in the Manufacturing Industry to See the Competitiveness of Taiwan's Labor Market," Conference on Taiwan's Industrial Development, pp.427-444.
- DGBAS, Executive Yuan, Analysis Report of Current Labor Shortage in Taiwan Area, 1987, Taipei.
- \_\_\_\_\_, Analysis Report of Present Labor Shortage in Taiwan Area, 1989, Taipei.
- Dicks-Mireaux L. A. and J. C. R. Dow, (1959), "The Determinants of Wage Inflation: United Kingdom, 1946-1956," Journal of Royal Statistical Society, Series A. Part II, 122, pp.145-174.
- Gee, P.J. and B.Y. Zhen, (1988): "Analysis of Current Status of Elementary Labor Shortage," in Department of Human Resources Planning of Council for Economic Planning and Development of Executive Yuan, ed., Research Report of Human Resources Planning, No.7, pp.160-173.
- General Price Monitoring Committee of Ministry of Economic Affairs, Analysis of Whether to Introduce Foreign Labor, 1988, Taipei.
- \_\_\_\_\_, Review of Current Domestic Industrial Labor Shortage, 1989, Taipei.

- Hansen, B., (1970): "Excess Demand, Unemployment, Vacancies and Wages," Quarterly Journal of Economics, 84:1, Feb, pp. 1-23.
- Lee, Chen, (1975): "A Study of Current Labor Shortage in Taiwan," in C. Sun, ed., Essays on Taiwan's Human Resources, pp.153-192.
- Lee, J. S., (1979): "Empirical Study of the Functioning of the Labor Market in Taiwan", in Conference on Manpower in Taiwan, The Institute of Economics, Academia Sinica, Taipei.
- Lewis, W. A., (1954) "Economic Development with Unlimited Supplies of Labour," Manchester School of Economic and Social Studies, 2:2, May, pp.139-191.
- \_\_\_\_\_, (1958) "Unlimited Labour: Further Note," Manchester School of Economic and Social Studies, 26:1, Jan, pp.1-32.
- Lin, D.C., (1988): "Review of Problems of Foreigners Working in Taiwan," in Research Report of Human Resources Planning, No.7, pp.144-155.
- Liu, P. K. C., Interactions Between Population Growth and Economic Development in Taiwan, Monograph Series 7, The Institute of Economics, Academia Sinica, 1973.
- Ranis, G. and J. C. Fei, (1961): "A Theory of Economic Development," American Economic Review, 51, Sept, pp.533-565.
- \_\_\_\_\_, Development of the Labor-Surplus Economy: Theory and Policy, Homewood, Ill.:Irwin, 1964.
- Tsui, Tsu-Kan, Kwang Loh and Maria M.Y.Chang, (1973): "Women Workers in Taiwan," in Sino-American Conference on Manpower in Taiwan, Taipei: Academia Sinica, pp.327-367.
- Wu, Hui-Lin, (1985): "The Determinants of Taiwanese Wages," Bank of Taiwan Quarterly, Vol.36, No.1, pp.317-345.
- \_\_\_\_\_ and Ching-hsi Chang, (1989): Problems of Labor Shortage and Foreign Labor in Taiwan Area, Chung-Hua Institution for Economic Research, Taipei.

Wu, J.S., (1988): "Review of Foreign workers Policy," in Labor Committee of Executive Yuan and University of Dr. Sun Yat-Sen, eds., Conference Essays on Human Resources Management and Economic Development, pp.1-15.

Wu, Rong-I, (1976): "Analysis of Present Labor Shortage of Our Country," Bank of Taipei Monthly, Vol.7, No.5, pp.1-8.





