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# **The Impact of Chilean Fruit Sector Development on Female Employment and Household Income**

By

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**California Agricultural Experiment Station  
Giannini Foundation for Agricultural Economics**

# **The Impact of Chilean Fruit Sector Development on Female Employment and Household Income**

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## **Summary**

Modern fruit sector development in Chile led to agricultural employment for women, though usually only as temporary workers and often at a piece rate. Nonetheless, fruit sector employment offered women access to income and personal fulfillment previously lacking. This paper links the fruit sector to improving female and family economic welfare in rural Chile and changing gender relations. Using a unique longitudinal data set, we examine women's decisions regarding labor force participation and employment, their earnings and contributions to household income, and their attitudes toward employment to understand how new opportunities are changing women, their households, and the rural sector.

*Keywords: South America, Chile, female temporary labor, fruit sector, gender, welfare*

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# **The Impact of Chilean Fruit Sector Development on Female Employment and Household Income**

## **1. Introduction**

Economists have looked with interest at the growth of female employment in non-traditional agricultural activities in developing countries, particularly in the export sector. Why are women entering this labor force when traditionally most women were not formally employed in agriculture work? Who is hired, for what tasks, and for what periods of time? What do they earn and how does their employment affect their family's welfare, directly and indirectly? Few detailed studies have been carried out and relatively little empirical evidence is available. This paper analyzes the impact of Chilean fruit sector development on female employment.

Modern fruit sector development in Chile began in the mid-1960s and accelerated in the mid-1970s in response to government land and economic reforms, rising international demand, and the transfer and adaptation of fruit technologies that greatly increased the profitability of fruit production (Jarvis, 1992, 1994). Given its Southern Hemisphere location, Chile found ready markets in developed countries of the Northern Hemisphere. Labor was cheap relative to that of its main competitors (Australia, New Zealand, Argentina and South Africa) and Chile developed a system that utilized substantial labor in the orchard and in post-harvest to improve fruit quality and prepare it for relatively lengthy transit to Northern Hemisphere markets. While demand for labor rose along with fruit output and although labor was inexpensive, Chilean fruit producers often had difficulty obtaining sufficient workers, particularly for the packing plants during the harvest season. As a result, women, who traditionally had not worked in

agriculture on a salaried basis, found new employment opportunities as temporary laborers in the fruit sector.

A substantial number of women began working in table grape packing plants in the late 1960s. However, the real growth in the number of female workers occurred during the late 1970s and the 1980s. Throughout the decade that followed the military coup in 1973, policy reforms resulted in significant disruption within the agricultural sector, temporarily reducing agricultural labor demand and agricultural wages (Jarvis 1985). Two severe recessions, in 1975-76 and 1982-83, caused high levels of aggregate unemployment that only gradually declined. Moreover, about 50,000 male workers who had been employed in the reform sector were abruptly dismissed without land or employment in the late 1970s, when the reform sector land was redistributed to others.<sup>1</sup> As men lost work and suffered reduced incomes, many women sought employment.

Most early social science commentary regarding fruit sector female employment was negative (e.g., Lago). Several scholars hypothesized that women had been forced to take unattractive employment. Some argued that female workers were exploited by being offered only seasonal employment, at low wages or, frequently, on a piece rate basis that encouraged women to work lengthy hours at a rapid pace, competing with each other for a fixed amount of raw material.<sup>2</sup> However, by the late 1980s and early 1990s, evidence from sociological studies began to emerge showing that the fruit sector offered women opportunities for employment, income and personal fulfillment that were previously lacking (Rodriguez and Venegas, Venegas). Work allowed women to achieve greater independence and voice within their households and to significantly improve their household's standard of living. Several subsequent sociological/historical studies, e.g., Barrientos, et al., Bee, Bee and Vogel, and Matear, have provided additional evidence

supporting the view that fruit sector development has affected positively affected women and their households in rural Chile.

This paper adds to the existing literature using results from a uniquely detailed Chilean data set collected in 1992. These data provide substantial new information about female agricultural work, both in their principal jobs in fruit packing plants during the summer and also in other work throughout the year. The data allow the use of formal statistical approaches to quantitatively analyze many economic issues not previously investigated. Analysis data regarding detailed worker and firm characteristics, including worker productivity and piece rates paid by different table grape packing firms, provides new insights into how sophisticated and knowledgeable female workers are about the value of their labor skills, the opportunities facing them, and their ability to negotiate employment terms (Newman and Jarvis). Similarly, the availability of detailed day-by-day information, collected for one full year regarding labor force participation, employment and earnings, allows analysis of how female workers adjust to seasonal shifts in labor demand (Jarvis and Vera-Toscano). We combine results from these studies and with those from additional analysis to provide a broad view of female agricultural workers labor market decisions, women's attitudes towards fruit sector employment, use of earned income and contribution of their income to household welfare.

## **2. Background on the Evolution of the Fruit Sector Employment in Chile**

The Chilean fruit sector grew dramatically after 1973. The total area planted increased from around 66.000 ha in 1974 to 178.000 ha in 1992, and fresh fruit exports increased about 20 percent annually during this period (DEP, from CIREN-CORFO, INE). By the early 1990s, table grape production accounted for roughly half of all fresh fruit exports and was the most labor intensive of the major fruit crops. In terms of employment, the

agricultural sector accounted for about 17 percent of the national labor force, while fruit production, per se, absorbed around 25 percent of the labor employed in agriculture.

The demand for fruit sector labor was highly seasonal (Jarvis and Vera-Toscano). Chilean fruit farms employed a small number of relatively skilled workers on a permanent basis (paid on a monthly wage) and hired a larger number of less skilled workers on a temporary basis to undertake specific tasks when needed. The permanent workers handled daily tasks and helped supervise the temporary workers. Temporary workers were usually paid on a piece rate or contract basis in order to provide better incentives, lessen supervision costs and incorporate a heterogeneous labor force. Temporary work has been increasing relative to permanent employment in agriculture and especially fruit production. For example, Gómez, S. and J. Echeñique (1988) estimated that the total permanent agricultural labor force fell from 208.000 to 120.000 between 1964 and 1987, while the total temporary agricultural labor force increased from 147.000 to 300.000 in the same period.<sup>3</sup>

Fruit production was concentrated in specific geographical areas. Workers were generally unwilling and unable to migrate from one area to another for short periods. Accordingly, in many areas the fruit sector demanded more labor than the traditional labor force was able to supply during the summer months.<sup>4</sup> The shortage of labor during the peak season encouraged employers within the fruit sector (mainly in the packing sheds) to develop mechanisms to attract, motivate and compensate workers for seasonal work. Piece rate pay emerged to facilitate the incorporation of heterogeneous workers, particularly women, into the labor force, while also providing direct motivation to increase effort over a longer workday. By the early 1990s, we estimate that female employment in the fruit sector amounted to roughly 30% of total fruit sector employment.



