Workers' Benefits from Bolivia's Emergency Social Fund
LSMS Working Papers

<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Household Survey Experience in Africa</td>
</tr>
<tr>
<td>7</td>
<td>Measurement of Welfare: Theory and Practical Guidelines</td>
</tr>
<tr>
<td>8</td>
<td>Employment Data for the Measurement of Living Standards</td>
</tr>
<tr>
<td>9</td>
<td>Income and Expenditure Surveys in Developing Countries: Sample Design and Execution</td>
</tr>
<tr>
<td>10</td>
<td>Reflections on the LSMS Group Meeting</td>
</tr>
<tr>
<td>11</td>
<td>Three Essays on a Sri Lanka Household Survey</td>
</tr>
<tr>
<td>12</td>
<td>The ECIEL Study of Household Income and Consumption in Urban Latin America: An Analytical History</td>
</tr>
<tr>
<td>13</td>
<td>Nutrition and Health Status Indicators: Suggestions for Surveys of the Standard of Living in Developing Countries</td>
</tr>
<tr>
<td>14</td>
<td>Child Schooling and the Measurement of Living Standards</td>
</tr>
<tr>
<td>15</td>
<td>Measuring Health as a Component of Living Standards</td>
</tr>
<tr>
<td>16</td>
<td>Procedures for Collecting and Analyzing Mortality Data in LSMS</td>
</tr>
<tr>
<td>17</td>
<td>The Labor Market and Social Accounting: A Framework of Data Presentation</td>
</tr>
<tr>
<td>18</td>
<td>Time Use Data and the Living Standards Measurement Study</td>
</tr>
<tr>
<td>19</td>
<td>The Conceptual Basis of Measures of Household Welfare and Their Implied Survey Data Requirements</td>
</tr>
<tr>
<td>20</td>
<td>Statistical Experimentation for Household Surveys: Two Case Studies of Hong Kong</td>
</tr>
<tr>
<td>21</td>
<td>The Collection of Price Data for the Measurement of Living Standards</td>
</tr>
<tr>
<td>22</td>
<td>Household Expenditure Surveys: Some Methodological Issues</td>
</tr>
<tr>
<td>23</td>
<td>Collecting Panel Data in Developing Countries: Does It Make Sense?</td>
</tr>
<tr>
<td>24</td>
<td>Measuring and Analyzing Levels of Living in Developing Countries: An Annotated Questionnaire</td>
</tr>
<tr>
<td>25</td>
<td>The Demand for Urban Housing in the Ivory Coast</td>
</tr>
<tr>
<td>26</td>
<td>The Côte d’Ivoire Living Standards Survey: Design and Implementation</td>
</tr>
<tr>
<td>27</td>
<td>The Role of Employment and Earnings in Analyzing Levels of Living: A General Methodology with Applications to Malaysia and Thailand</td>
</tr>
<tr>
<td>28</td>
<td>Analysis of Household Expenditures</td>
</tr>
<tr>
<td>29</td>
<td>The Distribution of Household Expenditures in Côte d’Ivoire in 1985</td>
</tr>
<tr>
<td>30</td>
<td>Quality, Quantity, and Spatial Variation of Price: Estimating Price Elasticities from Cross-Sectional Data</td>
</tr>
<tr>
<td>31</td>
<td>Financing the Health Sector in Peru</td>
</tr>
<tr>
<td>32</td>
<td>Informal Sector, Labor Markets, and Returns to Education in Peru</td>
</tr>
<tr>
<td>33</td>
<td>Wage Determinants in Côte d’Ivoire</td>
</tr>
<tr>
<td>34</td>
<td>Guidelines for Adapting the LSMS Living Standards Questionnaires to Local Conditions</td>
</tr>
<tr>
<td>35</td>
<td>The Demand for Medical Care in Developing Countries: Quantity Rationing in Rural Côte d’Ivoire</td>
</tr>
<tr>
<td>36</td>
<td>Labor Market Activity in Côte d’Ivoire and Peru</td>
</tr>
<tr>
<td>37</td>
<td>Health Care Financing and the Demand for Medical Care</td>
</tr>
<tr>
<td>38</td>
<td>Wage Determinants and School Attainment among Men in Peru</td>
</tr>
<tr>
<td>39</td>
<td>The Allocation of Goods within the Household: Adults, Children, and Gender</td>
</tr>
<tr>
<td>40</td>
<td>The Effects of Household and Community Characteristics on the Nutrition of Preschool Children: Evidence from Rural Côte d’Ivoire</td>
</tr>
<tr>
<td>41</td>
<td>Public-Private Sector Wage Differentials in Peru, 1985–86</td>
</tr>
</tbody>
</table>

(List continues on the inside back cover)
Workers’ Benefits from Bolivia’s Emergency Social Fund
The Living Standards Measurement Study

The Living Standards Measurement Study (LSMS) was established by the World Bank in 1980 to explore ways of improving the type and quality of household data collected by statistical offices in developing countries. Its goal is to foster increased use of household data as a basis for policy decisionmaking. Specifically, the LSMS is working to develop new methods to monitor progress in raising levels of living, to identify the consequences for households of past and proposed government policies, and to improve communications between survey statisticians, analysts, and policymakers.

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Workers' Benefits from Bolivia's Emergency Social Fund

John Newman
Steen Jorgensen
Menno Pradhan

The World Bank
Washington, D.C.
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John Newman is an economist in the Population and Human Resources Department, Steen Jorgensen is an economist in the Southern Africa Department, and Menno Pradhan is a consultant in the Population and Human Resources Department, all at the World Bank.

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ABSTRACT

Bolivia's Emergency Social Fund (ESF) was established to cushion the adverse effects of its economic crisis and subsequent stabilization program on the poor and to facilitate transition through the phases of structural adjustment. The ESF program represented one of the first World Bank funded efforts to address the social costs of adjustment by including a separate compensatory program, rather than by modifying the implementation of a structural adjustment program in light of the expected social costs.

The ESF was established explicitly as a temporary financial institution outside of the normal bureaucratic structure of the government. While its primary emphasis was to provide temporary employment opportunities, it differed from more typical government works projects in being demand-driven. The management team of the ESF approved or rejected funding requests for small-scale, labor intensive projects that came from local governmental and non-governmental agencies, but did not propose any projects themselves. The projects were executed and the workers hired by private subcontractors working under the supervision of the local agency and the central management team of the ESF.

This paper is concerned with measuring the effect of the ESF program on employment and income of workers in the ESF projects. The analysis is based on the results of a survey administered to workers in ESF infrastructure projects and to the population at large by the Instituto Nacional de Estadistica (INE) of Bolivia. In the first part of the paper we identify the characteristics of the workers in the ESF infrastructure projects and compare these workers with the population in general and workers in the construction sector in particular. In the second part of the paper we perform a counterfactual simulation, asking what would have been the position of the workers in the absence of the ESF program. Based on this simulation, we infer what the employment and income effect of the ESF program has been on its beneficiaries.

The average ESF worker experienced a 12.8 percent increase in wages, an increase of 9.5 hours of work a week, and a 32 percent increase in weekly earnings over what he would have earned if he were working in the absence of the ESF. Taking into account the probability that the individual may not have worked in the absence of the ESF leads to larger gains. The unconditional comparison indicates that the average ESF worker receives a 33 percent increase in wages, an increase of 15.5 hours of work a week, and a 51 percent increase in earnings. The greatest benefits from participating in the program were received by those who would have been least well-off in the absence of the program.
ACKNOWLEDGMENTS

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TABLE OF CONTENTS

1. Introduction ........................................... 1
2. Background to the ESF .................................. 5
3. The Data ................................................. 7
4. Background of ESF Workers .............................. 9
5. Earnings of ESF Workers ................................ 11
6. Hours Worked and Hourly Wages ....................... 11
7. Position of the Family ................................ 15
8. Impact of the ESF Program ............................ 17
   A. The Econometric Specification ..................... 19
   B. The Variables ...................................... 22
9. Results .................................................. 23
10. Conclusions ............................................ 33
References .................................................. 37
Appendix A .................................................. 39

TABLES AND FIGURES

Table 1 Sample Distribution of Workers in ESF Projects and Distribution of Funding of Urban Projects ................. 9
Table 2 Education Levels .................................. 10
Table 3 Total Family Earnings by Family Food Expenditure Quartiles Percent of ESF families in Cell ................. 17
Table 4 Descriptive Statistics of Males Aged 18 to 55 ........ 25
Table 5 Wage and Hours of Males 18-55 in the General Population . 26
Table 6 Wage and Hours of Males 18-55 in the ESF Sample .... 28
Table 7 Expected Wages, Hours, and Earnings ................ 29
Figure 1 How the Earnings of ESF Workers Compare to Earnings in Construction ........................................ 12
Figure 2 How Earnings of ESF Workers Compare to those of all prime age males ...................................... 13
Figure 3 How Family Income of ESF Workers Compares to the General Population ..................................... 14
Figure 4 Distribution of Hours of Work ..................... 16
Figure 5 Comparison of Predicted Earnings ESF Workers with and without ESF Program ......................... 32
1. INTRODUCTION

Bolivia’s Emergency Social Fund (ESF) was established to cushion the adverse effects of its economic crisis and subsequent stabilization program on the poor and to facilitate transition through the phases of structural adjustment. The ESF program represented one of the first World Bank funded efforts to address the social costs of adjustment by including a separate compensatory program, rather than by modifying the implementation of a structural adjustment program in light of the expected social costs.

