

The Role of the non-wage labour costs as in-work benefits schemes: The case of the free availability of the CTS in Peru

Henry Espinoza Peña

Maastricht Graduate School of Governance

Maastricht University

September 2006

ABSTRACT

This paper explores the implementation of an income support scheme in the form of in-work benefits for workers with incomes temporally below the poverty line, as an alternative to smoothen the effects of the reduction in the purchasing power of their wages. The idea is to use the funds of the non-wage labour cost (CTS) as a source of income to transfer to those workers. An analysis of the effectiveness of the free availability of the CTS will be developed through the estimation of its possible effects on poverty and labour market participation based on a structural labour market choice model using micro simulations, based on the models proposed by Gerfin and Leu (2003); Blundell, Duncan, McGrae and Meghir (2000) and De Hoyos (2006). The results suggest that the free availability of the CTS funds reduce the non extreme poverty rate on until 8% in average for the different cases analyzed.

CONTENTS

I. Introduction..... 3

II. Wages and their determination 5

III. CTS as an In-work benefits scheme 8

IV. A model to evaluate the effects of free availability CTS..... 11

V. Data 17

VI. Results of the microsimulations model 20

VII. Conclusions and Recommendations 29

VIII. References..... 31

IX. Annexes 35

The Role of the non-wage labour costs as in-work benefits schemes: The case of the free availability of the CTS in Peru

I. Introduction

The fluctuation of real wages has been a topic of debate between different schools of economics during the last decades, with respects to which are its causes. Although one could agree or disagree with the different theories it cannot be denied that these fluctuations have had terrible effects on the purchasing power of the workers' wages¹.

In Peru, due to the high costs of dismissals in the formal labour market, most firms react (as a strategy to reduce costs, in cases of shocks) altering their labour costs increasing the number of hours worked (for the same wage) or reducing the nominal wages of their workers². In this way, the firms are reducing irremediably the effective and real wages of their workers, diminishing their capacity to deal with their consumption requirements. After the effects of the period of crisis have passed, the firms make little increases in wages (not reducing hours worked, at least most of the times) to compensate the workers (in some cases the return to the pre-shock wage level is slow, thus the worker is not fully compensated for the temporary loss of earnings), this means that the workers share the risk of the business with the owners³.

The situation described definitely has an impact in the living standards of the population, considering that in average the share of the labour income is more than 80%⁴. So, as much as the wages (in real terms) fluctuate and take time to recover, the effects on the purchasing power of the family will be critical: putting the household in a vulnerable situation if not in poverty. In fact, according to some calculations based on the National Living Standard Survey 2002 (ENAHO): 81% of the households below the poverty line have their household head

¹ See Ravallion, Prennushi and Ferreira (1999), for a detailed description.

² According to Yamada (2004), the average quantity of hours worked per week increased from 48 to 51 during the recession period (1998-2001). About dismissal costs see Chacaltana (2001); Rama and MacIsaac (2001); Saavedra. and Maruyama. (2000).

³ This strategy to fix the payment for labour services is known as "risk sharing". See Birgsten, Collier, et al. (2003); and Espinoza (2006) for an application to Peruvian labour markets.

⁴ Own calculation based on National Living Standard Survey 2002 (ENAHO) from the National Institute of Statistics and Informatics of Peru (INEI)

working either on the informal labour market or in the formal one (working poor population). Other issue of concern is the fact that the most common strategies used for those household victims of an economic shock⁵ are: “working more” or sending to work other members of the household (35%), or the reduction of consumption (25%).

Considering that part of the role of the social protection schemes is avoiding population to be in a situation of poverty and vulnerability, some alternatives must be explored to deal with this. In the case of this study, an alternative use of the non wage labour cost known as CTS will be explored. Since January 1991, one additional labour cost item was added to the labour legislation in Peru: Tenure Bonus – CTS (*Compensación por tiempo de servicios*, in Spanish). The CTS consists of an additional wage paid by the employer to the employee for every tenure year of the worker. In order to simplify the way this labour cost is paid, the labour authority defined that every month the employer should pay into an account on behalf of the employee an amount equivalent to 1/12 or 8.3% of his/her gross wage⁶. This amount of money constitutes a fund in case the employee was fired⁷ or he/she left the job, meaning that he/she could not dispose of it otherwise.

In 2001, due to the effects of the recession and low economic activity, the government decided to apply the law of free availability of the CTS as an incentive to increase aggregate demand, allowing all workers to dispose the 50% of their CTS funds in any purposes they decide. Although this policy was applied for a different reason, it constitutes a good example, in the sense that it provides a counterfactual, to evaluate the impact of an in-work benefit scheme as an alternative to deal with the fluctuated evolution of the wages and its effects on the poverty status of the workers.

In this sense the objective of this thesis is exploring the implementation of an income support scheme in the form of in-work benefits for workers with incomes temporally below the poverty line, as an alternative to smoothen the effects of the reduction in the purchasing

⁵ Economic shocks are considered the lost of employment of one member of the household or the reduction of the income. See Chacaltana (2005) for a deeper analysis of shocks and poverty in Peru.

⁶ At the beginning of the CTS implementation the employer had to deposit in a bank account on behalf of the worker, every six months (in May and November) 1/12 of the last monthly wage multiplied by the number of months worked by the employee in those six months. After 10 years, in 2001, there was a change in the law and the deposits should be done now every month and for the equivalent of 8.33% of the wage.

⁷ There are additional benefits in case of dismissals: these include an indemnification equivalent to one and a half monthly wage for every year services, with a limit of twelve wages.

power of their wages⁸. The idea is to use the CTS funds as a source of income to transfer to those workers. To evaluate who is entitled to dispose freely of their CTS funds an assessment of the household situation would be necessary, like in means-tested benefits.

To deal with this objective, it will be developed an analysis of the effectiveness of the free availability of the CTS, through the estimation of its possible effects on poverty and labour market participation based on a structural labour market choice model with micro simulations, based on the models proposed by Gerfin and Leu (2003); Blundell, Duncan, McGrae and Meghir (2000) and De Hoyos (2006). In sum the idea of this thesis is to present the possible effects of an alternative social protection instrument that deals with the fluctuation of the purchasing power of the wages of the Peruvian workers.

This thesis is organized as follows: the next section makes a theoretical review of the wage determination process and some statistical evidence pertaining to Peru. Section 3 describes the CTS in some detail and how this scheme could be used as an in-work benefit scheme. Section 4 develops the structural labour market choice model, and how from this model a microsimulation analysis is being derived. The data used in this research are briefly described in section 5, and the estimation results are presented and discussed in section 6. Finally, section 7 contains the conclusions.

II. Wages and their determination

In economics theory, the rigidity or flexibility of real wages has been a major topic of debate. Some studies have shown empirically that wages fluctuate less than aggregate production, employment or hours worked; and that these (real wages fluctuations) have a procyclical behaviour (See Cahuc and Zylberbeg, 2004). But, the results of these studies are not in line with the determination of prices in competitive markets in some countries (like Peru) or with the factual variation of wages and hours worked (Yamada, 2004).

In this sense, trying to explain what happens in reality, the analysis of the trends in the evolution of the wages in real terms is exposed, from the point of view of the

⁸ The in-work benefits are a type of income support program, which could be financed by the Government or workers' contributions, characterised by making eligibility conditional on working.

macroeconomics, according to labour supply and labour demand factors⁹. Thus, within the factors associated with the labour supply are considerate situations like the “baby boom”, or the increase of female labour participation, or migration of labour force. Meanwhile, the factors associated to the labour demand are referred to the impact of globalization of markets and the role of the institutions of the labour markets (labour ministries and unions¹⁰).

The labour market, analyzed as any other market, adjusts itself due to these factors: prices or quantities. In Peru, considering the low and stable unemployment rate (between 8 and 9% the last 30 years) and the rapid increasing of the labour force (from almost 6 millions people in the mid 80’s to more than 10 millions in 00’s) the adjustment seemed to have happened by prices (rather than reductions in the volume) in the form of lower remunerations¹¹.