$L^*$   
Figure 1

Table 1 Unemployment Rate and Vacancies/Applications Ratio in Taiwan

Year	Unemployment Rate (%)			Vacancies
	Total	Male	Female	Applications
1952	4.40	3.30	6.30	-
1953	4.20	3.20	6.70	-
1954	4.00	3.00	6.40	-
1955	3.80	2.80	6.10	-
1956	3.60	2.70	5.90	-
1957	3.70	2.80	6.00	-
1958	3.80	2.80	6.20	-
1959	3.90	3.00	6.20	-
1960	4.00	3.10	6.20	-
1961	4.10	3.20	6.30	-
1962	4.20	3.30	6.50	-
1963	4.30	3.40	6.50	-
1964	4.30	3.30	6.90	0.64
1965	3.30	2.30	5.90	0.87
1966	3.00	2.20	4.90	0.55
1967	2.30	1.80	3.50	0.98
1968	1.70	1.60	2.00	1.29
1969	1.90	1.60	2.60	1.44
1970	1.70	1.50	2.20	1.35
1971	1.70	1.50	2.10	1.29
1972	1.50	1.20	2.00	2.04
1973	1.30	1.10	1.60	2.32
1974	1.50	1.30	2.00	1.63
1975	2.40	2.10	3.10	2.10
1976	1.80	1.60	2.20	2.32
1977	1.70	1.70	1.80	2.03
1978	1.70	1.60	1.80	2.57
1979	1.30	1.20	1.50	2.42
1980	1.20	1.10	1.50	1.94
1981	1.40	1.20	1.60	1.61
1982	2.10	2.10	2.30	1.18
1983	2.70	2.70	2.80	1.58
1984	2.40	2.40	2.50	1.61
1985	2.90	2.90	2.90	0.93
1986	2.70	2.80	2.50	1.70
1987	1.97	1.96	1.97	2.69
1988	1.69	1.70	1.68	2.88
1989	1.57	1.57	1.56	2.59

Source: The Directorate-General of Budget, Accounting and Statistics (DGBAS) of the Executive Yuan, and the Statistical Department of the Ministry of Interior.

Table 2 Unemployment Rate in Taiwan by Education Level and Age Group

Unit: %

Year	Education Level			Age Group										
	9th-Grade or Under	High School	College and above	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65 and over
1978	1.03	3.69	3.15	3.95	3.77	1.54	0.64	0.38	0.43	0.43	0.82	0.76	0.34	0.17
1979	0.77	2.80	2.27	3.12	3.36	1.03	0.42	0.23	0.24	0.32	0.48	0.47	0.41	-
1980	0.68	2.62	2.23	3.21	3.13	1.09	0.44	0.31	0.19	0.29	1.43	0.44	0.29	-
1981	0.81	2.72	2.23	3.75	3.50	1.12	0.50	0.40	0.35	0.34	0.44	0.38	0.17	-
1982	1.42	3.81	3.14	5.18	5.45	2.02	0.98	0.88	0.64	0.56	0.88	0.71	0.59	-
1983	1.78	4.69	4.04	6.60	6.49	2.65	1.44	1.18	0.90	0.98	1.26	1.21	0.57	-
1984	1.50	4.26	3.85	5.85	6.23	2.64	1.30	1.00	0.71	0.72	0.98	1.02	0.69	0.12
1985	1.91	4.78	4.22	7.53	7.12	3.05	1.76	1.21	1.13	0.91	1.25	1.20	0.79	0.20
1986	1.68	4.41	3.76	6.76	6.79	2.95	1.50	1.22	1.05	1.01	0.95	0.82	0.89	0.23
1987	1.91	3.28	2.73	5.57	5.39	2.13	1.04	0.84	0.62	0.65	0.66	0.62	0.44	0.12
1988	1.02	2.69	2.36	5.02	4.78	1.95	0.94	0.70	0.56	0.57	0.43	0.40	0.55	0.12
1989	0.96	2.44	2.10	5.04	4.39	1.88	0.89	0.68	0.50	0.55	0.47	0.42	0.25	0.24

Source: Human Resources Statistical Monthly, the DGBAS of the Executive Yuan.