Notwithstanding, women worked almost exclusively as temporary laborers, usually in tasks paid at a piece rate in the summer, but often at a time rate in the slack season.<sup>5</sup>

### **3. Data Overview**

The data utilized in this study were collected from a random sample of 690 workers taken from 56 table grape packing sheds during the harvest season (mid-January to mid-March) of 1992.<sup>6</sup> Data was collected regarding worker productivity and pay in the task the worker was performing at the time interviewed, as well as other information regarding work age, education, job experience, household demographics, and household income, plus worker opinions and preferences regarding many aspects of their current job. Data were also collected regarding each worker's labor force participation, employment, and earnings, daily, throughout 1991.

Table 1, taken from Jarvis and Vera Toscano, reports general characteristics of the workers surveyed in January-March 1992. The labor force was relatively young, with most between 15–34 years old. Males tended to be slightly younger than females. As all women in the sample were engaged in piece rate work in 1992, the data suggest that most piece rate workers sought wage work or dropped out of the labor force as they aged.<sup>7</sup> The labor force was also relatively well educated; 66% of women and 85% percent of men had completed secondary school. Table 2 shows that the average level of education declined as age rose. This changing educational profile probably reflected the steady improvement over time in rural educational opportunities (especially for women) during the last 35 years. That women with secondary (and some with post-secondary education) accepted these temporary, manual jobs suggests that employment opportunities were limited for many rural females even after they acquired considerable schooling.

Female workers had a significantly higher number of children, on average, than their male counterparts and about half of female workers and about a third of male workers were married. A small proportion of workers were students, 12% of women and 15% of men, who generally worked only during the summer.

Each worker surveyed was asked to sequentially list all periods of employment during 1991 (first and last day of work in each job), the task performed, the location and economic sector of the job, whether they were paid a wage or piece rate, the daily wage and/or the total amount earned, and when they had been in the labor force. This information yielded labor force participation,<sup>8</sup> employment,<sup>9</sup> and the wage or average piece rate earnings when employed.

Table 3, also from Jarvis and Vera Toscano, presents additional labor related information. Both men and women averaged about 5 separate jobs per year, with the number slightly higher for men. Men worked more days during the year (265 versus 166), mainly because men worked steadily throughout the year while women averaged sharply fewer days per month during the slack season (Figure 1). Women reported working, on average, less than 10 days a month during five months (May –September) compared to 15 to 21 days per month during the peak season. Although a significant proportion of the individuals surveyed lived in or close to towns, roughly 85% of the jobs reported by this sample of workers were in agriculture. Females had somewhat greater packing shed employment experience than males.

Surprisingly, women had higher average daily earnings than did men. Women worked more frequently on a piece rate basis (36% of female jobs, vs. 14% of male jobs; Figure 2), which paid more than comparable wage employment, and women were employed primarily during the peak season, when earnings were highest.

Most workers lived in households with several workers. Twenty-five percent of the females surveyed and half of the males provided more than 50% of their household's annual income. Only a third of the females who were widows or separated were their household's major earner (Table 4).<sup>10</sup> Still, interviews indicated that many women had been able to separate from their husbands and/or live apart from their parents because of income obtained as a temporary fruit laborer. Although female-headed households tended to have lower incomes than male-headed households, many female heads of households spoke with satisfaction that their work allowed them to support themselves.

Worker's household characteristics influenced the number of days employed each year. Figure 3 shows that married men worked the most, especially if they had young children, approximately 275 days per year.<sup>11</sup> Single males worked much less, about 170 days. Men who were separated or widowed worked an amount intermediate between these levels. The significant affect of marriage on the number of days worked suggests that marriage affected the motivation to work and that search effort was an important determinant of employment.

Women averaged significantly fewer days worked per year than men did. Some women worked more than 220 days per year, but no female category had such a high average. Women also showed less variation in the number of days worked with respect to their household situation, at least as here categorized, and the variation shown was directly reversed from that of men. For example, married women with young children worked the least of individuals in the sample, while single women who were not living with their parents (but who had young children) worked the most of all female categories. There is thus evidence that married women with young children had a higher reservation

wage than other workers. However, women lacking income from a husband or parents worked substantially even when they had young children.

#### **4. Employment Patterns and Seasonality of Labor Demand**

Female labor force participation varied greatly by season, declining sharply from February to May, remaining low through September, and then rising steadily to February. Labor force participation was less variable for males. Daily earnings varied seasonally more in agricultural than in non-agricultural jobs, especially for jobs held by women. Women tended to earn more than men in agricultural jobs during the peak season, but less during the slack season, while the situation was reversed for non-agricultural jobs.<sup>12</sup> As agricultural wages declined, a rising proportion of workers was employed in non-agricultural jobs (from 5% to 30%).

While female temporary workers face greater wage variation than men and vary their labor participation more, they also suffered substantially more unemployment (Figure 5). The female unemployment rate exceeded 50% during five months. Male unemployment was also high, but averaged only about half as much.

##### *4.1. Labor Market Participation Equation and Expected Earnings*

Jarvis and Vera Toscano explored adjustment in this market to identify whether seasonal differences in labor force participation was attributable to the existence of specific ‘barriers’ to employment, differences in preferences or differences in observed worker characteristics. Specifically, they modeled labor force participation for male and female workers by estimating a random effects probit that allowed for unobserved heterogeneity in preferences. Table 5 reports the results. For women, the estimated coefficients on the explanatory variables were generally highly statistically significant and in line with prior expectations. Few of the estimated coefficients were statistically significant for men

(Table 5, cols. 1 and 2), a result consistent with the relatively constant male labor force participation rate.<sup>13</sup>

Women participated in the labor force less than men did. Female labor force participation increased with age. Since rising education was associated with higher daily earnings, education may have altered the preference for work versus leisure. School attendance reduced participation for males and females when schools were in session. Marriage reduced labor force participation for females, perhaps due to increased household responsibilities and/or a social-cultural bias against work, but did not affect male participation. Female labor participation declined as the number of the worker's children aged 0-5 years increased, but this effect was reduced if another adult female lived in the household, suggesting that childcare was gender specific and indicating the importance of (household) childcare for female labor force participation. Men and women were more likely to participate during the peak season and less during the slack season as compared to the transition months of April and October through December, a result probably linked to expected earnings.