On the other hand, the labour economic theory has developed the contract theory in order to explain the evolution of wages. This theory is based on the strategies followed by the firms to hire new workers. Firms try to deal with the uncertainties in the market and with the imperfect nature of the information about the future performance of the potential workers. In this sense, after the market forces determines one range of remunerations for a job with certain characteristics, called area of indeterminacy (in terms of Kaufman and Hotchkiss, 2003) within it, the wage of the worker is bargaining. Then how close the wage is to the minimum or maximum limit will depend on many factors, mainly, on the bargaining power of the contracting parts.

There are many strategies that a firm has in order to determinate the level and way to pay the worker. One of them is “risk sharing¹²”, which means that the firms fix the wages according to the performance of the business, thus in crisis periods the firms pay lower wages and in good times they compensate the workers with higher wages. Espinoza (2006), using a dynamic pseudo panel model to measure the relationship between economic shocks and wages, provides empirical evidence of the existence of the use of this kind of strategies in Peruvian labour markets, specifically in the manufacturing sector.

⁹ McConnell, Brue y Macpherson (2003).

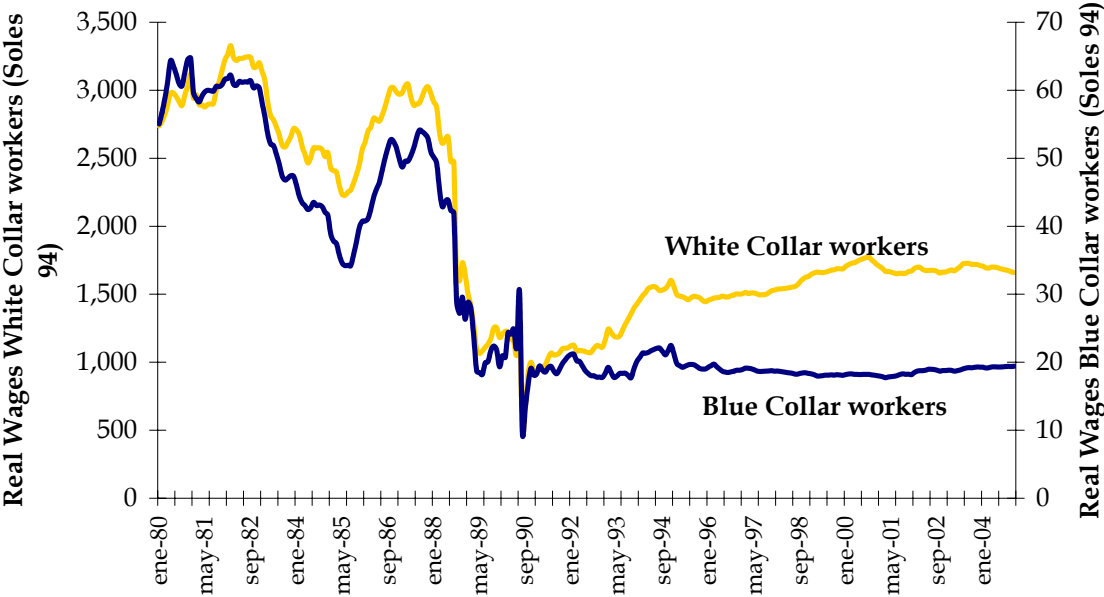
¹⁰ Basically, the lost or increase of the bargaining power of those institutions.

¹¹ Unfortunately, most of the new participants in the labour markets were absorbed by the informal sector due to the low capacity of the formal economy to create jobs for them, Chacaltana (2005).

¹² Known like ability to pay, too. See: Kaufman and Hotchkiss (2003).

The observation of the figure 1 shows the evolution of the real wages for Lima (capital of Peru) for blue and white collar workers. They seem to follow the same pattern, a negative trend, since 1980 until the early 90's, with a slow recuperation since then accompanied by some recurrent periodical variations, giving us more evidence about the price adjustment and its variability in the Peruvian labour markets.

Figure 1. Peru Jan 1980 – Mar 2004. Monthly Real Wages.



Source: INEI (National Institute of Statistics and Informatics). Own elaboration.

The recurrent variations and decreasing level of wages shown in the previous figure have some implications in the standard of living of the workers due to its effects on the purchasing power of the workers' wages. The recent advances in the collection of statistics in survey data, allows us to know that the evolution of poverty is not anymore a static phenomenon. Thus, in Peru, according to Chacaltana (2005) between 1998 and 2001 around 68% of households have experimented at least one episode of poverty and 25% of them were poor the entire period (based on Panel Data National Living Standard Survey - ENAHO). See table 1.

These figures illustrate the tremendous impact of the fluctuations of the real wages in the vulnerability of the households (considering that the rate of unemployment is only 9%). This fact is not only a problem but a challenge to the innovation and proposition of policies to deal with this reality.

Table 1. Peru 1998-2001. Dynamic Nature of Poverty Rate

	Met. Lima	Urban Areas	Rural Areas	Total
(%)				
At least 1 year poor	55	52	86	68
4 years poor	8	13	41	25
3 years poor	10	12	17	14
2 years poor	15	11	16	14
1 year poor	22	16	12	15
Never poor	45	48	14	32

Source: Chacaltana (2005). Based on Panel Data National Living Standard Survey – ENAHO.

These calculations from table 1 suggest that different kind of strategies must be pursued to deal with different kinds of poverty, because some households can leave the poverty by themselves (temporarily or permanently) but in some cases their strategies may fail. Some households can become poor again, they are at risk. These “revolving door” kinds of households are the potential beneficiaries of policies like the free availability of the CTS according to the proposal of this study, because this would provide them with some kind of “insurance” for crisis periods, as they would not be poor during those periods and they could keep more or less the same level of consumption.

III. Labour costs (CTS) as an In-work benefits scheme

Since the labour costs regulation only affects the employers and employees in the formal labour market is important to have an idea about the constitution of the Peruvian labour market. The urban labour force in Peru is constituted of 8.3 millions of people, and from them the 35% is part of the formal labour market¹³, meaning that 3 millions of people in the labour force are affected by the regulations established in the Peruvian labour legislation, and from them 97% have a relationship of dependence with respect of their employer.

There are many reasons explored to explain the composition of the labour force in Peruvian labour market; one explanation that is often used is the low capacity of the economy to create jobs for the waves of migration from rural areas to the cities in the 80’s that added to the baby

¹³ Velazco (2004).

boom in the 70's generated a greater increase of the labour supply that was not absorbed by the demand of labour; forcing new entrants to generate their own jobs¹⁴.

On the other hand, in the 90's and 00's another explanation to the same phenomenon was discussed, in this case more related with competitiveness. Authors like Jaramillo (2004), Saavedra and Torero (2000) argue that the non-wage labour costs are too high comparing with other countries in Latin America (around 50% of the gross wage) increasing irremediably the costs of hiring new workers: Saavedra and Maruyama (2000) and Chacaltana (2001), go further arguing that the costs associated to firing workers are high which makes it more expensive to hire workers. This affects the capacity of firms to create jobs in the formal labour market due to the costs associated.

However, the purpose of this study is not to take a position about the labour costs and their influence in formal jobs creation, but to evaluate an alternative use (different from the objective for which it has been created) for the tenure bonus, known as CTS (*Compensación por tiempo de servicios*), as an income support program (a means-tested one) in the form of in-work benefit scheme, in the cases when the workers are affected in their capacity to consume due to human resources strategies of their companies or because the occurrence of a shock. The idea is using the CTS funds as a source of income to transfer, taking into consideration that this funds have already been collected. Additionally, it is proposed that to evaluate who is entitled to dispose freely of their CTS funds an assessment of the household situation would be necessary, like in a means-tested benefits.