While the primary emphasis of this program was to provide temporary employment opportunities, it differed from more typical government works projects in several important ways. First, the program was intended to be demand-driven. The management team of the ESF approved or rejected funding requests for small-scale, labor intensive projects that came from local governmental and non-governmental agencies, but did not propose any projects themselves. Secondly, the ESF did not directly employ the workers. Rather, the projects were executed and the workers hired by private subcontractors working under the supervision of the local agency and the central management team of the ESF. Thirdly, the ESF was established explicitly as a temporary financial institution outside of the normal bureaucratic structure of the government.

There are several avenues through which a compensatory program such as the ESF can affect the transition through the structural adjustment process. It may contribute political support to carry out the adjustment policies, create infrastructure that reduces the cost of producing tradeable goods, and alter workers’ incentives to move towards favored sectors. As in any program designed to ameliorate the social costs of the adjustment process, there is a tension between ameliorating the adverse impact and counteracting the necessary reforms. Because the ESF’s economic infrastructure projects generate employment in the non-traded goods sector, they do not directly contribute towards shifting the structure of production towards traded goods. Indeed, they raise the return to employment in a nontraded goods sector. If the ESF is to aid in the transition, what it does contribute towards easing the transition (the economic infrastructure and the income maintenance), must outweigh whatever negative effect it would have in counteracting the reforms.
Quite apart from the ESF's role in the adjustment process, there also has been interest expressed in Bolivia's experience with the demand-driven mechanism used to distribute the funds. Under the auspices of the ESF, a substantial amount of external funds were generated and channelled to a large group of smaller governmental and non-governmental organizations. The ESF's success in this regard has motivated efforts to establish similar social investment funds in other countries (notably in Guatemala, Haiti, and Jordan), either with or without a connection to a structural adjustment program.

As different groups have been interested in different aspects of the ESF, there is no single criterion for success of the program and, consequently, no single source of information on which to judge the program. At the risk of oversimplification, one can identify four different views of the ESF. Depending on the perspective of the observer, the ESF was a) a Keynesian aggregate demand policy designed to keep the economy from further contraction during the structural adjustment process; b) an institution for channelling externally-generated funds down to local groups that previously had no recourse to this type of funding; c) a program designed to compensate those who suffered the greatest loss due to adjustment; d) a program designed to protect the poor and vulnerable during adjustment. Those in group (d) are not necessarily the same as those in group (c).

In the early days of the ESF, the predominant view of ESF's role was that it should generate external funds and quickly inject them into the economy. External funds were required to finance the ESF since financing the project out of domestic funds would have made it that much harder to achieve the objective of the structural adjustment program of reducing the budget deficit.

To judge how well the ESF did in this regard, one need only consult the administrative record. By the end of 1988, the ESF had raised more than $100 million in foreign currency, an amount equal to about one-fourth of the current account deficit in 1988. Most of the foreign financing received has been in the form of grants. There is reason to believe that foreign aid inflows would have been considerably lower without the ESF. Several donors have begun or resumed programs in Bolivia because ESF was able to ensure efficient and speedy implementation. The ESF's administrative costs amounted to no more than 3 percent of its budget. The average lag between date of commitment and disbursement of all funds is less than one year in the ESF, shorter
than even fast-disbursing balance of payments support. Rapid disbursements were facilitated by the ESF's use of the market, relying on local groups to propose projects and mainly private subcontractors to execute them.

The ESF was effective in making resources available to municipalities, community organizations, and nongovernmental organizations, which, by nature of their size, do not typically receive funding from international organizations. By the end of 1988, the ESF had committed about $20 million or 20 percent of its total commitments to non-governmental organizations (NGOs).

Of course, the viability of social investment funds and the benefits of such a program as the ESF can not be judged solely on the basis of the administrative record. The administrative record provides a measure only of the inputs (the expenditure of the investment fund) and not the outputs of the investment fund. Moreover, it remains an open question whether the success the ESF has had as a temporary institution operating to a large extent independently of the line ministries and outside of many normal constraints can be replicated in a permanent institutional framework. The experience that will come with the successor to the ESF in Bolivia (the Social Investment Fund) and with efforts to establish other social investment funds elsewhere will be a strong test of the institutional viability of a permanent social investment fund. Certainly, the experience of the ESF provides useful lessons for the establishment of those funds.

To judge the effectiveness of ESF's institutional structure, its role in compensating those adversely affected by the structural adjustment, and its contribution towards protecting the poor during adjustment, requires information on the outputs of the program - on the value of the infrastructure created and of the impact of the program on beneficiaries.

This paper is concerned with measuring the effect of the ESF program on employment and income of workers in the ESF projects. This is an important element in an evaluation of the ESF, but does not, by itself, constitute a complete evaluation of the ESF. Two aspects, in particular, that are not addressed in this paper are worth mentioning. Given the relatively small size of the ESF program, we do not estimate spillover effects of the program on the urban labor market in general. How one might estimate such effects is discussed in section 8. Secondly, this paper is not concerned with estimating the value of the economic infrastructure created. Nevertheless, it is
important to recognize the additional objectives of the program - to generate productive economic infrastructure and to generate and disburse funds quickly. These objectives imposed constraints on the type of employment generation and income maintenance that were undertaken. For example, because economic infrastructure projects were managed by subcontractors who decided whom to hire, almost no women were hired. This is not surprising since these were construction projects and extremely few women work in the urban construction sector in Bolivia. If the output of this employment/income maintenance program is valued highly, then it may still be desirable to fund such projects even though the mix of the workers hired does not match the desired targets. If the indirect effects of the program are judged not sufficient to improve the welfare of the targeted groups, then other facets of the ESF program would have to be directed towards the appropriate groups.

Our analysis of the effect of the ESF projects on the urban labor market is based on the results of a survey administered to workers in ESF infrastructure projects and to the population at large by the Instituto Nacional de Estadistica (INE) of Bolivia. In the first part of the paper we identify the characteristics of the workers in the ESF infrastructure projects and compare these workers with the population in general and workers in the construction sector in particular. In the second part of the paper we perform a counterfactual simulation, asking what would have been the position of the workers in the absence of the ESF program. Based on this simulation, we infer what the employment and income effect of the ESF program has been on its beneficiaries. We do not attempt to analyze how these results translate into political support for the adjustment program as this is something that does not readily lend itself to empirical study.

1 Grosh (1990) describes evaluations of other facets of the ESF that have been conducted. These consist of: a) a technical audit of the technical/engineering quality of its civil works; b) an early evaluation and monitoring report conducted by a team of economists and sociologists; c) a community participation study conducted by anthropologists through open-ended but structured interviews; d) an ex-post cost-benefit analysis of a small sample of completed projects; e) a study of the macro-economic impact, comparing the results of investing through the ESF to results from investing through alternative channels; f) a study of the impact on institutions with which the ESF worked; g) a study of its impact on one particular community; and h) a study on the geographic targeting of projects.

2 Herrick (1989) presents a benefit-cost analysis of the infrastructure created using respondents' perceived increases in their property values following the completion of an ESF-funded infrastructure project as an indicator of the benefits. In an ex post evaluation of 20 street paving, sewer, and water projects, he finds 15 out of the 20 projects with a benefit cost ratio greater than 1. The lowest ratio is 0.84 and the median value is over 4.
The Bolivian economy deteriorated rapidly and continuously after 1980, reaching a point of chaos by 1985. In retrospect, the causes are clear. In the seventies, an artificial boom, fed by capital inflows followed the discovery of substantial hydrocarbon resources. The boom lasted as long as access to financial resources was easy. When the situation changed around 1980, for both internal and external reasons, economic performance deteriorated sharply. Net foreign transfers became strongly negative, GDP fell in real terms, and capital flight accelerated. Economic policies became erratic and inconsistent. By September 1985, inflation had reached 24,000 percent a year, GDP per capita had fallen by more than a fifth since 1980, and public sector deficits were around one fourth of GDP.

When the Government of President Paz-Estenssoro took office in August 1985, an orthodox, wide-ranging stabilization package was introduced. The package included freeing most prices, deregulating the trade system and the labor market, establishing a uniform exchange rate (determined through daily auctions) and cutting public sector deficits. Inflation was immediately curtailed and has remained low. Inflation was 11 percent in 1987 and 21 percent in 1988 and 1989. Public sector deficits have been brought under control and the exchange rate has remained unified. Growth has taken longer to occur, as Bolivia faced serious negative terms of trade shocks in the first year of the program. However, the economy grew, albeit slowly, in 1987, 1988, and 1989.