Jarvis and Vera Toscano examined the sensitivity of labor force participation decisions to changes in expected earnings using a probit equation that included the same regressors plus estimated earnings (Table 4, cols. 3 and 4). The coefficient on expected earnings was positive and significant and the other coefficients were closely similar to those obtained cols. 1 and 2. Though labor force participation for men and women responded strongly and positively to the expected wage, the female participation rate varied substantially more because females tended to have a higher reservation wage. Still, female unemployment was generally much higher than male unemployment (Figure 7).

#### *4.2. Open unemployment*

Although wages varied greatly by season, Jarvis and Vera Toscano found they did not vary sufficiently to fully equate the supply and demand of labor and achieve zero unemployment. Four factors were advanced to explain this high unemployment. First, frictional unemployment was high as a result of individuals entering and/or leaving the labor force, changing jobs, and searching for employment in a spatially dispersed market where jobs were relatively short lived and search costs relatively high. Second, many or all firms may have paid an efficiency wage or piece rate (Weiss; Akerlof and Yellen; Solow) to motivate workers, thereby causing the unemployment rate to remain above zero even during periods when labor demand is high. Third, the average reported wage in agriculture lay above the average reported wage in the non-agricultural sector throughout the year. Thus, waiting for an agricultural job could easily have been the better strategy for most workers even when few agricultural jobs were available. Fourth, some workers, especially females, may incorrectly report having been in the labor force and actively seeking work. Alternatively, they may have considered themselves in the labor force, but searched only within a small, local area, where there were few jobs.

## **5. Determinants of Daily Earnings**

The average wage rose by about 50% from the slack season to the peak season, a surprisingly large variation. To understand the determinants of changes in daily earnings over the one-year period, Jarvis and Vera Toscano estimated an earnings equation where the dependent variable was the log of average daily earnings and the regressors included both supply and demand side factors. Human capital variables such as education and experience were hypothesized to influence worker productivity and earnings, while monthly dummies reflected the net influence of seasonal fluctuations in agricultural labor supply and demand. Wages were hypothesized to vary in response to the worker's

decision to seek either piece rate or wage employment, and either non-agricultural or agricultural employment. Such choices were assumed dependent on a worker's willingness to supply effort and preference for factors such as work environment and a shorter commute time to work. Since dummy variables were used to measure the effect of working at a piece rate as opposed to a wage, the other coefficients measured the effect of the respective independent variables on the daily wage.

Consistent estimates of the earnings function were obtained using the two-step estimator proposed by Vella and Verbeek. The results for both men and women are reported in Table 6. The earnings of both men and women increased with schooling, suggesting that education significantly increased labor productivity in agricultural work, although the higher return was probably partly due to the innate ability that allowed individuals to successfully complete additional schooling. Experience had a significant positive impact on female daily earnings in jobs throughout the year; the analogous coefficient was not significant for males. The square of experience had a significant negative coefficient, indicating that rising experience had a non-linear effect.

A dummy variable was also used to measure the earnings effect of working on a piece rate basis. A piece rate system was frequently used to motivate and remunerate temporary agricultural workers in the fruit sector and a substantial theoretical literature indicates that the piece rate system should increase worker's productivity and workers' incomes (Gibbons; Lazear, 1986; Pencavel; Stiglitz). There have been few empirical studies. The estimated coefficient on the piece rate dummy indicates that piece rate jobs in this case earned a daily premium of about 12 percent relative to wage jobs.<sup>14</sup>

A dummy variable was also used to measure the effect of working in the agricultural as opposed to the non-agricultural sector. Agricultural work paid

substantially more, particularly for women (Figure 4). Men's wages in this sample were about 18 percent higher when working in agriculture, while women's wages were about 37 percent higher. Agricultural jobs were probably even more attractive than shown for women since there were few piece rate jobs available in non-agricultural work.

As earlier noted, women's average daily earnings were higher than men's average daily earnings (see Table 1). Women working as temporary agricultural laborers were thought to earn relatively high wages in the Chilean fruit sector (e.g., Rodriguez and Venegas), and the results in Jarvis and Vera-Toscano supported that view. Nonetheless, women earned substantially less than men did in wage employment once earnings were adjusted for observed and unobserved characteristics. The estimated gender wage differential was about 25 percent.

Although females had higher average daily earnings than men, women earned less than men when working for a wage, but not when working for a piece rate. Jarvis and Vera-Toscano suggested that these results indicated discrimination in the wage market. There may be less possibility of discrimination when workers are employed at piece rate (unless denied access to such jobs) since pay is directly linked to productivity. The large magnitude of the gender wage differential suggests an area for further analysis.

## **6. Women's Knowledge of Work Opportunities and their Work Choices**

Newman and Jarvis (2000) found that women were highly informed about many aspects of the packing shed jobs that they accepted, e.g., shed-related characteristics that affected workers' productivity, fringe benefits, and the expected duration of the job. Women's willingness to accept work at a specific piece rate was strongly influenced by these characteristics. Piece rates for the same tasks were found to vary by as much as 100%



among different packing sheds and these differentials were well explained econometrically by the observed heterogeneity among workers and firms.

For example, most processing sheds provided workers with some combination of fringe benefits that included meals, snacks, transportation to and from work, childcare, interest-free loans, and higher quality bathrooms. Supervisors and managers in different sheds treated created different quality work environments. According to the theory of equalizing wage differentials, sheds that provide more and better fringe benefits and/or a better work environment should have paid lower piece rates. This hypothesis was supported by the data.

Similarly, Newman and Jarvis hypothesized that firms' investments in technology, improved plant organization, or the ability to process grapes that were in better condition would raise worker productivity. Further, so long as workers were aware of firm-influenced productivity differences, such higher productivity should lead to lower, not higher piece rates. To the extent that firms possessed improved technology that allowed their workers to achieve higher productivity or were better organized and could provide a constant flow of good quality grapes to workers, allowing workers to process more boxes per time period, the firm should pay a lower piece rate. This followed from the assumption that each worker should earn an income consonant with her opportunity cost in equilibrium. If a firm's characteristics allowed its workers to produce more output, *ceteris paribus*, worker competition for the jobs at the firm should have caused the piece rate to decline until its workers' incomes were equal to what they would earn elsewhere. This hypothesis was also supported by the econometric results.