In 1991, as a part of the reforms in the labour legislation the CTS was established as a right for all the workers working more than 4 hours daily. The employer had to deposit in a bank account in behalf of the worker, every six months (in May and November) 1/12 of the last monthly wage multiplied by the number of months worked by the employee in those six months. After 10 years, in 2001, there was a change in the law and the deposits should be done now every month and for the equivalent of 1/12 of the wage.

In its creation, the original objective was that the CTS would constitute a fund in favour of the worker in case of the termination of the labour relationship, serving as a kind of

¹⁴ See Espinoza and Rios (2004) for more references about it.

unemployment insurance¹⁵. At the end of the labour relationship the employee had the right to dispose of the 50% of the fund accumulated plus the interests earned to deal with the lack of income due to having lost his/her job. During the years after the initial implementation many changes were introduced in this item, unfortunately not in line with the original objectives, but rather in an effort to reactivate the aggregate demand¹⁶.

In this way, in 1996 in the Legislative Decree 857 it was established that the 50% of the fund could serve as collateral for loans in the local banking system and that 50% of the fund could be freely available for all the workers temporarily (six months). Then with a new government and because the recession experienced by the Peruvian economy in 2001 the Legislative Decree 127 established again the free availability of the 50% of the CTS fund for the workers under this legislation and for a temporary period (10 months)¹⁷. Then successive Legislative Decrees in 2002 and 2003 extended the period of the free availability of the CTS funds, even allowing for a 100% availability for purposes of paying debts acquired in the financial system, and the use of it as a collateral for mortgage loans¹⁸.

As it can be seen from the evolution of the legislation of CTS its use has been biased from its original purpose as unemployment insurance, weakening the position of the workers to deal with a possible period of unemployment. That is the reason because in this study is intended to analyse the deployment of the CTS as an in-work benefit, a means-tested one financed by a tax that is already being levied; allowing the worker to deal with temporary crisis due to a lower wage or an economic shock¹⁹.

¹⁵ Some authors like Jaramillo (2004) and Saavedra and Torero (2000), suggest that the CTS is overlapping the function of the indemnification of firing (1.5 wages for every year worked) questioning its nature as an unnecessary labour costs and increasing the costs of firing workers, but other authors, like Alonso (2006), suggest that is a good policy in terms of time of waiting for the indemnification, because this last one could take even years to materialize if the parts involved decide to go to jury. Also could be used as a mechanism to facilitate the transition of the search of a new job when the employee left his/her job by own choice.

¹⁶ That was the case in 2001 when Peru was experienced a period of recession due to the effects of Russian and Asian crisis.

¹⁷ The application of the free availability of the CTS in 2001 will be the subject of study of this thesis.

¹⁸ For a more detailed description of the evolution of the CTS legislation see: Jaramillo (2004) and the web page of the Ministry of Labour and Employment Promotion (<http://www.mintra.gob.pe/leyes.php> - in Spanish).

¹⁹ In Peru the share of the expenditures focused to deal with poverty is around 1.5% of the GDP (INEI). Unfortunately there is not a clear policy to distribute this expenditure, thus this is composed in programs not articulated between them. In the recent times the only program that could be considered like one to deal with the effects of temporary poverty is the workfare program “A Trabajar Urbano”, but studies like Chacaltana (2004) have shown that, although the positive impact in the consumption of the beneficiaries (using a propensity score matching approach) the program has deficiencies identifying its objective public (unemployed head households with children), because the expectation of a secure income (there is a high turn-over rate in Peruvian labour markets) many workers prefer to work in the program, and additionally could be taking out people from inactive labour market status.

Thus, by analysing the effectiveness of the deployment of the CTS funds to reduce the probability of getting into poverty and to deal with vulnerability, this study will be able to propose it as a social protection mechanism. In fact, in the case of Switzerland, United States and United Kingdom the in-work benefit schemes seemed to be efficient and effective policy tools to deal with the risk of temporary poverty in comparison to other alternative policies (Gerfin and Leu, 2003; and Bargain and Orsini, 2004).

IV. A model to evaluate the effects of free availability CTS

Since the 90's due to the exponential improvement in the informatics software and hardware, there has been an increasing number of studies and applications of microsimulations analysis, particularly applied in public policies²⁰. In the last decade an important application for example has been the ex ante evaluation of cash transfer programs conditional to some requirements. This methodology basically consists of simulating the effect of some policies, especially when these have some implications not only in the welfare of the potential beneficiaries, but additionally in their behaviour. For instance, the microsimulation technique allows the policy planner to take into account that his/her policy can generate extra costs due to its effects on the behaviour of the beneficiaries (e. g. unemployment or poverty traps).

According to Bourguignon, Ferreira and Leite (2003), the microsimulations as an ex-ante technique to evaluate social protection programs has additional advantages: first from a perspective of costs, because is cheaper to experiment on the computer than with people; second that is has a direct counterfactual element of comparisons, and third that is very convenient for evaluation and redesign of currently working programs. Given these advantages, these authors suggest this technique as a complement of ex-post evaluation rather than as a substitute.

In the spirit of the objective of this study, it has been considered that the microsimulation technique is the most suitable methodology, due to the consideration, that the free availability of the CTS has not been applied as an instrument to reduce temporary poverty and

²⁰ See Harding (1996).

vulnerability²¹, and because the rules to be entitled to receive this benefit, being employed in the formal labour market and employer contributions, have some effects on the behaviour of the working population, in their labour supply choice.

In this context, the model proposed for the evaluation is based on the approach that is used to evaluate means-tested transfer programs developed by Gerfin and Leu (2003); Eggink, Hop and Van Praag (1995); Blundell, Duncan, McGrae and Meghir (2000); Duncan and Giles (1998); and De Hoyos (2006), but with some modifications, taking into account that those models are evaluating the effects of tax credits and the impact of external shocks on female labour market participation.

In this sense, applying the rules and restrictions defined to the CTS as an in-work benefit scheme, its effects on the poverty status can be evaluated over a representative sample of population, in this case the *Encuesta Nacional de Hogares- ENAHO 2000* (National Household Survey) collected by the *Instituto Nacional de Estadísticas e Informática – INEI* (National Institute of Statistics and Informatics)²².

To be entitled to receive the CTS, the potential beneficiary must be a blue or white collar worker in the formal labour market (where all the labour legislation it is supposed to be fulfilled). That is why a model to explain the participation in the formal or informal labour market is necessary: this model will be called labour supply choice model.

In the case of this study a multivariate probit model will be estimated to analyse the probability of being in the formal or informal labour market or not participating at all (labour supply choice model). The multivariate probit estimates M- equations probit models (in this case the decisions of labour supply choice) by the method of simulated maximum likelihood (SML); the idea of the utilization of this approach is to take into consideration the nature of the relationship between all the decisions, for instance the decision of participate in the formal

²¹ In fact, the free availability of the CTS has already been applied but with different purposes as was explained in the previous section and because of this: with different constraints.

²² The election of the 2000 as a year of analysis is because is the year before the decree of the free availability of the CTS. A more detailed description of this survey will be provided in the next section of this document.

or informal labour market or not participate at all for one wife depends on the decision her husband has taken and vice versa²³.

The labour supply choice model in order to be simplified will be subject of some crucial assumptions. The labour supply equation is different from those used by Gerfin and Leu (2003); Eggink, Hop and Van Praag (1995); Blundell, Duncan, McGrae and Meghir (2000) and Duncan and Giles (1998), because they evaluate tax credits constrained to a minimum quantity of hours worked. In the case of CTS as, it was mentioned in the previous section to be entitled to receive this benefit the worker must be employed in the formal labour market²⁴.

In this sense, in the first place it will be defined $w_{i,j,1}^* = w_{j,1}^*(I_{i,1}, H_i)$, like the reservation wage of the adult 1 (a household could have two adults working: husband and wife) of the household i on the labour market sector j . And this reservation wage depends on the characteristics I of the adult and the characteristics of the household H . Then it will be assumed that the expected labour market participation is specified like in the human capital theory: $\hat{w}_{i,j,1} = I_i \hat{\beta}_{j,1}$. Thus, the labour supply choice will depend on the difference between the expected wage in the labour market j and the correspondent reservation wage, then, the adult 1 of the household i will participate in the labour market j if: $\hat{w}_{j,1} - w_{j,1}^* > 0$.