The effects of the economic program on the public sector were especially dramatic. The Government set out deliberately to introduce a fundamentally different view of the public sector. The public sector’s role was viewed as providing basic public services efficiently, engaging in only limited extraction and processing of natural resources, and otherwise providing a “level playing field” for the private sector. The state mining sector was closed for restructuring and 90 percent of the employees were fired. Public sector salary policy was left to individual entities under a fixed wage bill, and important reforms were initiated to establish a better accounting and control system in the public sector.

From the outset of the adjustment program, the Bolivian Government attached
a high priority to measures to alleviate any further deterioration in social conditions. This was due to fears over the effect of economic dislocation on the already very low living standards of the Bolivian poor, as well as concern that increased hardship would strengthen opposition to the Government's policies.

Various options were considered for alleviating the social costs of adjustment before setting up the ESF. The early discussions in 1985 revolved around more traditional programs of widespread distribution of food or medicines, or direct subsidies for selected items. A number of difficulties were perceived with this approach. First, the administrative costs in directly providing or subsidizing the purchase of commodities to low income groups was felt to be high. Second, providing free food (particularly if taken from international donations) would have discouraged the production of food and increased the country's dependence on food imports. Third, permitting recipients more discretion in the use of assistance (providing money instead of food, for example) was viewed as more consistent with the reduced role of the state inherent in the adjustment program. Finally, the Government wished to avoid imposing a uniform method of assistance, but rather to respond to the demands of local groups which would be in a better position to judge the most immediate needs.

Following these principles, the ESF was established in November 1986 to provide funds for small-scale, labor-intensive projects mostly in infrastructure. The projects were meant to be demand-driven, meaning that the ESF would finance projects proposed by local groups. The focus on labor-intensive, infrastructure projects was adopted to increase employment among the poor while at the same time providing services to the community that would aid development. A second feature was that the ESF was primarily a financing institution. It did not involve itself in the implementation of projects, except for some supervision and technical support. The organizations that received funding were responsible for hiring the workers in the projects and ensuring that the projects moved towards completion.

ESF was designed as a temporary institution and is scheduled to disappear in December 1990. It was hoped that in four years time growth would have picked up enough to solve the employment problem and that the need for austerity measures would be less, allowing for increases in social spending as part of the regular budget. ESF's total program was planned as US$ 180 million over the life of the institution, with US$ 8 million dollars coming from the Bolivian government and the rest from
external sources in the form of grants or loans at concessional rates.

The ESF funds projects in four basic categories: economic infrastructure, social infrastructure, social assistance, and production support. Economic infrastructure (covering 37.8 percent of committed funds) encompasses infrastructure closely related to productive activities, including road maintenance and upgrading, urban improvement, irrigation, flood control, and reforestation. Social infrastructure (47.6 percent of committed funds) covers infrastructure for health and education, water and sanitation, basic housing (mostly self-construction), and some cultural projects (for example, repairs of historic buildings). Social assistance (8.8 percent of committed funds) covers recurrent costs in education and training, vaccinations, school breakfasts, and production of school materials. Production support (5.7 percent of committed funds) is mainly credit provided through NGOs to productive units which are outside of the formal financial system, such as microenterprises producing for the informal sector and small cooperatives in mining and agriculture.

3. THE DATA

The management team of the ESF commissioned ex post evaluations of the economic returns of the projects and surveys of the beneficiaries of the employment generating projects. This paper analyzes the results of the 1988 household survey administered to ESF workers and to the population at large by the Instituto Nacional de Estadística (INE) of Bolivia with the financial support of the ESF and the World Bank.

Information on the general population was obtained from the 1988 Encuesta Permanente de Hogares (EPH), part of an ongoing survey effort that has been conducted yearly by the Instituto Nacional de Estadística (INE) since 1976. The 1988 survey took place in May and covered urban households in nine capital cities of the provinces in Bolivia. Information on workers and their families in ESF funded projects was obtained from a special survey conducted for the ESF by INE. From a list of all ESF projects in execution, INE selected all those that were (a) in capital cities; (b) in operation at the time of the EPH Survey; and (c) in economic infrastructure (i.e. explicitly employment generating). Only the capital cities were chosen because INE’s May 1988 household survey covers only the capitals and information on a control group
was required for the analysis. A total of 64 projects employing 3,051 workers met these requirements. INE then visited the projects to ascertain the actual number of workers working at the projects and drew a random sample of 600 workers from the list of all workers. The ESF workers were visited in their homes and were administered the same household questionnaire as that of the EPH sample. Table 1 indicates the distribution of all workers in the 64 projects and of the sample across all cities.

This procedure of conducting a separate sample of ESF workers was done for two reasons. First, because at the time of the survey the size of the ESF program was small compared to the population economically active, the probability of finding a sufficiently large sample of workers in the ESF for analytical work from a sample of the general population was low.\textsuperscript{3} Second, previous pilot surveys indicated that many of the workers who were actually working in ESF financed projects did not know that they were doing so. This is evidenced by the fact that when INE visited the workers known to work in the projects, having obtained their names and addresses from the subcontractors, a majority of the workers had not heard of the ESF. This meant that the only way of guaranteeing that ESF workers would be interviewed was to employ a separate sample consisting only of ESF workers.

The results from the May 1988 survey provide additional information to that contained in a previous survey conducted in December 1987. In the 1987 survey the ESF workers were interviewed on the job site. While this may be expected to generate reliable information on the characteristics of the ESF workers themselves, it is not the best procedure to obtain information on other family members or on family-level variables. The 1988 survey has better information on family characteristics. Despite the differences in collection procedures, many of the 1988 results confirm the picture presented from the 1987 survey and from other surveys conducted of the beneficiaries. Unless otherwise specified, the results presented in this document are taken from the 1988 survey.

\textsuperscript{3} At the time of INE’s survey (May 1988), the size of the ESF program was small relative to the labor force. In all ESF-sponsored employment generating projects in the capital cities, 3,051 persons were employed. This number constitutes 0.3 percent of the economically active population and 2.7 percent of the unemployed in the capital cities.
Table 1 -- Sample Distribution of Workers in ESF Projects and Distribution of Funding of Urban Projects

<table>
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<tr>
<th>Capital City</th>
<th>Total Workers in ESF Projects</th>
<th>Sample of Workers</th>
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<tr>
<td>Sucre</td>
<td>173</td>
<td>34</td>
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<tr>
<td>La Paz</td>
<td>1296</td>
<td>255</td>
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<td>Cochabamba</td>
<td>403</td>
<td>80</td>
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<td>Oruro</td>
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<td>Potosi</td>
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<tr>
<td>Tarija</td>
<td>118</td>
<td>23</td>
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<tr>
<td>Santa Cruz</td>
<td>82</td>
<td>16</td>
</tr>
<tr>
<td>Cobija</td>
<td>86</td>
<td>17</td>
</tr>
<tr>
<td>Total</td>
<td>3051</td>
<td>600</td>
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4. BACKGROUND OF ESF WORKERS

The workers in these ESF projects are, for the most part, prime-age married males who are heads of household. Ninety-nine percent are male and seventy-one percent are married. Ninety-one percent fall in the age category between twenty and sixty-five years old and ninety-three percent are reported as head of the household. These workers are apparently the prime income earners of their household and the earnings from the ESF projects are their primary source of income. In 62 percent of the households of ESF workers there is only one reported income earner, in 25 percent there are two and in 9 percent there are three. These results closely approximate the pattern of the 1987 survey. Only 7.2 percent of the ESF workers have a secondary job.

Most of the ESF projects in the capital cities are in the construction sector and ninety-one percent of the ESF workers work in construction. This high percentage is due to the selection of only projects in economic and social infrastructure. We compare the ESF workers with other workers in the construction sector and with workers in general, using information from the EPH sample.

In comparison with other workers in the construction sector ESF workers are less
educated. The distribution over the different education levels is given in table 2.

<table>
<thead>
<tr>
<th>Education Level</th>
<th>ESF Workers</th>
<th>Workers in construction</th>
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<tr>
<td>None</td>
<td>6.3</td>
<td>4.4</td>
</tr>
<tr>
<td>Basic</td>
<td>41.2</td>
<td>36.8</td>
</tr>
<tr>
<td>Intermediate</td>
<td>24.1</td>
<td>15.8</td>
</tr>
<tr>
<td>Middle</td>
<td>26.0</td>
<td>26.9</td>
</tr>
<tr>
<td>Technical</td>
<td>0.7</td>
<td>3.5</td>
</tr>
<tr>
<td>Normal</td>
<td>0.2</td>
<td>0.6</td>
</tr>
<tr>
<td>University</td>
<td>2.0</td>
<td>12.0</td>
</tr>
</tbody>
</table>

Thirty-nine percent of the sample responded that they were looking for work prior to working in the ESF, 54 percent reported that they had a job, and 7 percent had another response. Of those who had a job before joining, sixty percent worked in construction before, either as an independent or wage worker. That is, a little over 30 percent of all those working in ESF projects were working on construction jobs before working on the ESF projects. Again, of those with a previous job, five percent were vendors and 1.4 percent were miners before working in the ESF. The rest are spread out over various occupations.