Workers could easily ascertain the piece rates paid by different firms, but the effect of firm characteristics on a worker's productivity should have been harder to

predict. Firms that had made investments that led to higher worker productivity should have wanted to advertise that information in order to convince workers that they should accept a lower piece rate, while firms that had not should have wanted to hide the fact. Newman and Jarvis also found that piece rates were adjusted in many packing sheds if the quantity and/or quality of the grapes being processed changed. Although strikes were legally prohibited, female workers were able to “stop” production and successfully negotiate an increase in the piece rate, and the reverse was also true. Indeed, several male shed managers said that they found it easier to negotiate a “fair” piece rate with women than to negotiate pay with men.

The evidence in Newman and Jarvis suggested that women workers were both aware of the importance of firm-influenced productivity differences and able to obtain information about what firms actually provided. Thus, there was evidence that female workers operated within and were part of a highly sophisticated labor market in which firms and workers obtained and used information regarding about their heterogeneity. Neither workers nor firms thought that firms or workers were homogeneous.

## **7. Attitudes toward Work**

Each worker was asked how many months he/she would have liked to work during 1991 and 1992. The mean response by females was 11.1 months and 9.7 months, respectively. The responses were surprisingly high, given that most women had worked much less than this in 1991. The question did not specify a wage at which they would be employed, but the responses suggested that most women wanted to work most of the year.

To further explore workers’ preferences for seasonal as opposed to permanent employment, including a specified wage, each worker was asked to indicate her/his preference for one of three employment options: 1) 3 months employment per year at

100,000 pesos per month, 2) 6 months employment at 60,000 pesos per month, and 3) 12 months employment at 35,000 pesos per month. Option 2) required twice the time to obtain an additional 60,000 pesos of annual income, as did option 3). When the options were designed, it was believed that most women preferred to work only the summer months and thus would choose the first option. In fact, 50% of workers chose permanent employment as their preferred option and an additional 25% choose the 6-month option. Only 25% choose the 3-month high-salary option, even though its 300,000-peso salary turned out to significantly exceed the mean annual earnings of workers.

What do these answers mean? We believe, based on respondents' anecdotal comments, that most female temporary agricultural laborers want to work most of the year. First, most women wanted to earn more, even if the marginal earnings associated with longer employment were low. Second, some women expressed a desire to spread their income throughout the year and thought that a permanent salary would help achieve this. They commented on how hard it was for them to adequately carry funds from one month to the next given a lack of accessible savings institutions<sup>1</sup> and constant pressure from friends and relatives for loans and assistance. Third, many women said that they enjoyed working, particularly as it allowed them to feel productive, benefit economically, and have greater social contact with others.

When asked what they liked about their work, some women responded simply that they enjoyed (or did not enjoy) it. However, most provided additional insight into what the work experience meant for them. Some responded that work allowed them to financially help their families, others that they enjoyed socializing with other women, having an opportunity to talk about their problems, possible solutions, and simply their

concerns, and to form personal connections that they could not otherwise make. Others were glad simply to feel useful.<sup>15</sup>

Having said that women wanted additional employment, they were not idle. Combining employment and family responsibilities placed a harsh demand on women's time and energy. Their summer work schedule was especially grueling. They worked very long hours. Processing sheds began work at 2:00 p.m. and continued until all of the grapes picked had been packed. On average, cleaners worked 9.6 hours per day and packers 10.3 hours, not counting time waiting for the sheds to open, or for coffee breaks and dinner. Work commonly finished well after midnight and, during the seasonal peak, as late as 6:00 a.m.

Many females liked beginning work in the early afternoon because it gave them time to take care of family responsibilities in the morning. Women also mentioned the burden that they faced in meeting these dual responsibilities. Some women indicated that their husbands did not want them to work and a few said they had obtained agreement to work only during peak season when earnings were high. However, more women indicated that their husbands appreciated their income, recognized that it improved family welfare, and supported their working. A few women said that their husbands had accepted some household tasks to help.

All of the women interviewed worked at a task that was paid on a piece rate basis most of the time. Despite the increased pressure and expenditure of effort that piece rate work required, when asked their preference for summer work, 58% of workers expressed a preference for piece rate pay when working in a packing shed during the summer. The overwhelming reason for preferring piece rate pay was that it allowed the worker to earn

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<sup>1</sup> Chilean banks are very restrictive in terms of who is permitted to open a savings or checking account.

more. Nonetheless, a significant proportion of these workers would have preferred a salaried job during the summer and most did not want piece rate employment on a year-round basis. Indeed, 61% of workers preferred a fixed wage if they could get a year-around job. Roughly half said they did not want to work at the intense pace required by piece rate work on a continuing basis.<sup>16</sup> Others commented that they felt that they would earn more if working for a wage, including some who said that they would earn a higher rate for overtime, while others said their earnings would be more stable.

The workers interviewed understood the advantages and disadvantages of their various employment options. Their decision to accept piece rate work depended partly on a lack of other remunerative employment during the rest of the year. Their relative poverty contributed to their desire to work hard when an employment opportunity presented itself. One might expect the supply of labor for temporary agricultural work on a piece rate basis will decrease if and when other employment opportunities materialize.

## **8. Household Income Distribution Effects of Female Work**

Many women entered the labor force to supplement the income of other family members and/or to satisfy their own special needs.<sup>17</sup> However, a majority of women in our data set were the major income earner in their household. Approximately 180 women (26%) lived in households that contained no male workers. Another 25% of women were the primary earner in their households even though their households included an adult male who worked at least part of the time.

We lacked data to test whether women's acceptance of temporary work in the fruit sector had improved household income. We only observed the households in which female workers resided, not the households they resided in prior to obtaining employment, and we had no information on rural families that did not have any members

working in the fruit sector. It is nonetheless instructive to see how the income earned by women in our sample affected their current households.

We analyzed the income distribution effects using a Gini coefficient that is decomposed using the approach developed by Stark, et al. The Gini coefficient can be written as:  $G_0 = \sum R_k G_k Y_k$ , where  $G_0$  is the Gini for total income and  $G_k$  the Gini for income from source  $k$ .  $Y_k$  is income from source  $k$  and  $R_k$  is a measure of the variation between income from source  $k$  and total income.