In the second place a joint function of the utility of the household will be defined. In this case taking into consideration the approach of De Hoyos (2006), this will be a function of the labour market participation choice of the members of the household (husband and wife): $U_i = U(\hat{w}_{j,1} - w_{j,1}^*, \hat{w}_{j,2} - w_{j,2}^*)$. Then, because the reservation wage ($w_{i,j,1}^*$) can not be observed the utility form specification will be described using the components of the reservation wage for the two adults of the household, and it will be assume to be linear²⁵:

²³ According to Capellari and Jenkins (2003) the multivariate probit uses the Geweke-Hajivassiliou-Keane (GHK) simulator to evaluate the M-dimensional Normal integrals in the likelihood function. For each observation, a likelihood contribution is calculated for each replication, and the simulated likelihood contribution is the average of the values derived from all the replications. The simulated likelihood function for the sample as a whole is then maximized using maximum likelihood method.

²⁴ In fact, it is subject to discuss if working in the informal labour market is a choice, probably it could be the case for self employed population, but probably not in the case of dependant workers, but for a simplification it will be assumed that this is the case.

²⁵ In the models proposed by Gerfin and Leu (2003);and Blundell, Duncan, McGrae and Meghir (2000), the utility function is a quadratic one due to this depends on the labour market supply defined like the numbers of hours worked.

$$U_i = \lambda_1 \hat{w}_{i,j,1} - (\gamma_{j,1} I_{i,1} + \gamma_{j,1} H_i) + \lambda_2 \hat{w}_{i,j,2} - (\gamma_{j,2} I_{i,2} + \gamma_{j,2} H_i) + v_i \quad (\text{Eq. 1})$$

Now, using the definitions of the expected wages in the labour market choice ($\hat{w}_{j,1}, \hat{w}_{j,2}$), the equation 1 can be rewritten as:

$$U_i = \lambda_1 (\hat{\beta}_{j,1} I_{i,1}) - (\gamma_{j,1} I_{i,1} + \gamma_{j,1} H_i) + \lambda_2 (\hat{\beta}_{j,2} I_{i,2}) - (\gamma_{j,2} I_{i,2} + \gamma_{j,2} H_i) + v_i \quad (\text{Eq. 2})$$

Then, simplifying equation 2, it could be obtained:

$$U_i = \left(\lambda_1 - \frac{\gamma_{j,1}}{\hat{\beta}_{j,1}} \right) (\hat{\beta}_{j,1} I_{i,1}) + \left(\lambda_2 - \frac{\gamma_{j,2}}{\hat{\beta}_{j,2}} \right) (\hat{\beta}_{j,2} I_{i,2}) - (\gamma_{j,1} + \gamma_{j,2}) H_i + v_i \quad (\text{Eq. 3})$$

But, the equation 3, could be simplified more in order to get an expression of the utility, where this depends only on the expected wage markets ($\hat{w}_{j,1}, \hat{w}_{j,2}$), the household characteristics (H) and the random variable v_i :

$$U_i = \delta_1 \hat{w}_{i,j,1} + \delta_2 \hat{w}_{i,j,2} - \alpha_j H_i + v_i \quad (\text{Eq. 4})$$

Thus, due to this definition, every adult in the household i will choose the labour market option j if and only if: $U_i(j) > \max_{m \neq j} \{U_i(m)\} \quad \forall j$. And for simplicity it will be assumed that v_i is an independent variable identically distributed, and $\alpha_j = \alpha$ for all labour market participation possibilities (j).

The Labour supply choice model

In the beginning of the section three options of labour market participation were defined: $j = \{\text{not participation at all, formal, and informal labour market}\}$. Thus the probability of chosen the way of participation in the labour market would be:

$$\Pr(j = s1, s2) = \frac{\exp[\delta_1 \hat{w}_{i,s1,1} + \delta_2 \hat{w}_{i,s2,2} - \alpha H_i]}{\sum_{s2} \sum_{s1} \exp[\delta_1 \hat{w}_{i,s1,1} + \delta_2 \hat{w}_{i,s2,2} - \alpha H_i]} \quad (\text{Eq. 5})$$

Where $s1$ and $s2$ are the labour market choices of the adult 1 and adult 2 of the household i , respectively. As it was mentioned, the estimation of these probabilities will be done using a multivariate probit model with 10 replications²⁶.

After this, another problem arise from the simultaneity of the estimation of the choice of labour market and expected wage for every adult: $\hat{w}_{i,j,1} = w[I_{i,1}, \Pr(\hat{w}_{i,j,1}, H_i)]$: because the choice of the labour market depends on the expected wage and the expected wage depends on the labour market choice. To solve this endogenous nature of this expression, the De Hoyos (2006) approach to solve simultaneity will be used with some variations²⁷. Thus, the model will be estimated in two steps: first, the choice of labour supply (with multivariate probit SML) using as regressors the components of the expected wage instead of itself; and in second place including the conditional probabilities in the wage equation. In this way, taking G_1 as a vector containing $I_{i,1}$ and H_i :

$$w_{i,s,1} = I_{i,1} \beta_s + \sigma_s \rho_s \left(\frac{\phi(K_s(\gamma_s G_i))}{F_s(\gamma_s G_i)} \right) + \eta_s \quad (\text{Eq. 5})$$

Where: σ_s and ρ_s are the parameters capturing the covariance between the wage and labour market choice equation; $K_s(\gamma_s G_i)$ is the transformation of the multivariate probit index $\gamma_s G_i$ into a standard normal distribution; $\phi(\)$ is a standard normal density function; and $F_s(\gamma_s G_i)$ is the marginal distribution of the multivariate probit residuals. Thus, implicitly, the structural labour market participation function is estimated using multivariate probit, and the expected wage ($\hat{w}_{i,s,1}$) is obtained from the regression expressed in the equation 5.

²⁶ This will be done in the econometrics program STATA and the syntax of the programs used can be seen previous request.

²⁷ In his approach De Hoyos (2006) use a multinomial logit for his labour market participation model, in this case it will be used the multivariate probit model to estimate the labour market choice model, because of the simultaneity and dependence of the choice of the labour market for a husband and a wife, and the dependence exclusion of choosing formal labour market or informal one.

Simulation of the free availability of the CTS

Because the free availability of CTS is not only a change in the disposable income it has also effects in labour behaviour of the potential beneficiaries, for instance those working in the informal labour market will have an incentive to find a job in the formal labour market. The microsimulation techniques will allow us to observe the effects of this policy on the poverty status, but taking into consideration the effects on the behaviour of the potential beneficiaries.

In this sense the strategy²⁸ to simulate the effects of the introduction of the free availability of the CTS as a means-tested in-work benefit scheme, will start with the definition of a vector containing parameters explaining labour market participation in the period t : $\Omega_t = (\delta_t, \gamma_t)$; then it is defined a vector containing the variables, that according to the model, explain labour market participation in the same period: $\Pi_t = (\hat{w}_t, H_t)$. And, finally, the residual ν_i is included as a component of in the labour market decision, generating the following function:

$$\Pr(\cdot)_t = \Pr(\Omega_t, \Pi_t, \nu_t) \quad (\text{Eq. 6})$$

Basically, the idea of this definition is to translate any change in the probability of participation in the labour market between the period t and the hypothetical situation t' in terms of changes in the parameters Ω_t , in the variables Π_t , or in the residuals ν_i . Thus, in the case of the free availability of the CTS, the consequence is an increase in the other incomes of the household (because income from labour remains the same), so in this case this modification is expressed in a change of the household characteristics $H_{i,t}$ (that contains the other incomes of the family), and that additionally is a component that affect the expected labour market wage \hat{w}_t . To simulate the effects the steps suggested by De Hoyos (2006); and Bourguignon, Ferreira and Leite (2003) will be followed:

- *Step 1*: Estimate the structural model (labour supply choice model and wage equation) for the period t and the hypothetical situation t' . In the second case the new set of hypothetical regressors $\Pi_{t'} = (\hat{w}_{t'}, H_{t'})$ will be used.