Table 3 Vacancies and Applications in Taiwan by Education Level and Age Group  
Unit: Person

Year	Category	Total	Education Level					Age Group						
			6th-Grade or Under	7th to 9th Grade	Regular High School	Vocational High School	University College and above	Under15	15-19	20-29	30-44	45-64	65and over	
1982	Vacancies	272366	62995	146447	24602	26420	7132	4770	2606	133646	98924	25567	10848	775
	Applications	230516	18768	102374	20788	64877	15298	8411	1116	107740	96877	16947	7531	305
	Vacancies /Applications	1.2	3.6	1.4	1.2	0.4	0.5	0.6	2.3	1.2	1.0	1.5	1.4	2.5
1983	Vacancies	369658	94257	192594	35458	38320	6197	2832	1371	165277	152480	36959	13402	169
	Applications	233402	20401	95828	21117	71766	16718	7572	473	101625	99782	21668	9463	391
	Vacancies /Applications	1.6	4.6	2.0	1.7	0.5	0.4	0.4	2.9	1.6	1.5	1.7	1.4	0.4
1984	Vacancies	54274	13663	22693	6718	8939	1580	654	598	187788	148299	39034	13529	81
	Applications	49063	4427	14996	44.8	19581	3988	1663	261	103859	104905	20284	8146	278
	Vacancies /Applications	1.1	3.1	1.5	1.5	0.5	0.4	0.4	2.3	1.8	1.4	1.9	1.7	0.3
1985	Vacancies	271368	57973	131942	29092	41056	7823	3482	344	126806	110918	24883	8389	28
	Applications	279737	19291	94493	22636	106332	25903	11082	351	107857	137542	25679	8101	207
	Vacancies /Applications	1.0	3.0	1.4	1.3	0.4	0.3	0.3	1.0	1.2	0.8	1.0	1.0	0.1
1986	Vacancies	450598	123939	185356	44700	64302	20032	12269	405	177770	209033	48216	15110	64
	Applications	265101	15524	86974	22031	96979	29269	15324	311	94092	136960	25425	8082	231
	Vacancies /Applications	1.7	8.0	2.1	2.0	0.7	0.7	0.8	1.3	1.9	1.5	1.9	1.9	0.3
1987	Vacancies	560538	132662	222966	60969	85153	37057	21731	143	186645	286705	64575	22369	101
	Applications	208481	11243	69674	16810	73666	22973	14115	94	76500	104174	20755	6692	266
	Vacancies /Applications	2.7	11.8	3.2	3.6	1.2	1.6	1.5	1.5	2.4	2.8	3.1	3.3	0.4
1988	Vacancies	584589	129419	211701	68002	86132	58548	30790	1417	177876	282865	91277	30581	573
	Applications	202991	8818	67448	15519	72131	25262	13813	110	72976	102780	20381	6366	378
	Vacancies /Applications	2.9	14.7	3.1	4.4	1.2	2.3	2.2	12.9	2.4	2.8	4.5	4.8	1.5

Source: See Table 2.