Taking into account both those who came directly from mining and those who had an intervening spell of unemployment, some ten percent of the 3,050 ESF workers in the capital cities were ex-miners. Given the size of the ESF employment program at that time and the approximately 23,000 miners let go when COMIBOL was closed, it is clear that the ESF did not come close to absorbing all of the ex-miners. However, that was never the intention of the program.
5. EARNINGS OF ESF WORKERS

The evidence indicates that the ESF workers are on the low skilled end of the construction market, but that they are paid according to the levels prevailing in the labor market in construction. The mean monthly earnings was 225 bolivianos per month for workers in ESF projects, 375 per month for the average prime-age male construction worker in the EPH sample, and 348 for the average prime-age male in the population at large. However, the mean monthly earnings of low skilled construction workers in the EPH sample (those with the characteristics of the ESF workers) was 196 bolivianos per month. The median monthly earnings was 194 for workers in ESF projects, 220 for prime-age males in the construction sector, and 230 bolivianos per month for workers in the population in general.

Figure 1 presents the distribution of ESF workers across the deciles of monthly earnings of males between 18 and 65 in the construction industry. Figure 2 presents a similar distribution of ESF workers among all males aged 18 through 65 in the EPH sample. The height of the bars indicate the percentage of ESF workers with monthly earnings that would place them in the given decile in the EPH sample. For example, 45 percent of the ESF workers receive monthly earnings within the range of the fourth poorest decile and 31 percent receive monthly earnings within the range of the lowest three deciles. Earnings in the fourth poorest decile range from a low of 150 to a high of 200 bolivianos a month. While earnings of all ESF workers are low relative to earnings in other countries, not all the workers in the ESF projects are low-income workers by the standards of the urban Bolivian work force.

Figure 3 presents the distribution of family income of ESF workers across EPH family income deciles. It looks much the same as for the distribution of monthly earnings. There is an overrepresentation of ESF families in the middle deciles, 3 through 6, and an underrepresentation of ESF families in the lower and upper deciles. Less than 10 percent of the ESF families are in the two highest deciles.

6. HOURS WORKED AND HOURLY WAGES

On average, the workers in the ESF projects work more hours than the prime
Figure 1: How the Earnings of ESF Workers Compare to Earnings in Construction

Note: deciles from all Constr. workers
Figure 2: How Earnings of ESF Workers Compare to those of all prime age males

Note: Deciles calculated from EPH sample
Fig. 3: How Family Income of ESF Workers Compares to the General Population

Note: Deciles calculated from EPH sample
age males within the EPH sample. ESF workers work 50.3 hours a week compared with 46.8 for the EPH workers. Compared with other prime-age males in the construction sector and the population in general, the distribution of hours worked by ESF workers is less variable. Figure 4 illustrates the distribution of hours worked in the primary job for the two samples. The conclusion drawn from this figure is that, in general, ESF workers are employed full-time.

The mean hourly wage of workers in the ESF projects was 1.16 bolivianos compared with a mean hourly wage of 2.28 of the corresponding group in the EPH sample. The median hourly wage is 0.98 bolivianos for ESF workers and 1.29 bolivianos in the EPH sample.

7. POSITION OF THE FAMILY

Table 3 presents cross-tabulations of total family earnings quartiles by total family food expenditure quartiles. The quartiles were calculated using all the families in the EPH sample. In general, the ESF families appear to be worse off if judged by their position within food expenditure quartiles as opposed to family earnings quartiles. For example, 34.6 percent of the ESF families are in the lowest food expenditure quartile, whereas only 21.5 percent of the families are in the lowest family earnings quartile. While there is always the possibility that measurement error in either food expenditure or family earnings results in a misclassification of families into the wrong cell, the observed relationship between expenditure and income is what one would expect given the fact that the jobs in the ESF were temporary. The ESF families may not be changing their expenditure patterns in response to the temporary gain in income.

The majority of the ESF families (54.1 percent) are in the lowest two earnings and food expenditure quartiles. Seventeen percent of the families are in the two highest earnings quartiles, yet are in the lowest two food expenditure quartiles. Eleven percent of the families in the lower two earnings quintiles are in the highest two food expenditure quintiles. The workers in this group may have come from relatively well-off households, since even receiving low earnings does not lead the household to have low food expenditure. The workers who are in both high earnings and food expenditure quartiles (18.8 percent) may have come from relatively well-off households to begin with or the high earnings may have raised the food expenditure in the household. With the
Figure 4: Distribution of Hours of Work

ESF workers

EPH workers

percent

0 20 40 60 80 100

<= 40 41-45 46-50 >50
limited amount of information on the household characteristics of ESF workers, we can not tell which is the more likely explanation.

Table 3 -- Total Family Earnings by Family Food Expenditure Quartiles
Percent of ESF families in Cell

<table>
<thead>
<tr>
<th>Food Expenditure Quartile</th>
<th>1 (low)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Row Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Family Earnings Quartile</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 (low)</td>
<td>12.9</td>
<td>5.5</td>
<td>2.4</td>
<td>0.7</td>
<td>21.5</td>
</tr>
<tr>
<td>2</td>
<td>16.5</td>
<td>19.2</td>
<td>7.0</td>
<td>1.0</td>
<td>43.7</td>
</tr>
<tr>
<td>3</td>
<td>4.3</td>
<td>9.6</td>
<td>9.6</td>
<td>2.9</td>
<td>26.4</td>
</tr>
<tr>
<td>4</td>
<td>0.9</td>
<td>2.2</td>
<td>2.9</td>
<td>2.4</td>
<td>8.4</td>
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<tr>
<td>Column Total</td>
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<td>36.5</td>
<td>21.9</td>
<td>7.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

8. IMPACT OF THE ESF PROGRAM

To ascertain the effect of the ESF on the labor market, we ask a counterfactual question - what would have been the position of the ESF workers and other individuals in the labor market in the absence of the program. In principle, the positions of both types of workers could be estimated by holding constant for local labor market conditions (the size and structure of demand) and estimating the incremental effect of the ESF program on wage offers. As the ESF increases the demand for labor, one would expect a measure of the size of the ESF program to have a positive effect on wage offers and, therefore, most likely an increase in the probability of working and
hours worked. To infer the position of workers in the absence of the ESF program one would compare expected wages, probabilities of working, and hours worked with the incremental effect of the ESF program to the corresponding values obtained by setting the incremental effect to zero.

Such a procedure requires an accurate indicator of the differential size of the ESF program in the different capital cities. At the time of the survey, there was substantial variation both in local labor market conditions and in the size of the ESF program. However, the variation in the ESF program was not random. The actual size of the program reflected the applications for proposals that were received from each city and the funding decision rules of ESF’s management team. An attempt was made to locate projects where wages were low and unemployment and underemployment were high. Because of this nonrandom allocation, including a direct measure of the ESF (e.g. number of ESF workers or expenditure in each city) would generate biased estimates of the program’s effect. The problem is that the ESF measure would be correlated with the error terms in the equations explaining wages and labor force participation because of its correlation with unobserved local labor market conditions.

This is a common problem in the evaluation of government programs (Rosenzweig and Wolpin, 1986) and is typically solved by incorporating information on the program implementation to distinguish between the effects of the allocation and the impact of the program. The case of evaluating a demand-driven program such as the ESF can be easier or harder than the typical case depending on whether the applications for the projects are uncorrelated or correlated with the variables of interest. If the applications are uncorrelated with the variables of interest (as would be the case if the underlying capacity to generate proposals was randomly distributed across cities), then information on the applications could serve as an instrument for the size of the ESF program. No additional information on the decision rules would be needed. However, if the initial applications are not randomly distributed across the cities, then even the knowledge of the management’s decision rules may not overcome the problem of a nonrandom allocation of the ESF program. Additional information would have to be available on the ability of a city to generate fundable proposals.

Our attempts to measure the incremental effect of the ESF program using the dollar amount of applications in each city as an instrument for the size of the program were unsuccessful. The problem was that the ESF applications were highly correlated
with the size and unemployment rate in the city. Consequently, it proved impossible to measure any spillover benefits of the ESF program on other workers who do not participate in the program. However, given that the total amount of workers employed in capital cities at the time of the survey amounted to just 0.3 percent of the population economically active and 2.7 percent of the total unemployed, any spillover effects would be expected to be minimal. Thus, we focus exclusively on measuring the benefits of the ESF program to the workers who participate in the program.

8.A. THE ECONOMETRIC SPECIFICATION

We estimate the workers’ expected gains from participating in the ESF program using two models. Both models are based on Heckman’s (1974) model describing the determination of wages, the probability of working, and the hours of work. Our first model consists of four equations that describe: (a) wage offers in the general population; (b) the marginal value of leisure of individuals in the general population; (c) wage offers in the ESF; and (d) the marginal value of leisure of ESF workers. In this model, we assume that the errors in the equations for the general population are independent of the errors in the equations for the ESF. This implies that ESF workers differ from those in the general population only in their observed characteristics, not in unobserved characteristics and allows us to estimate the wage offer and marginal value of leisure equations separately for each group.