²⁸ This strategy is based on the approach of De Hoyos (2006); Gerfin and Leu (2003); and Bourguignon, Ferreira and Leite (2003).

- *Step 2*: Import the wage parameters of the calculations for the hypothetical period t' into the parametrized model estimated for the period t .
- *Step 3*: Compute the new set of hypothetical wages and household expenditures; allowing individuals to change labour status given the new set of data.
- *Step 4*: Simulate household expenditures using hypothetical information, and since then calculate poverty rates, product of the new optimization of utility function. Basically, calculate the poverty rates from the estimated expenditure per household, obtained from the results of the hypothetical simulations.

In sum, the structural model departs from a utility maximizing framework where individuals' choice of their labour market participation depends on a set of comparisons between expected market wages and a subjective reservation wage. Given this some changes (policies) are introduced to simulate the effects on labour supply choice and welfare of these policies. The next section will have a more detailed look into the data to be used, and in section VI the results of the estimation of the structural model will be presented.

V. Data

In order to calculate the model proposed in the previous section the National Household Survey of Living Standards and Poverty (ENAHO – Encuesta Nacional de Hogares sobre Condiciones de Vida y Pobreza) of the National Institute of Statistics and Informatics (INEI- Instituto Nacional de Estadística e Informática del Perú) will be used.

This survey has been collected since 1996 yearly every fourth trimester. This survey is representative of three rural areas in the three natural regions (Selva, Sierra and Costa) and four urban areas in the three natural regions and including Lima city as a different region. Household surveys include information on housing, demographics, education, health, expenditure, income, and employment. For purposes of this study the survey of the year 2000 will be analyzed, because it is the year before the second decree of free availability of CTS

(the following years can caused a biased estimation due to this issue) and only will be taken into account the urban areas²⁹.

The analysis will be concentrated on those households where the household head is employed or available for the labour market, thus the resulting household sample consists of 2264 households divided in 1524 couples and 740 single household heads. Table 2 displays some descriptive statistics for the sample and its geographical distribution.

Table 2. Urban Peru. Household Descriptive Statistics

	Households (sample size)	Av. Household Size	Two Adult Households (%)	One Adult Households (%) - Female	One Adult Households (%) – Male
Total	2264	4.5	68.60	20.65	10.75
North Coast	240	4.6	68.04	22.38	9.58
Center Coast	249	4.3	72.97	16.67	10.36
South Coast	162	4.4	69.09	21.25	9.66
North Sierra	260	4.4	70.67	20.58	8.75
Center Sierra	251	4.1	56.92	28.09	14.98
South Sierra	201	3.8	54.71	26.31	18.99
Selva	371	4.5	68.40	21.56	10.03
Met. Lima	530	4.7	73.95	17.54	8.50

Source: Own calculations based on ENAHO 2000.

Notes: The proportions are expressed taking into consideration the weights provided by the survey

Table 3 shows additional characteristics of the household with respect of their poverty status. As it can be seen extreme poverty rate³⁰ is around 3% in total urban areas, but because of the nature of the standard of living in the urban areas the real problem seems to be focused in non-extreme poverty³¹ where about 26% of the household are below the poverty line. This provides more evidence supporting the point discussed in one of the previous sections about the dynamic of poverty.

²⁹ In rural areas, agriculture is the predominant economic activity, where the kind of labour relationships are mostly informal.

³⁰ Av. Household Consumption per capita lower than extreme poverty line defined as the value of a basic basket of food.

³¹ Av. Household Consumption per capita lower than poverty line defined as the value of a basic basket of consumption.

Table 3. Urban Peru. Household Poverty Status Statistics

	Extreme Poverty Rate (%)	Non Extreme Poverty Rate (%)	Vulnerability Rate* (%)	Av. Household Consumption per capita (S/.)
Total	2.98	25.63	5.21	414.2
North Coast	6.16	24.25	4.21	341.9
Center Coast	2.52	19.43	3.86	339.5
South Coast	0.48	25.03	4.69	379.7
North Sierra	6.69	31.96	3.59	292.7
Center Sierra	1.80	28.41	3.36	345.8
South Sierra	3.32	15.45	5.94	413.7
Selva	6.39	24.03	6.04	326.2
Met. Lima	1.23	29.73	5.92	495.8

Source: Own calculations based on ENAHO 2000.

Notes: The monetary variables expressed in Peruvian currency: Nuevos Soles (S/.). Exchange rate: S/. 3.52 per 1 US \$.

The proportions are expressed taking into consideration the weights provided by the survey

* Av. Household Consumption per capita lower than poverty line multiplied by 1.05.

Some additional information about the labour status of the household heads, and characteristics of their education level can be found in table 4 and 5. From there we can infer that the informal labour market is a majoritary proportion of the employed population. In the same way, a big share of them has reached only the secondary and primary education level. Then, the level of hacinamiento³² it is a major problem for single household heads but not for two-adult households; and almost all two-adult household have children, but in the case of one adult household is clear that the women bear the responsibility to take care of them. In this way the presence of an additional income earner is very important for this kind of households (single female headed).

³² Number of rooms of the household divided by household size.

Table 4. Urban Peru. Labour Market Status

	Two Adult Households		One Adult Household	
	Husband	Wife	Male	Female
Sample size	1,524	1,524	245	495
Total	100	100	100	100
Employed	83.7	52.8	70.4	58.2
Formal	35.2	11.7	34.1	11.2
Informal	48.4	41.2	36.2	47.0
Unemployed	3.7	2.8	2.5	3.2
Inactive	12.6	44.4	27.1	38.6

Source: Own calculations based on ENAHO 2000.

Notes: The proportions are expressed taking into consideration the weights provided by the survey

Table 5. Urban Peru. Individual and household characteristics

	Two Adult Households		One Adult Household	
	Husband	Wife	Male	Female
TOTAL	100	100	100	100
Individual characteristics				
Age	47.2	42.8	48.9	50.5
Education (%)				
No education	2.4	6.1	7.3	9.1
Primary level	24.3	36.1	29.5	40.4
Secondary level	47.0	38.1	35.6	32.4
Sup. Level (no univ)	4.0	2.7	4.0	2.1
Univ. Level	22.2	17.0	23.6	15.7
Household characteristics				
Av. Hacinamiento	0.8		1.58	1.23
Children (%)	92.3		31.4	73.2
Children <4 years (%)	30.8		0.5	7.2
Children >18 years (%)	21.6		17.9	38.0
Additional Inc. earner (%)	48.4		49.4	68.0

Source: Own calculations based on ENAHO 2000.

Notes: The proportions are expressed taking into consideration the weights provided by the survey

VI. Results of the labour market choice model and microsimulations effects of CTS

Table 6 displays the first estimation of a standard wage regression. The variable used to correct the selectivity $Pr(\text{informal})$ is the ratio of the expected value of participating in the

informal labour market and the probability of success of this episode. Both variables were obtained from preliminary multivariate probit regressions (like in the equation 5 but using the determinants of wages instead of the expected wages as regressors).

The variable Pr(informal) corrects imperfectly the selection bias, because as it was described in the methodological section the dependent variables in the multivariate probit regressions consider as a value “zero” all the rest of labour status options. In order to check the selectivity bias in the determination of wages, according to Heckman-type models, the Mills ratio considers the possibility of working or not working. In this case we have another step not only working or not working, but after that working in the formal labour market or working in the informal labour market. Additionally, in our estimation is being considered the effect (in the case of two-adult households) of the decision of his/her couple.