Table 4 Survey Data of the Labor Shortage

Year	1981		1982		1983		1984		1987
	Number of Firms Surveyed	Shortage Ratio	Number of Firms Surveyed	Shortage Ratio	Number of Firms Surveyed	Shortage Ratio	Number of Firms Surveyed	Shortage Ratio	Shortage Ratio
Mining & Quarrying	292	30.14	260	16.90	248	23.80	216	43.06	16.27
Manufacturing	3,377	19.25	3,644	15.56	3,726	30.31	3,746	52.48	55.53
Food Manufacturing	274	15.33	346	7.52	249	18.48	277	42.60	22.47
Beverage & Tobacco	34	11.77	35	14.29	37	10.82	39	25.64	19.84
Textile Industry	331	35.96	320	25.63	432	46.30	462	65.37	70.72
Wearing Apparel & Accessories	128	43.75	137	37.96	180	42.78	229	73.80	65.94
Leather, Fur & Products	98	21.43	54	18.52	133	39.85	125	56.00	61.57
Wool, Bamboo Products & Non-Metallic Furniture	180	10.56	218	15.14	252	25.00	193	46.11	55.91
Paper & Paper Products, Printing & Publishing	146	16.44	157	9.56	196	24.49	142	50.70	40.98
Chemical Materials	104	15.39	106	10.38	93	16.13	73	27.40	52.81
Chemical Products	108	10.19	178	9.56	105	17.15	104	35.58	33.89
Petroleum & Coal Products	16	12.50	17	5.89	15	26.67	18	33.33	60.38
Rubber Products	77	25.98	86	25.59	100	43.00	133	62.41	49.68
Plastic Products	286	20.15	354	16.95	305	34.76	404	59.16	64.32
Non-Metallic Mineral Products	207	10.63	197	8.63	162	19.14	206	47.57	54.50
Basic Metal Industries	183	9.84	144	6.95	122	15.58	94	36.17	54.59
Fabricated Metal Products	267	18.36	286	15.04	344	25.59	226	51.88	62.75
Machinery & Equipment	224	21.88	281	12.46	203	29.07	164	43.29	58.77
Electrical & Electronic Machinery & Equipment	338	15.39	363	19.01	385	35.33	426	50.70	71.24
Transport Equipment	140	15.00	176	15.91	164	25.00	157	43.31	50.85
Precision Instruments	67	10.45	50	8.00	57	24.57	58	46.55	72.48
Misc. Industrial Products	187	25.53	139	19.43	192	33.34	216	56.48	52.50
Electricity, Gas & Water	27	33.33	27	22.23	29	24.14	27	48.15	38.46
Construction	655	21.53	653	11.95	661	14.98	574	30.14	37.56
Commerce	860	15.70							
Transport, Storage & Communication	495	11.32	520	10.20	487	18.49	502	33.27	
Services	121	6.62	127	5.52	121	19.01	118	27.97	

Source: Employees Movement and Status Survey Report of Taiwan Area, the DGBAS of the Executive Yuan.



Table 5 Labor Shortages of Industrial and Services Sectors in Taiwan on Dec. 1988,  
by Industry, Firm Size, and Location

Category	(1) Number of Firms with Vacancies (%)	(2) Number of Firms Without Vacancies (%)	(3) Vacancies Not Filled (A) (Person)	(4) Vacancies Minus Regular Turnovers (B) (Person)	(5) Total Employees in the End of 1988(C) (Person)	(6) Vacancies /Applications Ratio (A)/(A)+(C) (%)	(7) Vacancies /Applications Ratio (B)/(B)+(C) (%)
<b>(1) By Industry</b>							
Industrial and Services Sectors							
Total	24.55	75.45	321,482	252,238	4,206,773	7.10	5.66
Mining & Quarrying	9.02	90.98	588	401	25,482	2.26	1.55
Manufacturing	39.53	60.47	214,677	163,879	2,238,408	8.75	6.82
Electricity, Gas & Water	2.86	97.14	300	248	35,580	0.84	0.69
Construction	30.91	69.09	49,522	41,827	379,995	11.53	9.92
Commerce	13.74	86.26	35,934	30,491	727,676	4.71	4.02
Transport, Storage & Communication	10.92	89.08	5,138	3,565	362,236	1.40	0.97
Financing, Insurance, Real Estate & Business Services	14.54	85.46	4,928	3,587	213,894	2.25	1.65
Community, Social & Personal Services	15.6	84.4	10,395	8,240	223,502	4.44	3.56
<b>(2) By Firm Size</b>							
Industrial and Services Sectors							
Total	24.55	75.45	321,482	252,238	4,206,773	7.10	5.66
Over 500 Persons	68.25	31.75	26,832	11,307	693,598	3.72	1.60
300-499 Persons	66.29	33.71	17,264	10,402	306,540	5.33	3.28
100-299 Persons	62.44	37.56	54,304	34,344	751,979	6.74	4.37
30- 99 Persons	48.47	51.53	80,906	63,139	955,078	7.81	6.20
10- 29 Persons	32.17	67.83	63,182	56,415	815,060	7.19	6.47
Under 9 Persons	17.97	82.03	78,994	76,631	684,518	10.35	10.07
<b>(3) By Location</b>							
Industrial and Services Sectors							
Total	24.55	75.45	321,482	252,238	4,206,773	7.10	5.66
City of Taipei	19.01	80.99	66,403	57,553	1,059,972	5.90	5.15
City of Kaohsiung	13.06	86.94	15,507	8,184	335,167	4.42	2.38
Province of Taiwan	28.58	71.42	239,572	186,501	2,811,634	7.85	6.22
North	33.58	66.42	123,428	100,787	1,275,497	8.82	7.32
Central	23.32	76.68	61,505	44,733	864,810	6.64	4.92
South	28.57	71.43	51,625	38,493	613,464	7.76	5.90
East	14.43	85.57	3,014	2,488	57,863	4.95	4.12