Given the estimated wage offer and marginal value of leisure equations of the two groups, an estimate of the workers’ expected gains from participating in the ESF program is obtained by comparing the expected wages, hours of work, and earnings while participating in the program with estimates of what their wages, hours of work, and earnings would have been in the absence of the program. Under the assumptions of this first model, the counterfactual wage offers and marginal value of leisure are obtained by multiplying the characteristics of the ESF workers by the coefficients of the wage offer and marginal value of leisure equations of the general population. From these estimated structural equations, one may calculate wages, hours of work, earnings, and the probability of working.

4 A succinct description of this model is given in Amemiya (1985), pp. 391-393.
However, ESF workers may differ from individuals in the general population in ways that are not captured by measured characteristics of the survey. The information that these workers chose to participate in the ESF indicates they perceived working in the ESF to be better than their alternatives and, therefore, suggests that they might be different from the general population. Our second model takes this into consideration in estimating what the ESF workers would receive in the absence of the program. It adds an equation determining participation in the ESF and allows the error terms in the participation equation to be correlated with the errors in the wage offer and marginal value of leisure equations of ESF workers and the general population.

In this section we briefly describe the estimation procedure for this simpler model. The second, more complicated model is described in Appendix A.

The equation describing wage offers in the general population is:

\[ \ln w^o = X'_1 \beta_1 + u_1 \]  

(1)

where: \( X_1 \) is a vector of explanatory variables, \( \beta_1 \) a vector of coefficients, and \( u_1 \) is a random error term. The wage offer function is assumed not to depend on the hours of work, although this assumption could be relaxed.

The individual's marginal value of leisure is specified as a function of a set of exogenous variables and the individual's leisure, which, in turn is equal to the total time available minus the hours of work. Thus,

\[ \ln w^r = Z'_1 \alpha_1 + \gamma_1 H + u_2 \]  

(2)

where: \( Z \) is a vector of explanatory variables, \( \alpha_1 \) and \( \gamma_1 \) are coefficients to be estimated, \( H \) is the hours of work, and \( u_2 \) is a random error term. Errors between the wage offers and the marginal value of leisure are allowed to be correlated to take account of possible measurement error.

The equation describing wage offers in the ESF is:

\[ \ln w^o_{\text{esf}} = X'_2 \beta_2 + u_3 \]  

(3)
and the equation describing the marginal value of leisure of workers in the ESF is:

$$\ln w_{esf}^r = Z_2^1 \alpha_2 + \gamma_2 H_{esf} + u_4$$  \hspace{1cm} (4)

As everyone who participates in the ESF works, we do not have to consider their decision whether or not to work. However, we do have to consider this decision for those in the general population. Consider first the decisions for an individual in the general population. He or she will work if the wage offer is greater than the marginal value of leisure evaluated at zero hours of work, often referred to as the reservation wage. That is, if

$$\ln w^o > \ln w^r(H=0) \equiv Z_1^1 \alpha_1 + u_2$$  \hspace{1cm} (5)

or, making the substitutions, if

$$u_1 - u_2 > Z_1^1 \alpha_1 - X_1^1 \beta_1$$  \hspace{1cm} (6)

If the individual works, then he or she will work up to the point where the marginal value of leisure is equal to the wage offer. The wage and hours worked are determined by solving (1) and (2) simultaneously together with the condition that

$$\ln w = \ln w^o = \ln w^r$$  \hspace{1cm} (7)

Thus, for those individuals who work, we have the following two equations.

$$\ln w = X_1^1 \beta_1 + u_1$$  \hspace{1cm} (8)

$$\ln w = Z_1^1 \alpha_1 + \gamma_1 H + u_2$$  \hspace{1cm} (9)

or, solving (9) for hours,

$$H = \frac{1}{\gamma_1} \ln w - Z_1^1 \alpha_1 \cdot \frac{1}{\gamma_1} u_2$$  \hspace{1cm} (10)
Provided there are variables that affect the marginal value of leisure that do not also affect wage offers, all structural parameters of the model are identified.

The likelihood function for the general population is,

\[ L = \prod_{0}^{UB} \int_{-\infty}^{u_{1}-u_{2}} f_{u_{1},u_{2}}(v) \, dv \]

\[ \prod_{1} f_{u_{1},u_{2}}(\ell n w - X_{1}' \beta_{1}, H - \frac{1}{11} \ell n w + Z_{1}' \alpha_{1}, \rho_{1,2}) \]

where: \( u_{2} = -\frac{1}{2} u_{2} \), \( UB = Z_{1}' \alpha - X_{1}' \beta_{1} \), and \( \rho_{1,2} \) is the correlation between \( u_{1} \) and \( u_{2} \). The product over 0 consists of all those individuals who are not working and the product over 1 consists of all the individuals who are working. The parameters of interest, \( \beta_{1}, \alpha, \gamma, \sigma_{1}, \sigma_{2}, \) and \( \rho_{1,2} \) are estimated by maximum likelihood.

For the sample of ESF workers, only the second part of the likelihood function (with \( u_{3} \) replacing \( u_{1} \) and \( u_{4} \) replacing \( u_{2}' \)) appears as they all work. Indeed, one could just as well estimate the parameters of interest by seemingly unrelated regression to take account of the correlation between \( u_{3} \) and \( u_{4} \).

8. B. THE VARIABLES

The variables that affect the marginal value of leisure are age, a dummy equal to 1 if married, nonlabor income, years of schooling, and the number of other family members 12 years or older (included as a measure of the total number of potential workers). The variables in the wage offer function include age, years of education, the economy-wide open unemployment rate in the city of residence, and the size of the market as measured by the number economically active in the city. In lieu of price indices for each city, we include in the wage offer function a cost factor employed by the
ESF management team in setting administrative guidelines on wages paid in ESF projects. The guidelines allowed for paying higher wages where the nominal wage paid in the market was higher. Including the cost factor accounts somewhat for these differences, but does not allow one to distinguish whether nominal wages are higher because the price level is higher or because the demand for labor is higher. This is not important for the purposes of this paper.

As the ESF jobs are exclusively in construction, the wage offer function for ESF jobs is made a function of the unemployment rate in the construction sector instead of the unemployment rate of the economy as a whole. All other variables in the wage offer functions are the same. Of course, the coefficients on these variables differ for the ESF jobs and the EPH jobs.

The variables in the ESF participation equation include all those in the wage offer and marginal value of leisure equations, together with the monetary value of the accumulated applications to the ESF as of the date of the survey in each capital city and a dummy variable indicating whether the individual had ever heard of the ESF. In cities where ESF applications are higher, one would expect higher participation in the ESF. The dummy variable on knowledge of the ESF is included as a proxy for information costs. If the individual has heard of the ESF, this would be expected to reduce the information costs associated with finding employment in the ESF and make it more likely that the individual would participate. It is not a perfect predictor of being in the ESF as many who were working in projects funded by the ESF had never heard of it. The means of all the explanatory variables for males aged 18-55 in the ESF sample and in the general population are presented in Table 4.

9. RESULTS

As almost all ESF workers were prime-aged males aged 18-55, we limited our comparison of ESF workers and those in the general population to males in this age group. We also excluded as outliers those who reported working more than 350 hours per month and those more than two standard deviations away from the mean in wage. The exclusion criteria reduced the sample by six percent. Table 5 presents the estimated coefficients of the restricted and unrestricted models for males aged 18-55 in the general population. The variables are scaled as in Table 4. The coefficients of all of
the variables entering the hours of work equation were estimated as $\alpha_1/\gamma_1$ and $\alpha_2/\gamma_2$ in Tables 5 and 6, respectively. Since, estimate of $\gamma_1$ and $\gamma_2$ are available, the structural parameters of the marginal value of leisure for both the general population and the ESF workers could be recovered if so desired.

Table 5 presents the results for both models for the general population of males aged 18 to 55. In this sample, one can not reject the hypothesis that the restrictions are valid, namely that both $\rho_{15}$ and $\rho_{25}$ are zero. The point estimate of $\rho_{15}$ is negative, meaning that those more likely to participate in the ESF are, given their observed characteristics, more likely to have lower wage offers in the general population. However, this parameter is imprecisely estimated even in this large sample. The point estimate of $\rho_{25}$ is small and imprecisely estimated. The value of the likelihood changes only slightly between the two models and all estimated coefficients are virtually identical. Except for the estimates of the two rhos, all coefficients are statistically significant at the one percent level with the expected signs. The correlation between the error terms in the marginal value of leisure and the $\ell n$ wage is positive, or equivalently, between the error terms in the hours equation and the $\ell n$ wage is negative.