Workers in our sample reported three sources of household income during 1991: own income, income earned by other household members and income received from other sources, e.g., a farm plot, a business, a pension, or a government transfer payment such as a family allowance. Because our interest is in the effect of female employment in the fruit sector, we aggregated the income of each household into slightly different categories: 1) household income earned by males (regardless of source of earned income) and by females from work outside the fruit sector 2) income earned by females from fruit sector work, and 3) other income (Table 7).

The shares of these income sources in total household incomes are 0.66, 0.26, and 0.08, respectively. Females working as temporary laborers in the fruit sector accounted for approximately one quarter of their households' incomes. Males and females working outside the fruit sector accounted for approximately two thirds of household incomes. Other sources contribute only a small fraction of income. Practically all of the "other" income was received in the form of pensions and family allowances.

The Gini coefficient for the household distribution of income in this sample was 0.313. Not unexpectedly, the distribution of income among these households was relatively equal since most workers came from a similar economic background. For

comparison, the Gini coefficient for income only from male workers and female non-agricultural workers was .418. The Gini coefficient for women working in the agricultural sector is .453, somewhat higher. The Gini for "other" income is .416.

The calculated  $R_1$  (.85) indicates that income from source 1 is highly correlated with total household income. Similarly, income from source 3 is also highly correlated ( $R_3 = .84$ ) with total household income. This suggests that families with higher earned income also tended to have higher amounts of "other" income. However, income from source 2 was much less correlated with total household income;  $R_2 = .43$ . Further, in examining the marginal effect of a small percentage change in the income of each income factor on the Gini, we found that a 1 percent increase in income from sources 1) and 3) would increase income inequality, while a 1 percent increase in income from source 2) would reduce household income inequality.

The results suggest that the income earned by female agricultural workers decreased total income inequality among these households. Much of the positive marginal effect on income distribution occurring from greater female fruit sector income doubtlessly occurs because households headed by female agricultural workers have lower incomes than those headed by males. Still, most of these women have chosen to establish their own households, even if their household incomes have been reduced in the process, and their ability to do so appears to have been importantly assisted by the opportunity to gain fruit sector employment. Although women might have worked elsewhere had the fruit sector not developed, the dearth of non-agricultural work by workers in the sample and the historical lack of agricultural work for rural women suggest that fruit sector work has contributed to women's welfare and the income of their families.

## 9. Conclusions

The results presented in this paper suggest that modern fruit sector development in Chile offered women opportunities for employment, income and personal fulfillment that were previously lacking. Rural women traditionally had few opportunities for gainful employment other than migration to towns and cities, often for work as domestic servants. In contrast, the women in our sample obtained work while remaining in the rural area. All of the women in this sample were temporary agricultural workers, i.e., they worked one or more jobs serially throughout the year. Their average daily earnings exceeded those of the men in our sample, reflecting their skills and hard work, though women also worked mainly during the peak season when wages were highest and more often at piece rate pay, yielding a premium. Nonetheless, the econometric evidence suggests that women receive a wage about 25% less than men once adjustments are made for observable human capital characteristics, season of employment, sector of work and pay system. We suspect this reflects discrimination in jobs other than in packing sheds.

Women have a significantly higher reservation wage than men, mainly as a result of family responsibilities, and their labor force participation responded more strongly to seasonal wage variations. Women still suffer much higher rates of unemployment than men, especially during the long slack season. Women seem to be preferred employees in the fruit packing sheds, but they have difficulty obtaining work in other, mainly orchard tasks.

Most women wanted to obtain more work and many expressed a willingness to work for lower pay if they could obtain year-round employment rather than rely on a series of seasonal jobs. Part of their desire for year-round work was due to difficulties in consumption smoothing throughout the year. Most women preferred to



work on a piece rate basis during the summer because they believed they earned more than if paid a wage. However, they preferred to a wage if in a permanent job because they felt they could not sustain the intensity of piece rate work throughout the year.

Women were well informed about fringe benefits and other aspects of the packing shed jobs that they accepted. Their willingness to accept work in a specific shed at a specific piece rate was strongly influenced by these aspects. Most women also understood what their own skills could command. Female workers thus demonstrated that they possessed substantial economic sophistication in selecting among alternative employment opportunities and in negotiating for appropriate remuneration. Detailed information was systematically shared in conversations among friends and relatives and firms and workers in the job search process used these networks. Women worked rapidly and effectively, were remarkably flexible in adjusting to changing production schedules, and their productivity was related, as expected, to education, job experience and age.

Work allowed many women to significantly improve their household's standard of living and achieve greater independence and voice within their households, including more decision making power in purchases. Women's earnings from agricultural work contributed importantly, about 25%, to household income in this study. Nonetheless, most women and their families remained relatively poor by Chilean standards. Roughly half of these women were the primary wage earner in their household. Roughly one fourth resided in households with no male workers, suggesting that fruit sector work had enabled them to establish independent households. Since income from female fruit sector employment was not strongly correlated with income from other sources, such income probably decreased household income inequality within the households studied.

Women tended to work very long hours during the summer and most maintained significant responsibility for household tasks. The balance between household work and employment was challenging for women, but they consistently indicated that work was a source of satisfaction, social networking and self-esteem as well as greater financial independence. Work added an important social dimension to their lives, giving them the ability to interact with other women on a regular basis, networking on issues of mutual concern and sharing personal stories and humor. Thus, agricultural jobs that many observers in developed countries might feel relatively unattractive offered these women opportunities to better their lives. Few women in this data set obtained non-agricultural work that offered pay or working conditions rivaling those in agricultural work. Non-agricultural work opportunities will come as economic development continues in the Chilean countryside, but for some time the fruit sector will be an important source of employment for rural women.

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**Table 1: Personal and Family Characteristics of Surveyed Workers, 1992**

		<b>Women</b>	<b>Men</b>
<b>Age</b>	< 15	0.0152 (0.1223)	0.0153 (0.1231)
	15- 24	0.3269 (0.4691)	0.5230 (0.4997)
	25 – 34	0.3593 (0.4798)	0.3384 (0.4734)
	35 - 44	0.2072 (0.4053)	0.0923 (0.2896)
	>=45	0.0912 (0.2879)	0.0307 (0.1728)
<b>Education</b>	No formal schooling	0.0190 (0.1365)	0.0153 (0.1231)
	Had 1-5 years of schooling	0.1577 (0.3645)	0.0307 (0.1728)
	Completed primary school	0.1026 (0.3035)	0.0307 (0.1728)
	Completed secondary school	0.6634 (0.4725)	0.8461 (0.3610)
	Some postsecondary schooling	0.0570 (0.2319)	0.0769 (0.2666)
<b>Children</b>	No Children	0.4524 (0.4977)	0.6615 (0.4737)
	1 Child	0.3022 (0.4592)	0.1692 (0.3751)
	2 Children	0.1787 (0.3831)	0.1230 (0.3287)
	3+ Children	0.0665 (0.2492)	0.0461 (0.2099)
<b>Married</b>	% married or living together	0.5076 (0.4999)	0.3692 (0.4829)
<b>Household Assistance</b>	% having small children in household and additional female adult in household	0.1939 (0.3953)	0.3384 (0.4734)
<b>School</b>	% currently in school	0.1254 (0.3312)	0.1538 (0.3610)

*Note:* Averages are based on observations for the whole sample (599 workers; 531 women and 68 men). Standard errors are in brackets.