Source: See Table 4.

Table 6 Degree of Difficulty in Hiring of Firms With Vacancies  
December 1988

Unit: %

Category	Reasons of Difficulty in Hiring						
	Some Difficulties	No Applicant	Wages Asked too High	Skill Dose Not Match	Interest Does Not Match	Others	No Difficulty
<b>(1) By Industry</b>							
Industrial and Services Sectors							
Total	93.75	75.61	64.41	57.67	66.09	9.64	6.25
Mining & Quarrying	79.73	61.02	72.88	66.10	57.63	1.69	20.27
Manufacturing	96.17	77.02	66.50	61.01	69.48	10.50	3.83
Electricity, Gas & Water	100.00	--	--	--	--	100.00	--
Construction	93.76	72.87	62.31	46.47	43.81	10.03	6.24
Commerce	87.61	71.66	60.34	49.51	65.39	8.78	12.39
Transport, Storage & Communication	77.47	75.92	75.53	71.05	71.84	0.66	22.53
Financing, Insurance, Real Estate & Business Service	92.23	62.15	59.18	66.88	69.13	3.77	7.77
Community, Social & Personal Services	97.57	83.19	57.69	56.31	53.16	7.36	2.43
<b>(2) By Firm Size</b>							
Industrial and Services Sectors							
Total	93.75	75.61	64.41	57.67	66.09	9.64	6.25
Over 500 Persons	88.89	75.52	71.09	65.63	82.81	17.19	11.11
300--499 Persons	90.36	79.29	76.15	63.39	74.27	14.23	9.64
100--299 Persons	94.44	81.91	77.42	69.41	72.42	11.55	5.56
30-- 99 Persons	93.10	80.75	74.40	67.38	71.44	12.00	6.90
10-- 29 Persons	95.01	81.50	68.12	62.64	65.60	9.19	4.99
Under 9 Persons	93.32	70.01	57.58	50.44	63.69	8.79	6.68
<b>(3) By Location</b>							
Industrial and Services Sectors							
Total	93.75	75.61	64.41	57.67	66.09	9.64	6.25
City of Taipei	90.16	79.56	61.59	52.64	70.49	9.92	9.84
City of Kaohsiung	86.27	86.97	68.87	67.43	65.29	6.27	13.73
Province of Taiwan	95.32	73.86	65.06	58.74	64.78	9.72	4.68
North	96.81	74.36	60.85	58.51	60.43	9.18	3.19
Central	94.10	72.68	72.18	62.01	71.77	10.58	5.90
South	94.93	74.50	65.60	55.33	67.11	9.75	5.07
East	65.68	64.52	69.03	52.90	32.26	13.23	34.32

Source: See Table 4.

Table 7 Percentage of Workers (by Occupation)  
that the Manufacturing and Construction Industries Were Short in 1981 and 1984  
Unit: %

Occupation Industry	Year	Total	Managerial Workers	Clerical Workers	Engineers	Technical Workers	Production Operators	Laborers and Service Workers
Manufacturing	1981	19.25	0.36	1.52	0.75	3.81	12.43	0.38
	1984	52.49	2.06	2.14	2.64	12.54	30.73	2.38
Textile Industry	1981	35.96	0.61	1.21	0.61	5.75	29.01	0.00
	1984	65.37	1.52	0.43	0.87	11.25	48.70	2.60
Wearing Apparel & Accessories	1981	43.77	0.79	0.00	0.79	6.25	35.94	0.00
	1984	73.81	3.06	0.44	0.44	7.86	61.14	0.87
Construction	1981	21.53	0.00	0.16	2.29	13.43	2.90	1.37
	1984	30.13	1.74	2.26	4.01	16.20	0.00	5.92

Source: See Table 4.