All variables in the estimated wage offer function and the hours equation for the general population of males aged 18 to 55 were significant and of the expected sign. The estimated rate of return to an additional year of schooling is 5.4 percent. An increase of one percent (0.01) in the unemployment rate would lead to a 3.6 percent decrease in wage offers. The results also indicate that married men, those with more nonlabor income, and in families with more potential workers have a higher marginal value of leisure and will work less. An increase of 1000 bolivianos per year in non labor income decreases hours worked by 11. It increases the marginal value of leisure by 70 percent ($11.0 \times (1/17.0)$), which is $(\alpha_1/\gamma_1 \times \gamma_1)$. An increase in the $\ell n$ wage of 0.01 (i.e. a one percent increase in the wage) is estimated to lead to a increase of 0.17 hours worked. At the sample unconditional mean of 29 hours, this amounts to a 0.6 percent increase in hours worked. Thus, the estimated labor supply elasticity is 0.6.

While more educated men have higher wage offers, they also have higher marginal values of leisure. Thus, the effect of education on hours worked depends on the combined effect. An increase of one year of education increases the $\ell n$ wage by 0.054 which, in turn, increases hours worked by 0.92 hours. On the other hand, an increase of one year of education, acting through its effect on the marginal value of
Table 4: Descriptive Statistics of Males Aged 18 to 55

<table>
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<tr>
<th></th>
<th>ESF Workers</th>
<th>General Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std. Dev.</td>
</tr>
<tr>
<td>Proportion working</td>
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<tr>
<td>Weekly Hours</td>
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<td>7.00</td>
</tr>
<tr>
<td>ln wage*</td>
<td>-0.03</td>
<td>0.45</td>
</tr>
<tr>
<td>wage*</td>
<td>1.07</td>
<td>0.52</td>
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Variables in Wage Offer Equation

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<th>General Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>32.0</td>
<td>10.0</td>
</tr>
<tr>
<td>Years of schooling</td>
<td>6.6</td>
<td>3.6</td>
</tr>
<tr>
<td>Unemployment rate**</td>
<td>0.18</td>
<td>0.04</td>
</tr>
<tr>
<td>Econ. active / 100,000</td>
<td>2.29</td>
<td>1.76</td>
</tr>
<tr>
<td>Cost Factor</td>
<td>0.98</td>
<td>0.13</td>
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</table>

Variables in Hours Equation

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<th>General Population</th>
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</thead>
<tbody>
<tr>
<td>Married</td>
<td>0.73</td>
<td>0.45</td>
</tr>
<tr>
<td>Other family members 12 or older</td>
<td>2.0</td>
<td>1.70</td>
</tr>
<tr>
<td>Nonlabor income / 1000</td>
<td>0.003</td>
<td>0.012</td>
</tr>
</tbody>
</table>

N

452 4185

* For the general population, the mean ln wage and the wage are calculated only over those who work. All other mean values refer to the working and nonworking population.

** For the ESF workers, the unemployment rate is the unemployment rate in construction. For the general population it is the overall unemployment rate.
Table 5: Wage and Hours of Males 18-55 in the General Population

<table>
<thead>
<tr>
<th></th>
<th>Restricted($\rho_{15}=\rho_{25}=0$)</th>
<th>Unrestricted</th>
<th>Coef.</th>
<th>Std. Error</th>
<th>Coef.</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wage Offer</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-0.84*</td>
<td>-0.84*</td>
<td>0.13</td>
<td>0.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.0073*</td>
<td>0.0073*</td>
<td>0.0016</td>
<td>0.0016</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years of schooling</td>
<td>0.054*</td>
<td>0.054*</td>
<td>0.003</td>
<td>0.003</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>-3.61*</td>
<td>-3.61*</td>
<td>0.6</td>
<td>0.56</td>
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<td></td>
</tr>
<tr>
<td>Econ. active / 100,000</td>
<td>-0.03*</td>
<td>-0.03*</td>
<td>0.008</td>
<td>0.01</td>
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<tr>
<td>Cost Factor</td>
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<td>0.75*</td>
<td>0.08</td>
<td>0.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\sigma_1$</td>
<td>0.76*</td>
<td>0.76*</td>
<td>0.01</td>
<td>0.01</td>
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<td><strong>Hours of Work</strong></td>
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<tr>
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<td>14.0*</td>
<td>4.0</td>
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<tr>
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<td>0.48*</td>
<td>0.08</td>
<td>0.08</td>
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<tr>
<td>Married</td>
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<td>24.0*</td>
<td>1.0</td>
<td>1.00</td>
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<tr>
<td>Years of schooling</td>
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<td>-1.7*</td>
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<td>0.2</td>
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<tr>
<td>Other family members</td>
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<td>-2.3*</td>
<td>0.2</td>
<td>0.2</td>
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<td></td>
</tr>
<tr>
<td>Nonlabor income / 1000</td>
<td>-11.0*</td>
<td>-11.0*</td>
<td>1.0</td>
<td>2.0</td>
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</tr>
<tr>
<td>Coef. of $\ln w (1/\gamma_1)$</td>
<td>17.0*</td>
<td>17.0*</td>
<td>3.00</td>
<td>4.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\sigma_2$</td>
<td>2.24*</td>
<td>2.23*</td>
<td>0.35</td>
<td>0.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\rho_{1,2}$</td>
<td>0.70*</td>
<td>0.70*</td>
<td>0.04</td>
<td>0.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\rho_{1,5}$</td>
<td></td>
<td>-0.43</td>
<td>0.44</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\rho_{2,5}$</td>
<td></td>
<td>-0.01</td>
<td>0.44</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Log likelihood</td>
<td>4508.42</td>
<td>4506.72</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>4185</td>
<td>4185</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at the 5 percent level.
leisure, decreases hours worked by 1.7 hours. An additional year of education, therefore, is associated with a 5.4 percent higher wage in the general labor market and 0.81 hours less work per week.

Table 6 presents results of the restricted and unrestricted model for the ESF workers. As this sample is roughly one tenth the size of that of the general population, it is not surprising that the coefficients are estimated with less precision. Although the coefficients in the wage offer equation follow the same pattern as for the general population and are generally precisely estimated, this is not the case for the coefficients in the hours equation. This is undoubtedly due to the much lower variation in hours in the ESF sample. Not only do all ESF workers participate, but conditional on participating, their hours vary less than in the general population.

In contrast to the case with the general population, for the ESF workers we can reject the hypothesis that $\rho_{3,5}$ and $\rho_{4,5}$ are equal to zero. The negative $\rho_{4,5}$ indicates that those with a larger positive $u_5$, hence more likely to participate in the ESF, are those with a lower $u_4$, hence a lower marginal value of leisure. This means that those individuals are more likely to work longer hours. One possible explanation is that those individuals well suited to unskilled construction work may be more likely to work in the ESF and have the stamina to work more hours. Alternatively, it may be that those more likely to work in the ESF have a higher marginal utility of income and are prepared to work longer hours. It is, of course, impossible to distinguish among alternative explanations for associations between the unobserved errors.

The estimated coefficients in the wage offer function do not change dramatically between the restricted and the unrestricted model. As befitting the low skilled nature of the construction work, the return to education is only 1.6 percent - considerably lower than in the general population. The coefficients in the hours equation did change considerably between the restricted and the unrestricted model, but as the restricted model had so little precision, one should not make too much of the change.

The top half of Table 7 presents mean expected wages, weekly hours worked, and weekly earnings based on the estimated coefficients from both the restricted and unrestricted models. These expectations are calculated conditional on working and then multiplied by the predicted probability of working to yield the unconditional expectations. The mean expected values are calculated for each observation in the
Table 6: Wage and Hours of Males 18-55 in the ESF Sample

<table>
<thead>
<tr>
<th></th>
<th>Restricted ((\rho_{35}=\rho_{45}=0))</th>
<th>Unrestricted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef.</td>
<td>Std. Error</td>
</tr>
<tr>
<td><strong>Wage Offer</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-1.70*</td>
<td>0.31</td>
</tr>
<tr>
<td>Age</td>
<td>0.0086*</td>
<td>0.0023</td>
</tr>
<tr>
<td>Years of schooling</td>
<td>0.021*</td>
<td>0.006</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>-1.10**</td>
<td>0.62</td>
</tr>
<tr>
<td>Econ. active / 100,000</td>
<td>-0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Cost Factor</td>
<td>1.51*</td>
<td>0.27</td>
</tr>
<tr>
<td>(\sigma_3)</td>
<td>0.40*</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>Marginal value of leisure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>49.0*</td>
<td>2.0</td>
</tr>
<tr>
<td>Age</td>
<td>-0.01</td>
<td>0.05</td>
</tr>
<tr>
<td>Married</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Years of schooling</td>
<td>-0.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Other family members</td>
<td>-0.3</td>
<td>0.2</td>
</tr>
<tr>
<td>Nonlabor income / 1000</td>
<td>22.0</td>
<td>22.0</td>
</tr>
</tbody>
</table>

| Coef. of \(\ln w(1/\gamma_1)\) | 2.0 | 2.0 | 13.0* | 3.0 |
| \(\sigma_4\)                  | 4.11 | 4.71 | 1.11* | 0.18 |

| \(\rho_{3,4}\) | 0.32* | 0.11 | 0.39* | 0.16 |
| \(\rho_{3,5}\) |          | 0.14 | 0.18 |
| \(\rho_{4,5}\) |          | -0.91* | 0.02 |

- Log likelihood 1878.73 1863.66
N 452 452

* Significant at the 5 percent level.