Table 6. Wage Regression - Informal Labour Market (dependent variable: ln of hourly wage)

	Two Adult Households				1 Adult Household	
	Husband		Wife		Coef.	Std. Err.
	Coef.	Std. Err.	Coef.	Std. Err.		
Woman					-0.1429	0.1584
Age	0.0622**	0.0233	0.0114	0.0365	0.0286	0.0258
Age^2	-0.0007**	0.0003	-0.0002*	0.0004	-0.0004*	0.0003
Education						
Secondary level	0.1025	0.1120	0.1743*	0.1552	0.0487	0.1527
Sup. No Univ. Level	0.5886**	0.1810	0.5354	0.5009	0.4765	0.5953
Sup. Univ. Level	0.6412**	0.2075	-0.0127	0.2626	0.6002**	0.2307
Region						
Center Coast	-0.2161	0.2121	0.4102	0.3522	-0.1872	0.4486
South Coast	0.2845	0.2286	0.4786*	0.3297	-0.0101	0.2530
North Sierra	-0.5139**	0.2512	0.3191	0.3183	-0.1495	0.2578
Center Sierra	0.0394	0.1882	0.3453*	0.2664	0.2868*	0.2285
South Sierra	0.1964	0.2101	0.3009	0.2869	-0.1138	0.2558
Selva	-0.0504	0.1781	0.3986*	0.2674	-0.1108	0.2757
Met. Lima	0.3553**	0.1528	0.6721**	0.2556	0.4340**	0.2205
Pr(informal)	0.0407479	0.0423	-0.0715	0.0530	0.0093	0.0145
Constant	0.9012*	0.5464	1.2844*	0.8359	1.5083**	0.6532
	Num obs = 677		Num obs = 523		Num obs = 318	
	F(13, 663) = 6.56		F(13, 509) = 2.53		F(14, 303) = 3.24	
	Prob > F = 0.0000		Prob > F = 0.0023		Prob > F = 0.0001	
	R-squared = 0.1670		R-squared = 0.1898		R-squared = 0.1384	

* Significant at 10%; ** Significant at 5%.

In the case of Education Primary level was taken as reference.

From the table 6 it can be inferred that the expectation of wages increase for workers in Lima, probably due to all the networks that working in the capital city involves, then in all the cases is clear the quadratic relation of the wages with respect to the age (in the form of the signs of the coefficient) even when in the case of the one-adult household is not statistically significant. In the case of education it is noticed that higher levels of it increase the expectation of higher wages.

In an analogous way, the table 7 presents the estimation of the wages for the case of the formal labour market, and the variable Pr(formal) represents the ratio of the expected value of participating in the formal labour market and the probability of success of this episode. In a similar way to the previous regression, the effect of the level of education is very important, and it is reflected in a higher expectation of wages, but in the case of age the quadratic relation is not clear at least for the two-adult households, and again working in Lima increases the expectation of better level of wages per hour.

Table 7. Wage Regression - Formal Labour Market (dependent variable: ln of hourly wage)

	Two Adult Households				1 Adult Household	
	Husband		Wife		Coef.	Std. Err.
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Woman					-0.1011	0.2397
Age	0.0009	0.0316	-0.0209	0.0542	0.1191*	0.0609
Age^2	0.0001	0.0003	0.0002	0.0007	-0.0011*	0.0007
Education						
Secondary level	0.0831	0.1292	0.6445**	0.2827	0.5398*	0.2871
Sup. No Univ. Level	0.4580**	0.2281	-0.1523	0.5537	0.5490	0.4567
Sup. Univ. Level	0.6968**	0.1379	0.9816**	0.2749	1.1191**	0.2710
Region						
Center Coast	-0.0045	0.1674	0.3491*	0.2081	0.2658	0.3571
South Coast	0.1677	0.1766	0.3852*	0.2662	0.0411	0.4353
North Sierra	0.0520	0.1362	0.6225**	0.2512	0.2934	0.3108
Center Sierra	0.1506	0.1656	0.2502	0.2266	0.3127	0.3323
South Sierra	0.0888	0.1913	0.4141*	0.2241	0.2646	0.3631
Selva	0.1161	0.1396	0.4053*	0.2151	0.7235**	0.3444
Met. Lima	0.2685**	0.1319	0.3328	0.2389	0.6692*	0.4123
Pr(formal)	-0.0065	0.0086	0.000014	0.000015	-0.0011	0.0019
Constant	2.3513*	0.7267	2.5097*	1.0419	-1.0690*	1.3531
	Numf obs = 517		Num obs = 180		Num obs = 136	
	F(13, 503) = 4.28		F(13, 166) = 23.20		F(14, 121) = 3.54	
	Prob > F = 0.0000		Prob > F = 0.0000		Prob > F = 0.0001	
	R-squared = 0.1842		R-squared = 0.3067		R-squared = 0.3455	

* Significant at 10%; ** Significant at 5%.

In the case of Education Primary level was taken as reference.

From the models estimated and presented in tables 6 and 7 it is calculated the expectation of wage for husband and wife in the two-adult households and for the household head for the one-adult household. These estimations are used as regressors in the multivariate probit model that evaluates the labour market choice model presented in the tables 8 and 9.

The table 8 displays the results of the labour market choice model for the case of two-adult households. As it can be seen in most of the cases the probability of working in the informal labour market is closely linked with the status of poverty, being poor definitely has an impact in the acquisition of skills to work in the formal labour market and this can be confirmed in the regressions in all the cases. Then the expected wages are more important in the case of informal labour market than in the formal one in the case of husbands, because working in the formal labour market includes other benefits (for instance: pensions, health insurance, stability) that compensates this variable in comparison to the informal market.

In the table 8 also can be appreciated that in the case of the wives it seems to be very important the fact of having children when they make the decision of working (in formal or informal labour markets), and has similar effects in the case of having children younger than 4, this is expressed in the negative sign of this dichotomous variable in the regressions. This implies that they will take care of them and that is why they would not be able to offer many hours in the labour market, but has the same effect having a child older than 18, because this means that an average wife does not need to work because her son/daughter could do it for her.

Thus having an additional income earner in the household is more important in the labour market choice for the wives than the other incomes of the family. In this way an increase of the other income reduces the incentive of working in the informal labour market, but this effect is not clear in the case of the formal labour market probably due to the other benefits implied in working in there. The test of significance of the hypothesis that the correlation of the residuals is zero rejects this possibility, so it is considered well to assume that these decisions are related, as it was assumed at the beginning.

Table 8. Multivariate Probit Model Labour Market Choice. 2 Adult households

	Pr (Informal)- Husband		Pr (Formal)- Husband		Pr (Formal) - Wife		Pr (Informal)- Wife	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Extreme poor	0.8832**	0.2877	-1.8531**	0.2004	-1.0329**	0.3657	0.2958	0.2633
Non Extreme poor	0.5599**	0.1225	-0.6949**	0.1583	-1.1979**	0.1718	0.3386**	0.1121
Hacinamiento	-0.0589	0.1268	-0.0519	0.2198	0.0027	0.1299	-0.2217**	0.1012
Child	-0.3077*	0.1777	0.7759*	0.4105				
Children <4 years					0.0146	0.1579	-0.2217*	0.1182
Children >18 years					-0.4073**	0.1948	-0.4805**	0.1300
Additional Inc. Earner					-0.0060	0.1384	0.2913**	0.1048
Expected Wage	0.2322**	0.0739	0.0633**	0.0058	-0.0741	0.1556	0.000001**	0.0000
Ln Other Incomes	-0.0746**	0.0157	-0.0109	0.0138				
Constant	-0.2660	0.2812	-1.0358*	0.5943	-0.7292**	0.3126	-0.1431	0.1401

Multivariate probit (SML, # draws = 10)

Num obs = 1478

Wald chi2(26) = 733.57

Log pseudo-likelihood = -4497737.4 Prob > chi2 = 0.0000

Likelihood ratio test of rho21 = rho31 = rho41 = rho32 = rho42 = rho43 = 0: chi2(6) = 9.0e+06 Prob > chi2 = 0.0000

Significant at 10%; ** Significant at 5%.