Indicates that the difference between the male and female sub-samples is significant at 5% using adjusted Wald Test where the null hypothesis is:  $H_0 : \%^W = \%^M$ .

Source: Jarvis and Vera-Toscano, forthcoming.

**Table 2. Percentage of Workers Who Had Completed At Least 8 Years of Schooling (1992)**

<b>Age Category</b>	
14-21	72%
22-25	63%
26-29	50%
30-33	37%

Source: Authors' calculations.

**Table 3. Work-related Characteristics in 1991: Means and Standard Deviations**

	Women	Men
% workers who earned 50% or more of their household's income	0.249 (0.432)	0.501 (0.50)
% total days worked in agriculture	0.8565 (0.3505)	0.8378 (0.3689)
% total days worked at piece rate	0.3553 (0.4787)	0.1387 (0.3459)
Average daily income in Pesos	1426.3 (744.8)	1353.3 (652.59)
Average daily income in Peak Season (Jan-Apr)	1630.14 (830.89)	1554.64 (675.4)
Average daily income in Slack Season (May-Aug)	1069.01 (510.7)	1190.3 (648.9)
Years of experience in Packing sheds	7.05 (5.763)	4.65 (3.298)
Number of jobs held during year	4.5 (2.79)	5.4 (3.09)
Number of days employed during year*	166.88 (111.31)	265.70 (112.29)

Female coefficient significantly different from Male at 5%

\*Days employed are counted continuously from beginning to end of employment period, including weekends. Most workers work 5 \_ days per week when employed continuously, but sometimes work 6 or even 7 days a week during the peak season. Thus, workers probably worked about 80% of the days indicated.

Source: Jarvis and Vera-Toscano, forthcoming.



**Table 4. Percentage of Workers Who Earned > 50% of Their Household's Annual Income, by Marital Status and Gender**

	Women	Men	All
Married	15	75	20
Single	15	26	16
Separated/Widowed	33	na	31

Source: Authors' calculations.

**Table 5. Variables Determining Labor Force Participation Rates**

<i>Variable</i>	Results from the analysis that includes the expected earnings variable.			
	Impact of variable on labor for participation for women (1)	Is the impact of this variable significantly GREATER or LESS for men? (2)	Impact of variable on labor for participation for women (1)	Is the impact of this variable significantly GREATER or LESS for men? (2)
Age	POS.	n.s.	n.s.	n.s.
Age squared	NEG.	n.s.	n.s.	n.s.
No. Children <5	NEG.	n.s.	NEG.	n.s.
Dummy=1 if Married	NEG.	n.s.	n.s.	n.s.
Dummy=1 if young children and additional female	POS.	n.s.	POS.	n.s.
Dummy=1 if currently in School	NEG.	n.s.	NEG.	n.s.
Peak Season (Jan-Mar) (3)	POS.	GREATER	POS.	n.s.
Slack Season (May-Sep) (3)	NEG.	n.s.	POS.	n.s.
Dummy=1 if Post-secondary Education (4)	n.s.	n.s.	n.a.	n.a.
Dummy=1 if Primary Education (4)	POS.	n.a.	n.a.	n.a.
Expected Earnings	n.a.	n.a.	POS.	LESS

n.a. indicates “not applicable”.

n.s. indicates the variable is “not significant” in the sense that the impact of this variable on labor force participation rates is not statistically different from zero.

(1) This column provides the association between the variables and the labor force participation rate for women.

(2) This column indicates whether the association between each variable and the labor force participation rate is different for men. Note that if the impact for women is “NEG”, then GREATER implies “less negative” which means that the impact (negative) of the variable is less for men.

(3) The Impact of peak or slack season is evaluated compared to the ‘transition’ months April, Oct, Nov and Dec.

(4) The impact of education is evaluated compared to individuals with Secondary education.

Source: Based on Tables 4 and 6 in Jarvis and Vera-Toscano, Forthcoming.

**Table 6. Variables associated with worker earnings**

<b>Variable</b>	<b>Impact of variable on earnings for women (1)</b>	<b>Is the impact of this variable significantly GREATER or LESS for men? (2)</b>
Dummy = 1 if Piece Rate	<b>POS.</b>	n.s.
Experience	<b>POS.</b>	n.s.
Experience	<b>NEG.</b>	n.s.
Dummy = 1 if agricultural employment	<b>POS.</b>	<b>LESS</b>
Dummy = 1 if February (3)	n.s.	n.a.
Dummy = 1 if March (3)	n.s.	n.a.
Dummy = 1 if April (3)	n.s.	n.a.
Dummy = 1 if May (3)	<b>NEG.</b>	n.a.
Dummy = 1 if June (3)	<b>NEG.</b>	n.a.
Dummy = 1 if July (3)	<b>NEG.</b>	n.a.
Dummy = 1 if August (3)	<b>NEG.</b>	n.a.
Dummy = 1 if September (3)	<b>NEG.</b>	n.a.
Dummy = 1 if October (3)	<b>NEG.</b>	n.a.
Dummy = 1 if November (3)	n.s.	n.a.
Dummy = 1 if December (3)	n.s.	n.a.
Dummy = 1 if Postsecondary school (4)	<b>POS.</b>	n.s.
Dummy = 1 if Primary school (4)	<b>NEG.</b>	<b>LESS</b>
A1i (5)	<b>NEG.</b>	n.a.
A2it (6)	<b>NEG.</b>	n.a.

n.a. indicates “not applicable”.

n.s. indicates the variable is “not significant” in the sense that the impact of this variable on earnings is not statistically different from zero.

(1) This column provides the association between the variables earnings for women.