** Significant at the 10 percent level.
Table 7: Expected Wages, Hours, and Earnings

<table>
<thead>
<tr>
<th></th>
<th>Restricted Model</th>
<th>Unrestricted Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ESF</td>
<td>General Pop.</td>
</tr>
<tr>
<td><strong>Conditional on Working</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wages (Bolivianos)</td>
<td>1.15</td>
<td>1.19</td>
</tr>
<tr>
<td>Weekly Hours</td>
<td>50.2</td>
<td>35.4</td>
</tr>
<tr>
<td>Weekly Earnings</td>
<td>57.7</td>
<td>46.3</td>
</tr>
<tr>
<td>Prob. of Working</td>
<td>100%</td>
<td>72 %</td>
</tr>
<tr>
<td><strong>Unconditional</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wages</td>
<td>1.15</td>
<td>0.95</td>
</tr>
<tr>
<td>Weekly Hours</td>
<td>50.2</td>
<td>27.7</td>
</tr>
<tr>
<td>Weekly Earnings</td>
<td>57.7</td>
<td>33.3</td>
</tr>
</tbody>
</table>

The expected position of ESF Workers in the absence of the program

**Conditional on Working**

| Wages (Bolivianos)       | 0.94              |
| Weekly Hours             | 40.1              |
| Weekly Earnings          | 38.7              |
| Prob. of Working         | 82%               |

**Unconditional**

| Wages (Prob. x Wages)    | 0.80              |
| Weekly Hours (Prob. x Hours) | 34.1              |
| Weekly Earnings (Prob. x Wages x Hours) | 34.6              |

Note: At the survey date 1 boliviano was worth approximately US$ 0.50.

Mean conditional earnings and unconditional wages, hours, and earnings are obtained by averaging over all individuals. For example, the mean conditional earnings were calculated as \( \frac{1}{N} \sum W_i \times H_i \). This is not equal to \( \bar{W} \times \bar{H} \).
sample and then averaged. As the unrestricted model dominates the restricted model for ESF workers, the expected values of the unrestricted model are the ones to focus on. The results from the restricted model of ESF are presented solely for the sake of comparison. As it was not possible to reject the restricted model for the general population, we present only the results for the restricted model.

The mean expected wage of ESF workers, conditional on working, is 1.06 bolivianos per hour, very close to the actual mean wage in the ESF sample. The mean expected hours conditional on working is considerably higher for the ESF workers than for the general population (49.6 versus 35.4 hours). It is this difference that accounts for the higher mean expected earnings of the ESF workers (52.4 vs 46.3 bolivianos per week). At the then prevailing exchange rates this amounts to roughly $26 per week for the ESF workers and $23 per week for the sample of the general population.

As all ESF participants work, there is no difference between their conditional and unconditional values. However, the mean probability of working for the general population is 72 percent. The unconditional expected wages, hours, and earnings of the prime age males in the general population are correspondingly lower.

The expected position of ESF workers in the absence of the program is calculated by replacing the estimated coefficients from the ESF sample with the estimated coefficients of the general population and recalculating the expected wages, hours, and weekly earnings. These calculations are presented in the bottom part of Table 7. In the absence of the ESF program, those individuals working in the ESF would be expected to receive a mean wage of 0.94 bolivianos, work an average of 40.1 hours per week and have weekly earnings of 39.7 bolivianos per week, conditional on working. The mean probability that the ESF workers would be working in the absence of the program is 82 percent. Thus, they are more likely to be working than someone with the mean characteristics of the general population. The ESF workers' mean unconditional weekly hours worked is 34.1 hours with a mean weekly earnings of 34.6 bolivianos.

To ascertain the benefit from working in the ESF, we calculated the difference between the expected wages in the ESF and the expected wages in the absence of the ESF for each individual in the ESF. This enables us to look not only at the average benefit over all ESF workers, but also at the distribution of the benefits. The average ESF worker experiences a 12.8 percent increase in wages, an increase of 9.5 hours of
work a week, and a 32 percent increase in weekly earnings over what he would have earned if he were working in the absence of the ESF. Taking into account the probability that the individual may not have worked in the absence of the ESF leads to larger gains. The unconditional comparison indicates that the average ESF worker receives a 33 percent increase in wages, an increase of 15.5 hours of work a week, and a 51 percent increase in earnings.

An examination of the distribution of gains over all ESF workers indicates that the greatest benefits from participating in the program were received by those who would have been least well-off in the absence of the program. We define the least well-off group as those whose estimated conditional wage *in the absence of the program* would have placed them more than one half of a standard deviation below the actual mean wage of prime age males in the general population. Twenty-five percent of the ESF sample consists of individuals in this group. Participating in the ESF gives this group an absolute increase of 0.37 bolivianos per hour in their expected wages (a 64 percent increase), an increase of 20 hours worked and an absolute increase in earnings of 29 bolivianos per week (a 171 percent increase) over their position in the absence of the ESF. Taking into account the probability that they might not work yields corresponding absolute increases of 0.57 bolivianos per hour, 30 additional hours of work a week, and an increased earnings of 38 bolivianos per week.

The next group consists of those workers whose estimated conditional wage *in the absence of the program* would have placed them within one half a standard deviation of the actual mean wage of prime age males in the general population. Seventy-three percent of the sample fall in this category. The absolute wage gains are lower for this group than for the less-well off group and, as this group has higher wages and earnings, the percentage gains will be even lower. Conditional on working in the absence of the ESF, the absolute increase in wages is estimated to be .03 bolivianos per week (a 3 percent increase), the increase in hours worked to be 5.7, and the increase in earnings to be 7.4 bolivianos per week (a 15.9 percent increase). The unconditional comparison yields an average increase of 0.15 bolivianos per hour, an increase of 10.4 hours, and an increase of 16.5 bolivianos per week.

Only two percent of the ESF workers fell into the group whose estimated conditional wage *in the absence of the program* was more than one half a standard deviation above the actual mean wages of prime age males in the general population.
Fig. 5 Comparison of Predicted Earnings ESF Workers with and without ESF Program

Percent in EPH sample

Decile of primary earnings

- With ESF
- Without ESF

Note: Deciles calculated from EPH Sample
A further indication of the benefits of participation in the ESF is provided by comparing the estimated wages of ESF workers with the program to the same actual mean wages of prime age males in the general population. With the increased wages received in the ESF program, only 6 percent of the ESF workers are estimated to fall in the least well-off group (as defined above), ninety-one percent of the ESF workers are in the middle group, and only three percent in the highest group. The biggest shift was in moving individuals out of the least well-off category. As those ESF workers in the lowest groups also experienced the largest increase in expected hours worked, their relative benefits measured by gains in earnings compared to the better off groups are even larger than measured by wage gains.

Figure 5 presents the same comparison graphically. It illustrates in which decile ESF workers are estimated to fall without and with the ESF program. The deciles are constructed on the basis of the primary earnings received by males aged 18 to 55 in the general population. Note that the position of ESF workers in the absence of the program is counterfactual and can only be obtained by estimation. The reported earnings with the ESF represent estimated earnings. In this, it differs from Figure 2 which reports where ESF workers would fall in the deciles on the basis of their actual earnings. Whether one compares ESF workers in the absence of the program to their estimated or actual earnings with the program, the story is the same. There is a substantial temporary increase in earnings, with most of the increase coming from moving individuals out of the lowest deciles towards the middle deciles.

10. CONCLUSIONS

Returning to the four views of the ESF, it is apparent from the administrative records and the survey data that the ESF was more successful in fulfilling some of its promises than others. The ESF generated and rapidly disbursed external funds. To the extent that the ESF did successfully transfer these funds to lower income groups who consume mainly domestically produced goods, the expenditure would be expected to have a larger multiplier effect. It generated substantial temporary gains in earnings of workers in the projects over what they would have received in the absence of the program. The lowest income groups received the greatest increases in earnings. While most of the workers still received low incomes even with the program, there was some
leakage in that some individuals in the higher earnings deciles did benefit from the ESF. The ESF did not target the ex-miners and ex-employees of the public sector that are generally considered the ones most affected by the structural adjustment program. It did employ workers that came from the construction industry, which was hurt by the economic crisis.

The outcomes followed, to a large extent, from the decisions made early on in the design of the ESF to make extensive use of the local institutions already in place and of private subcontractors in the market. This requires the presence of local institutions capable of preparing projects. ESF experience has indicated that this can be a problem, particularly in low income areas, and requires active promotion on the part of the management team. Working with existing institutions undoubtedly contributed to the ESF’s ability to generate external funds and rapidly disburse them. Once the subcontractors received the funds, they paid market wages for unskilled laborers in construction. This is readily apparent from INE’s survey. It is also not surprising as the ESF did not exert control over whom the subcontractors hired, but did judge them on the progress of the project. In this respect the program differs from other temporary employment schemes that aim to be an employer of last resort by paying below market wages. In those schemes, the quality of the infrastructure created would be expected to be lower.