Table 8 Status of the Labor Shortage, 1987 Manufacturing and Construction Industries in Taiwan

Industry	End of August 1987		Status of Labor Shortage in Firms		Number of Workers Shorted (2)	Percentage of Workers Shorted(%) (2)/((1)+(2))
	Total Employees (1)	Total Workers	Without Labor Shortage(%)	With Labor Shortage(%)		
Manufacturing	2381924	1884601	34.15	65.85	200068	7.75
Food Manufacturing	118526	85950	55.71	44.29	9649	7.53
Beverage & Tobacco	15928	11974	-	-	-	-
Textile Industry	295354	232738	39.91	60.09	25508	7.95
Wearing Apparel & Accessories	146687	126913	0.00	100.00	28275	16.16
Leather, Fur & Products	51526	42263	65.63	34.37	4910	8.70
Wool, Bamboo Products & Non-Metallic Furniture	96157	82675	41.10	58.90	6491	6.32
Paper & Paper Products, Printing & Publishing	89216	73253	74.59	25.41	4287	4.58
Chemical Materials	58205	45972	56.57	43.43	1857	3.09
Chemical Products	58073	37965	45.67	54.33	3804	6.15
Petroleum & Coal Products	12826	8774	-	-	-	-
Rubber Products	53576	43794	75.46	24.54	2430	4.34
Plastic Products	274016	210039	22.43	77.57	27875	9.23
Non-Metallic Mineral Products	99174	81617	47.42	52.58	5809	5.53
Basic Metal Industries	66637	53501	38.21	61.79	4831	6.76
Fabricated Metal Products	162875	128725	11.38	88.62	17526	9.72
Machinery & Equipment	100019	76119	36.37	63.63	4814	4.59
Electrical & Electronic Machinery & Equipment	409367	321944	18.62	81.38	31326	7.11
Transport Equipment	117133	88654	30.75	69.25	7952	6.36
Precision Instruments	29433	24191	11.59	88.41	2794	8.67
Misc. Industrial Products	127196	107540	48.23	51.77	9843	7.18
Construction	365210	285638	23.04	76.96	124210	25.38
Basic Civil Structure	135243	106758	13.75	86.25	48714	26.48
Houses Construction	147434	122949	19.51	80.25	59111	28.62
Electricity, Water, Gas Pipe	32956	21315	30.22	69.78	6717	16.93
Painting, Mounting & Matting	11671	8997	20.62	79.38	1884	13.90
Other Construction	37906	25619	34.46	65.54	7783	17.03

Source: The DGBAS of the Executive Yuan.

Table 9 Degree of Difficulty in Hiring, 1987 Manufacturing and Construction Industries in Taiwan