(2) This column indicates whether the association between each variable and earnings is different for men. Note that if the impact for women is “NEG”, then GREATER implies “less negative” which means that the impact (negative) of the variable is less for men.

(3) The Impact of months is evaluated compared to the month of January.

(4) The impact of education is evaluated compared to individuals with Secondary education.

(5) This negative significant coefficient indicates that the time-invariant unobserved individual effect that increases participation decreases the earning level. More workers participate during the period when earnings are high, but those who have the highest earnings also have the highest reservation wages and thus tend to drop out the labor force as earnings decline in the slack season.

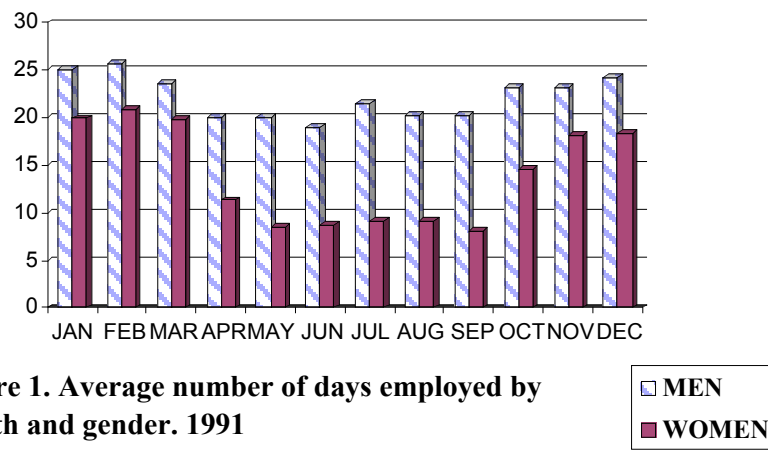
(6) This negative significant coefficient indicates that the time varying effects generating the simultaneity of wages to labor participation appears to increase participation and decrease wages.

Source: Based on Table 5 in Jarvis and Vera-Toscano, Forthcoming.

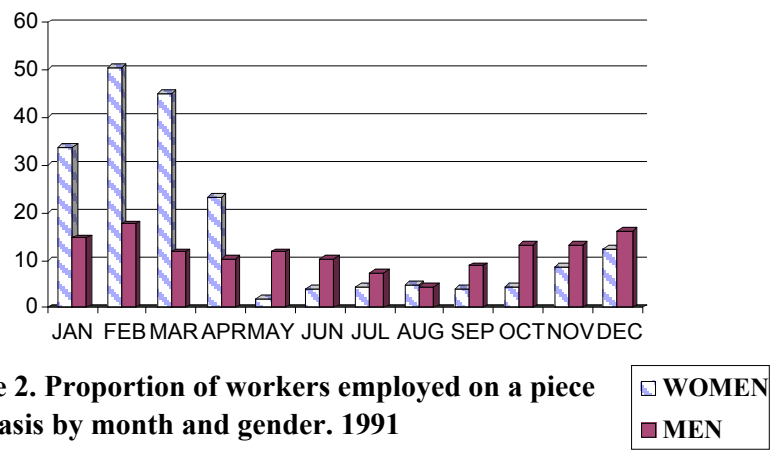
**Table 7. Composition of 1991 Seasonal Workers' Household Income Inequality**

Income Source	Share in total household income (S)	Gini coefficient for income source (G)	Gini correlation with total income rankings (R)	Contribution to Gini coefficient of total income (SGR)	Percentage share in Gini of total income
Male Income and Female Income outside the Fruit Sector	0.66	0.418	0.85	0.234	74.76
Female Income from Fruit Sector	0.26	0.453	0.43	0.051	16.29
Other Income	0.08	0.416	0.84	0.028	8.95
Total Income	1.00	0.313	1.00	0.313	100.0

Source: Authors' calculations from survey data.