By virtue of working with the subcontractors, all targeting takes place in the initial selection of the project. As unskilled construction workers are low income individuals, the ESF program succeeded in reaching poorer groups of families. However, while these workers are certainly poor by other countries’s standards, they are not the poorest groups or, necessarily, the groups most adversely affected by the structural adjustment program. The targeted groups would only be helped with this type of demand-driven program if they chose to seek work in the ESF and if the private subcontractors viewed them to be as attractive employees as would more permanent members of the construction sector. It was also to be expected that some subcontractors, faced with the need to meet performance standards on the quality of the projects, would hire workers who were already working in the construction sector.

While it was the administrative success of the ESF as a temporary financial institution that generated interest in the possibility of replicating the central ideas in a more permanent framework and as part of a compensation package in a structural
adjustment program, the information provided by the survey helps to demonstrate what was and was not accomplished. With the ESF's administrative procedures and extensive management controls, an employment generation program that used private subcontractors was seen to rapidly generate temporary benefits to a mostly low income group with low administrative costs.

The likely effects of a similar program in other countries depend on the labor market conditions, the administrative capability of existing ministries, and the strength of local governmental and nongovernmental organizations. A demand-driven program such as the ESF is unlikely to have much effect on unemployment resulting from educated youth waiting for a job in the modern sector. The program is more likely to be a success if there is the possibility of high return investments with low skill content, if there is unemployment in the construction sector and construction workers are at the low end of the income distribution, and if paying below market wages is considered undesirable - either because of the potential impact it could have on the quality of the project or because of the administrative costs of monitoring that low wages are actually paid. If these conditions prevail, then this type of temporary employment scheme may be a viable alternative to programs where the government directly hires workers.
REFERENCES


APPENDIX A

The second model consists of five equations that describe: (a) participation in the ESF; (b) wage offers in the general population; (c) the marginal value of leisure of individuals in the general population; (d) wage offers in the ESF; and (e) the marginal value of leisure of ESF workers. If participation in the ESF were simply a function of the relative wage offers between the ESF and the general labor market, there would have been no need to include a separate participation equation. However, as work in the ESF differs along other dimensions - for example, it offers full-time work over a period of short duration - a separate participation equation was included.

Participation in the ESF is modelled with a latent variable structure. An individual participates in the ESF if the latent variable passes a threshold, otherwise he does not. Thus, we specify:

\[ Y^* = \delta \Omega + u_5 \]  
(A.1)

\[ I = 1 \text{ if } Y^* \geq 0 \]
\[ = 0 \text{ otherwise} \]

where: I is an indicator variable, \( \Omega \) is a vector of exogenous variables affecting the participation decision, \( \delta \) is a vector of coefficients to be estimated, and \( u_1 \) is a random error term. In this and all other equations, the subscripts pertaining to the individual have been suppressed. The variable \( Y^* \) is an underlying latent variable which is not observed. We only observe whether the individual participates or not in the ESF.

The equations of the wage offer and marginal value of leisure equations are the same as in the text (eqs. 1-4). The error terms \((u_1,u_2,u_3,u_4,u_5)\) have a multivariate normal distribution with the following covariance structure:
Because participation is a zero-one decision, it is not possible to separately identify \( \delta \), the coefficients in equation 1, from \( \sigma_1 \). Following the usual practice, we normalize \( \sigma_1 \) to be equal to 1. The covariance among errors in the wage offer and marginal value of leisure equations of the general population on the one hand and among corresponding equations of the ESF on the other hand (\( \sigma_{13}, \sigma_{14}, \sigma_{23}, \) and \( \sigma_{24} \)) cannot be estimated because the individual either works in the ESF or in the general labor market. Thus, they are set to zero. Errors in the wage offer and marginal value of leisure equations in the general population are allowed to be correlated, thereby picking up measurement error between hours and wages. Similarly, errors in the wage offer and marginal value of leisure equations in the ESF population are allowed to be correlated.

The main difference between this model and the simpler one in the text is that in the text the implicit assumption is made that errors in the equation determining participation in the ESF are uncorrelated with wage offers and marginal values of leisure both in the ESF and in the general population, i.e. \( \sigma_{15} = \sigma_{25} = \sigma_{35} = \sigma_{45} = 0 \). Under these assumptions, the multivariate normal distribution of the errors collapses to the product of independent distributions:

\[
f(u_1,u_2,u_3,u_4,u_5) = f(u_1) \cdot f(u_2) \cdot f(u_4)\cdot f(u_5).
\] (A.2)

Thus, in the first model one may estimate the wage offers and marginal values of leisure in the ESF independently of the participation decision or of the wage offer and marginal value of leisure equations in the general population.

To allow for the possibility that ESF workers could differ in some unmeasured characteristics from those in the general population, we relax the covariance restrictions of the simpler model. Under a more general covariance structure, those individuals
more likely to participate in the ESF could have higher or lower wage offers than the general population. Under the less restrictive assumptions, the distribution of multivariate normal errors is:

\[ f(u_1, u_2, u_3, u_4, u_5) = f(u_5) \cdot f(u_1, u_2 | u_5) \cdot f(u_3, u_4 | u_5). \] (A.3)

In the previous case, \( f(u_1, u_2 | u_5) \) was assumed equal to \( f(u_1, u_2) \) and \( f(u_3, u_4 | u_5) \) equal to \( f(u_3, u_4) \). As this is no longer the case, we now must consider the participation decision in order to arrive at the expected wages and earnings of ESF workers in the absence of the program. We estimate this model in two steps.

In the first step, we predict the probability that a prime-age male would work in the ESF. Our problem is complicated by having to estimate the participation decision with a combined sample of ESF and EPH observations, with an over-representation of ESF workers. We know that those individuals taken from the ESF sample were program participants. Because the proportion of unidentifiable ESF workers in the EPH sample is so low, we assumed that their presence does not affect the distribution of workers in the population in any significant way. Thus, we consider the EPH sample to consist of non-participants in the program.

In combining information from the two samples, it is important to recognize that the ESF workers must have chosen to work in the ESF projects at least in part because they viewed that work as preferable to their alternatives. As the two samples are not distinguished solely on the basis of an exogenous variable such as age, but rather on a choice that was made, we face the problem of analyzing the participation decision using a choice-based sample. However, because we know the size of the ESF program in each of the capital cities, we can follow the weighted likelihood function approach of Manski and Lerman (1977) in estimation. In this approach, one weights the log likelihood pertaining to the outcome of each group by the ratio of the probability of encountering a member of a particular group in the population to the probability of drawing a member of that group from the sample.

In the second step, by virtue of the independence in the error terms in the ESF and general population conditional on the participation error, we can work with the

\[ 5 \] For a discussion of this problem see Manski and McFadden (1981) and Amemiya (1985), pp. 319-338.
ESF sample separately from that of the general population. For the general population, we need to modify the likelihood function given in equation (11) in the text by replacing the bivariate density function \( f(u_1, u_2) \) with the conditional bivariate density function \( f(u_1, u_2 | u_5) \). The conditional density function is bivariate normal, with

\[
f(u_1, u_2 | u_5) \sim N \left( \rho_{15} \sigma_1 u_5, \rho_{25} \sigma_2 u_5, \sigma_1^2(1-\rho_{15}^2), \sigma_2^2(1-\rho_{25}^2), \rho \right) \tag{A.4}
\]

where \( \rho = \frac{\rho_{23} \rho_{15} \rho_{25}}{\sqrt{1-\rho_{15}^2} \sqrt{1-\rho_{25}^2}} \)

Since the conditional means depend upon \( u_5 \), the error term from the participation equation will enter the likelihood function. However, because \( u_5 \) is not observed it must be integrated out of the likelihood function over its relevant range. For those who don’t participate in the ESF, \( u_5 < -\delta \Omega \). Thus, the relevant range for \( u_5 \) is from \(-\infty \) to \(-\delta \Omega \). The resulting likelihood function will now be:

\[
L = \prod_{0}^{UB} \int_{-\infty}^{-\delta \Omega} \int_{-\infty}^{v} f(u_1, u_2 | u_5) \, f(u_5) \, dv \, du_1
\]

\[
= \prod_{1}^{UB} \int_{-\infty}^{-\delta \Omega} f(u_1, u_2 | u_5) \, (\ell n w - X_1 \beta_1, H - \frac{1}{T_1} \ell n w + Z_1 \alpha_1, -\rho_{23}) \, f(u_5) \, du_5
\]

As in the previous estimation of the ESF sample, only the second part of the likelihood function given in (A.5) would appear. Because the condition for workers to participate in the ESF is \( u_5 > -\delta \Omega \), the limits of integration of \( u_5 \) for the ESF workers are from \(-\delta \Omega \) to \( \infty \).

---

6 If \( \rho_{34} \) were equal to zero, this estimation procedure would be exactly equivalent to Heckman’s (1979) two-step procedure of including the estimated value of the Mills ratio as a regressor on single equation OLS regressions of \( \ell n w_{esf} \) and \( H_{esf} \).
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