Category  Industry	Distribution of Degree of Difficulty in Hiring				Reasons of Difficulty in Hiring (%)				
	Total	Easy to Hire	Little Difficulty	Very Difficult to Hire	No Applicant	Pay too low	Interest Does not Match	Skill Does not Match	Others
Manufacturing	100.00	0.46	55.75	43.79	39.26	27.48	36.58	17.90	4.82
Food Manufacturing	100.00	1.41	75.63	22.96	12.20	58.41	89.23	2.87	1.43
Beverage & Tobacco	...	...	...	...	...	...	...	...	...
Textile Industry	100.00	0.56	57.50	41.94	53.24	9.73	41.62	5.70	0.00
Wearing Apparel & Accessories	100.00	0.00	19.89	80.11	86.45	10.10	3.45	7.20	0.00
Leather, Fur & Products	100.00	0.00	50.00	50.00	74.23	0.00	25.77	34.54	5.15
Wool, Bamboo Products & Non-Metallic Furniture	100.00	0.63	64.55	34.81	4.54	30.49	34.40	1.28	31.84
Paper & Paper Products, Printing & Publishing	100.00	0.00	90.14	9.86	17.59	20.86	73.64	5.50	3.27
Chemical Materials	100.00	4.75	72.01	23.24	80.59	24.40	75.60	0.00	0.00
Chemical Products	100.00	2.73	18.21	79.06	86.43	2.81	21.06	5.15	2.81
Petroleum & Coal Products	...	...	...	...	...	...	...	...	...
Rubber Products	100.00	0.00	83.98	16.02	41.60	33.59	41.60	16.80	16.02
Plastic Products	100.00	2.03	60.45	37.51	37.44	38.05	23.66	1.22	1.83
Non-Metallic Mineral Products	100.00	0.00	83.26	16.74	2.19	9.83	79.27	13.09	1.46
Basic Metal Industries	100.00	0.00	42.23	57.77	42.23	8.99	48.77	39.78	2.46
Fabricated Metal Products	100.00	0.00	63.03	36.97	36.82	34.74	49.65	13.68	1.69
Machinery & Equipment	100.00	0.00	64.16	35.84	18.37	41.49	5.65	71.08	17.47
Electrical & Electronic Machinery & Equipment	100.00	0.00	30.28	69.72	72.36	32.31	8.15	24.29	4.47
Transport Equipment	100.00	0.00	21.40	78.60	47.70	11.96	14.26	42.10	0.00
Precision Instruments	100.00	0.00	100.00	0.00	3.85	13.11	11.19	83.04	0.00
Misc. Industrial Products	100.00	0.00	53.32	46.68	15.35	10.93	78.15	0.00	0.00
Construction	100.00	0.11	47.89	51.59	33.15	51.46	25.77	21.49	14.14
Basic Civil Structure	100.00	0.34	50.98	47.40	27.73	55.55	23.22	12.13	21.92
Houses Construction	100.00	0.00	33.54	66.46	48.98	52.22	24.81	17.41	23.04
Electricity, Water, Gas Pipe	100.00	0.00	37.62	62.38	44.94	29.99	32.76	19.44	11.75
Painting, Mounting & Matting	100.00	0.00	7.78	22.22	11.11	55.56	11.11	44.44	0.00
Other Construction	100.00	0.00	31.06	68.94	37.06	88.83	42.23	20.71	10.35

Source: See Table 4.



Table 10 Labor Force Participation Rate in Taiwan, Japan and the U.S.  
Unit: %

Year	Taiwan			Japan	U.S.A.
	Total	Male	Female		
1964	59.24	83.70	34.04	-	-
1965	58.20	82.59	33.16	-	-
1966	57.21	81.49	32.51	-	-
1967	57.52	80.83	33.85	-	-
1968	57.43	80.21	34.38	-	-
1969	57.40	79.04	35.45	-	-
1970	57.35	78.82	35.51	-	-
1971	57.13	78.38	35.45	-	-
1972	57.34	77.22	37.07	-	-
1973	59.48	77.09	41.56	-	-
1974	59.37	78.11	40.32	-	-
1975	58.23	77.55	38.60	-	-
1976	57.51	77.08	37.64	-	-
1977	58.75	78.09	39.18	-	-
1978	58.75	77.94	39.14	-	-
1979	58.68	77.94	39.15	-	-
1980	57.97	76.61	39.17	-	-
1981	57.58	76.40	38.64	-	-
1982	57.93	76.47	39.29	63.3	57.8
1983	59.24	76.36	42.09	63.8	57.9
1984	59.71	76.11	43.28	63.4	59.5
1985	59.49	75.50	43.44	63.0	60.1
1986	60.38	75.19	45.51	62.8	60.7
1987	60.92	75.24	46.54	62.6	61.5
1988	60.21	74.84	45.55	62.6	62.3
1989	60.13	74.86	45.35	62.9	64.0

Source: See Table 2.

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