Table 9. Multivariate Probit Model Labour Market Choice. 1 Adult households

	Pr (Informal)		Pr (Formal)	
	Coef.	Std. Err.	Coef.	Std. Err.
Extreme poor	-0.2478	0.3490	0.1728	0.3746804
Non Extreme poor	0.0102*	0.1965	-0.1793*	0.3150472
Hacinamiento	-0.0855*	0.0612	-0.0062	0.0593343
Children <4 years	0.2864	0.2922	-1.0446**	0.2822733
Children >18 years	0.3891**	0.1525	-0.8414**	0.1730102
Expected Wage	0.4683**	0.1393	-0.0181	0.031041
Ln Other Incomes	-0.2162**	0.0289	0.0493**	0.0248218
Constant	-0.1041	0.3614	-0.7970**	0.1818075

Multivariate probit (SML, # draws = 10)

Number of obs = 726

Wald chi2(14) = 199.67

Log pseudo-likelihood = -1040653.5 Prob > chi2 = 0.0000

Likelihood ratio test of rho21 = 0: chi2(1) = 2.1e+06 Prob > chi2 = 0.0000

Significant at 10%; ** Significant at 5%.

In a similar way to table 8, table 9 presents the results of the estimation of the labour market choice model for the case of the one-adult households. Thus again the status of poverty defines in some way the probability of working whether in the formal labour market or in the informal one, and the expected wages and the other incomes has similar effects as in the previous case because of the additional benefits that come from working in the formal labour

market in comparison to the informal labour market. And the results of the likelihood ratio test for the correlations between the residuals confirm that both decisions (working or not in and informal or in a formal job) are correlated.

The final goal of the household is to maximize its utility; the estimation of this is presented in table 10, taken into consideration the model of the equation 4. Thus, the table 10 shed some lights on the effects of the variables estimated in the level of consumption of the household; in this sense it can be appreciated the positive effect of the expected wage, but in the case of the wife in the two-adult households apparently this effect is not so big. Then having a child influences negatively in the utility because of the way this have been estimated (it represents an increase in the denominator) then the level of the other incomes and having an additional income earner in the house definitely increases the consumption level of the household, and finally living in Lima increases the probabilities of a better level of consumption per capita in the household.

Table 10. Consumption regression (dependent variable: Ln of Household Consumption per capita)

	Two- Adult household		One Adult Household	
	Coef.	Std. Err.	Coef.	Std. Err.
Exp. Wage Head			0.0008**	0.0000
Exp. Wage husband	0.0054*	0.0203		
Exp. Wage wife	0.0000**	0.0000		
Hacinamiento	0.6059**	0.0549	0.3122**	0.0302
Child	-0.0611**	0.0126	-0.0726**	0.0215
Additional Inc. Earner	0.1218**	0.0394	0.1161*	0.0727
Ln Other Incomes	0.0117**	0.0054	0.0285**	0.0125
Region				
Center Coast	0.0601	0.0664	-0.0948	0.1081
South Coast	0.0859	0.0712	-0.0320	0.0963
North Sierra	-0.0815	0.0730	-0.1736*	0.1037
Center Sierra	0.0136	0.0631	0.0622	0.0928
South Sierra	0.1368*	0.0706	0.0720	0.0940
Selva	0.0642	0.0613	-0.1475	0.1157
Met. Lima	0.3643**	0.0526	0.3463**	0.0972
Constant	5.0562**	0.1211	5.3098**	0.1152
	Num obs = 1478		Num obs = 726	
	F(13, 1464) = 29.64		F(12, 713) = 69.75	
	Prob > F = 0.0000		Prob > F = 0.0000	
	R-squared = 0.4436		R-squared = 0.3982	

Significant at 10%; ** Significant at 5%.

Taking as a reference all the models estimated and the description of the model used in the section IV, four cases were simulated. Case 1: free availability of 50% of the CTS; Case 2: free availability of 75% of the CTS; Case 3: free availability of 100% of the CTS; and Case 4: annulations of the CTS and increase of the wages in 8.03%. Table 11 presents the effects of the different policies in the poverty status (the table A1 of the Annexes present the results for the extreme poverty rate).

According to table 11 the most effective policy seems to be the elimination of the CTS and including the allowance in the wages. Considering that the CTS is already a sunk cost this is an option that should be taken into account. Apparently there is not much different between the free availability of 50%, 75% and 100% of CTS, this is due to the way it has been estimated the effects: in fact the CTS was added through other incomes of the family; these variables then will be adjusted by the household size and natural logarithms allowing similar effects in the estimation of the utility consumption. Additionally the effect in the one adult household is sharper than in the case of two adult households, probably due to the increase in the other incomes would have to be distributed within less people or a closer relationship of dependency.

Table 11. Effects on Different policies on poverty rate

	Status Quo	Free availability 50% CTS	Free availability 75% CTS	Free availability 100% CTS	CTS - wage increase
Non Ext. Pov. Rate (%)					
Two Adult Household	30.47	27.17	27.05	26.75	24.91
One Adult Household	15.04	4.97	4.97	4.97	4.86
Total	25.63	20.20	20.04	19.91	18.61

Notes: the simulated poverty rates have been calculated using the estimated values of the regressions of consumption (welfare indicator) for every simulated case.

In table A1 (a more extended version of table 11) can be seen that the effect in the extreme poverty rate is not positive, because of the increase of this rate in the simulated cases, this effect is due to two causes. In the first place, in the data base for urban households we have few cases in the extreme poverty status, and then this affects the degrees of freedom in the estimations. In the second place, probably, even when the application of this policies increase the willingness of people in working in the formal labour market, it has to be remembered that not all of them have enough skills to work in a formal job, so probably a displacement effect

will occur in the application of these policies between extreme poor population working in the formal labour market in favour of non-extreme poor population working in the informal labour market.

The last effect can be confirmed in the figures 2, 3 and 4 where the cumulative distribution of the probability of working in the formal labour market is presented for all the cases suggested: by husbands in a two-adult household, wife in a two-adult household and household head in a one-adult household. These probabilities have been estimated from the regressions of the multivariate probit model of labour market choice.

The idea of the analysis of these probabilities is to evaluate the change of the “behaviour” of the workers due to this simulated policy. In this case, in the figures 2 and 4 can be observed the same pattern: for individuals with low probabilities of working in the formal labour market, mostly the poorest ones, the status quo case performs a stochastic dominance³³ with respect to the other cases, but not anymore for probabilities in working in the formal labour market above 20% approximately. Phenomenon that is recurrent observed for all the cases (without considering the scenario of wage increase – case 4). Thus, we can see that these policies increase the probability of working in the formal labour market due to the new incentives translated in the availability of the CTS in case of period of shocks, but it has to be taken into account that this is only an analysis of the supply so it would be necessary to see the effects on the labour demand in order to see the real effects, so far in this analysis there is an implicit assumption that people are able to find a job in the labour market they prefer to work.

From the figures 2, 3 and 4, also can be inferred that in the case 4 (CTS - wages increase), the effect on the probabilities of working in the formal labour market has a clearer stochastic dominance, for all the cases (husbands and the wives in two adult household and household head in one-adult household), probably due to the direct effect on the wages, that is why results more attractive for all the levels of workers, but even then the displacement effect it can be still being seen for the household head in the one adult household.

³³ The concept of stochastic dominance can be found better explained in Deaton (1997). Basically, it refers to the fact that in a comparison of two categories of the same cumulative distribution of the probability of working in the formal labour market (in this case) one dominates stochastically to another if it is more skewed to the right than the other one, meaning, for instance, in this case that that category of households are richer than the other one.