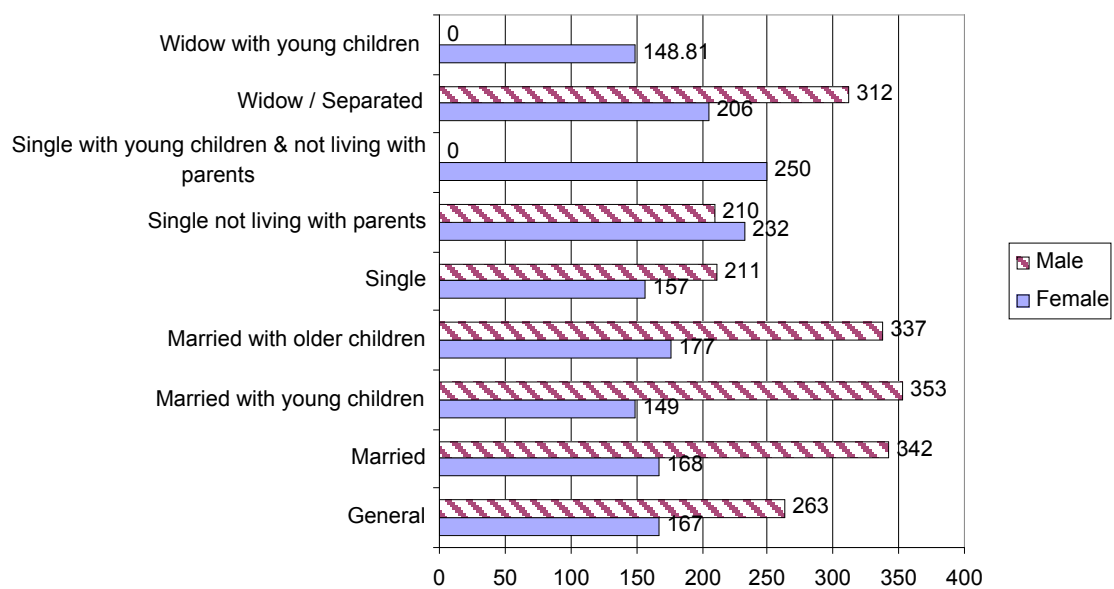


**Figure 1. Average number of days employed by month and gender. 1991**

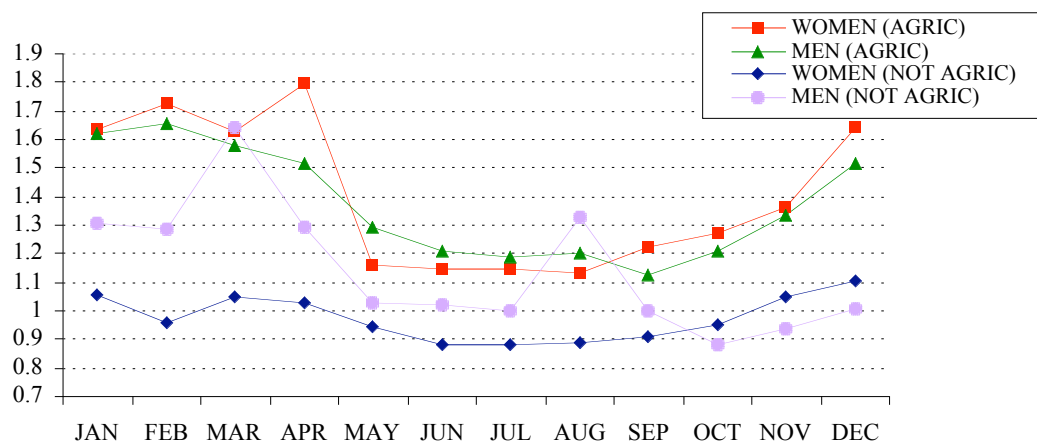


**Figure 2. Proportion of workers employed on a piece rate basis by month and gender. 1991**

■ WOMEN  
■ MEN



**Figure 3. Average number of days worked in 1991, by household characteristics and gender.**



**Figure 4: Average daily income of surveyed workers in 1991, by gender and sector of employment (Thousand of Pesos)**





**Figure 5: Unemployment rates of surveyed workers on 2nd Tuesday of each month during 1991.**

## Endnotes

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<sup>1</sup> The reform sector was composed of farms that had been expropriated during the land reform implemented during the Frei and Allende administrations.

<sup>2</sup> The decline in the number of permanent agricultural workers and the growth in the number of temporary agricultural workers in the 1970s and 1980s also raised policymakers' concern that changes in labor market structure had reduced rather than increased the welfare of many male as well as female agricultural workers (Cox, et al., Gómez and Echeñique, Schurman) and may have reduced efficiency.

<sup>3</sup> Official data on many aspects of agricultural employment are lacking or of poor quality. Definitions change from period to period, and from study to study. Comparisons are thus difficult to make. Assertions should often be treated as working hypotheses.

<sup>4</sup> For example, Yaksic (1986) estimated that the table grape sub-sector in the Provinces of San Felipe and Los Andes required labor equal to only about 3 percent of the locally available labor in the months of April and May, 1983, but needed absolutely more workers than were locally available during the month of February. However, Newman and Jarvis encountered few truly migratory workers among the packing shed workers in the three areas surveyed during January-February, 1992. It may be that Yaksic's estimates were in error, or that the local labor force grew significantly between 1983 and 1992. Although the temporary labor force in northern valleys, such as Copiapo, has long depended mainly on migratory workers, in other areas the labor force is composed overwhelmingly of workers from local rural and urban areas who travel daily from home to work and back (Venegas).

<sup>5</sup> Venegas estimated that women accounted for only 5 percent of permanent fruit workers, but 52 percent of temporary workers in 1990. Her data show clear gender segregation between permanent and temporary work, with women concentrated into less secure, short-term employment.

<sup>6</sup> These sheds were located in three regions: Santa Maria, Buin/Paine, and Lontue.

<sup>7</sup> When analyzing a 1983 sample of California agricultural workers, Rubin and Perloff found that a higher proportion tended to seek piece rate employment when they were young or old. However, the bulk of piece rate workers in their sample were relatively young.

<sup>8</sup> Information on Labor Force Participation was collected for every day in 1991. However, since some workers were employed on a monthly basis during at least part of 1991, we arbitrarily (after some descriptive analysis) used observations only from the second Tuesday of each month. Thus, the sample contained 12 observations for each worker and a total of 7188 observations. On average, workers in this sample participated in the labor force 72% of the time.

<sup>9</sup> Workers were asked to indicate whether there were any periods during which they had not been in the labor force. Next, they were asked whether, for those periods when they claimed to have been in the labor force, they had actively looked for work. Finally, they were asked whether they had looked for work locally, regionally and/or nationally. The latter questions were intended to cause them to reflect on whether and how hard they had looked for work. Workers were categorized as being unemployed in a given period only if they had declared themselves to be in the labor market and actively looking for work.

<sup>10</sup> Chile has no legalized divorce, but separation is common.

<sup>11</sup> Work periods reported include weekends. Workers sometimes worked on weekends, but not always. We assume that workers were employed roughly 5.5 days per week, or 80% of the days reported in each "employment period."

<sup>12</sup> Average Daily Income for workers not employed at a fixed daily wage was calculated by dividing total income earned in each job (per month, if the job spanned more than one month-workers were able to report their monthly earnings for piece rate jobs) by the number of days the worker was employed. Some of the seasonal decline in average daily income was probably due to fewer daily hours worked in the winter.

<sup>13</sup> The smaller number of male observations and the relative homogeneity of male respondent characteristics may have contributed to the lack of significant coefficients.

<sup>14</sup> The choices of whether to work at piece rate or wage, and in the agricultural and non-agricultural sector, are endogenous to the determination of daily earnings, but Jarvis and Vera-Toscano lacked instruments allowing them to treat this endogeneity.

<sup>15</sup> In one case, a young woman responded that cleaning grapes in a packing shed allowed her to achieve self-esteem (*me siento realizada*) and satisfy tangible needs. She had previously felt isolated in her rural home, lacking social contact and unable to contribute to her family's needs. Work in the packing shed allowed her to interact with her co-workers. She enjoyed them. She benefited from sharing problems with them, discovering that they struggled with similar issues, and talking to them about how to deal with these

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problems. She was proud that she performed her job task well and was pleased to contribute to her family's income and well being.

<sup>16</sup> Most workers (52%) believed that they increased their effort and their productivity when working on a piece rate basis. Only 6% believed that their productivity decreased. Eighty-three percent of workers indicated that they felt competition with their co-workers in terms of trying to process a higher share of the "common" raw material.

<sup>17</sup> Although data were not collected on how women used their earnings, informal discussion with workers suggested that, in addition to providing a general income supplement, most women emphasized expenditures on the practical needs of their children and on acquiring durable household goods that improved their own productivity and welfare. Nearly all households already had TVs, and most women asked indicated that they had already bought or hoped to buy (with their earnings) a gas range, a refrigerator, and a semi-automatic clothes washer.