Figure 2. Effects on probability of participating in the formal labour market. Husband in 2 adult household

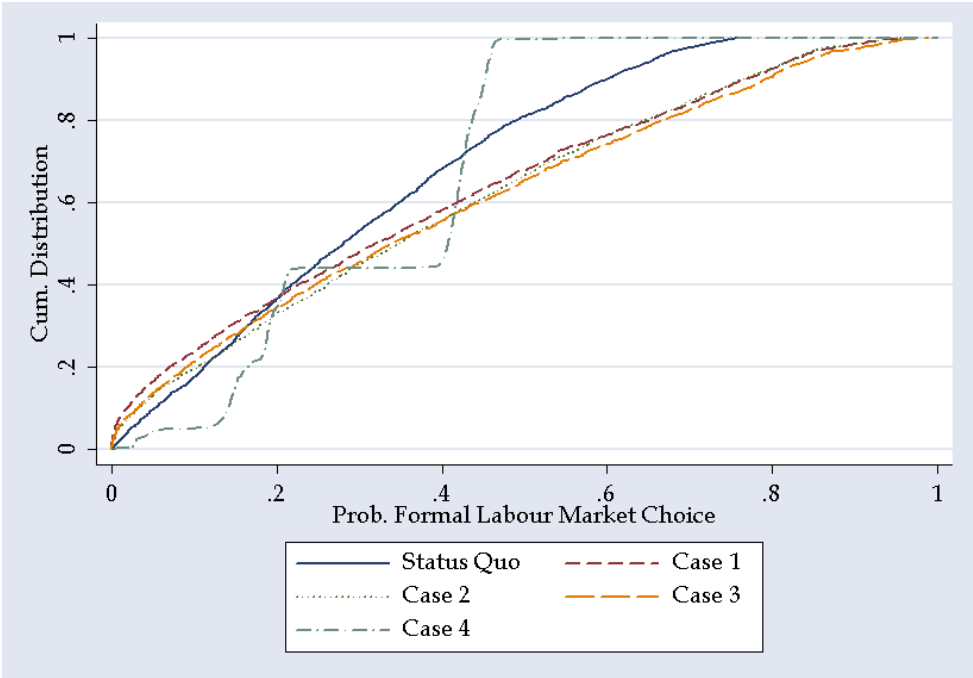


Figure 3. Effects on probability of participating in the formal labour market. Wife in 2 adult household

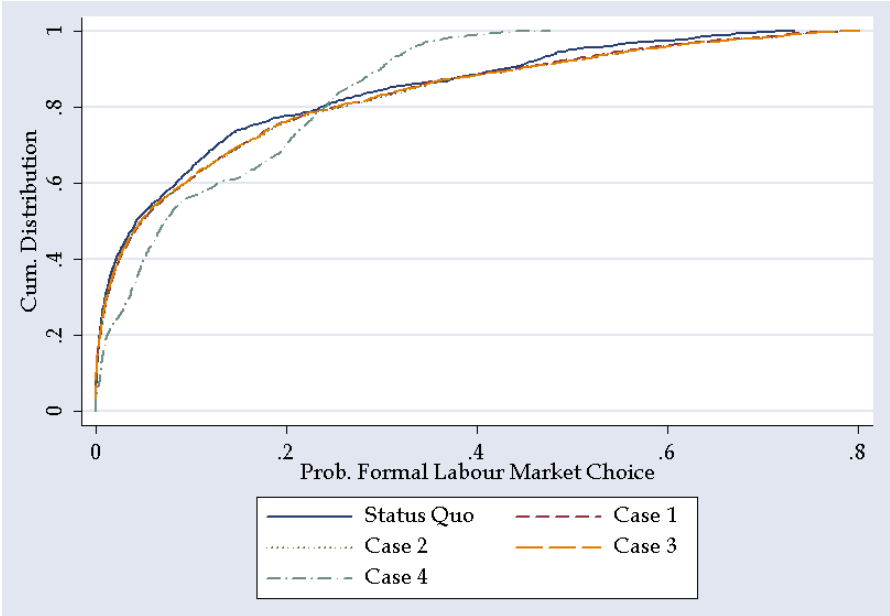
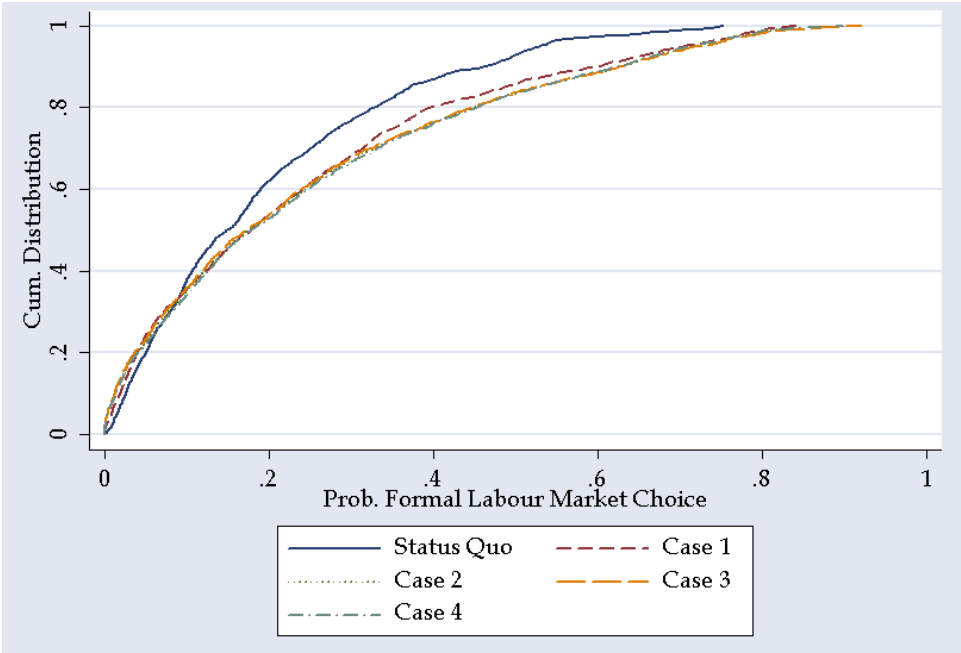


Figure 4. Effects on probability of participating in the formal labour market. Household head in 1 adult household



Finally, at the time of considering the benefits of the application of the free availability of the CTS it should also be considered the cost of it. In this sense, the administrative cost of this kind of policies, for instance, the cost of determining who is in need of using the CTS fund it would be an important variable for all the cases evaluated in this study in order to determine the affordability of this policy. In that aspect the case 4 (CTS - wages increase) seems to be more efficient due to the non-existence of administrative costs, but even then it also should be considered with the current benefits and costs of the CTS, but unfortunately due to this successive changes of the use of the CTS and the lack of specific data on unemployment spells this it will not be possible to be calculated in this thesis

VII. Conclusions and Recommendations

The fluctuation of wages and the utilization of human resources strategies like risk sharing are affecting the purchasing power of workers’ wages reflecting them in a more vulnerable population (68% of the households experienced at least one episode of poverty between 1998 and 2001). These facts represent evidence of the need of looking for new alternatives to deal with this new dimension of poverty.

In this sense, in view of the bias of the non-wage labour costs CTS from its original purposes, this thesis proposes a new use for this labour costs as a source of income for an in-work benefit means-tested income transfer. The CTS consists of a fund collected in a bank account on behalf of the worker paid by the employer monthly for the amount of 8.33% of the gross wage. It is supposed that this amount only can be used in case the employee is fired or if he/she quits the job. In the last years has been admitted the possibility of the free availability of this fund for purposes to increase the aggregate demand and consumption. Unfortunately, there is no evidence how well performances this policy.

Thus, this study proposes that the CTS could be freely available for those households having a shock that is affecting their consumption level in order to allow them to deal with this issue without becoming poor (temporary or permanent). And because it is a sunk cost (it has been already been paid by the employers) it does not represent more costs than the administrative costs of identification of a household as poor in order to be entitle to dispose of their CTS.

The CTS is a non-wage labour costs that due to its nature is only paid for the workers in the formal labour market, in this sense taking into consideration the big proportion of workers in the informal labour market (65%) the free availability of the CTS will generate some incentives to work in the formal labour market. That is why the microsimulation techniques appear as a convenience methodology as much as allows simulating the effect of this policy and its effects in the labour market choice.

The estimation of the effects on poverty and vulnerability of the free availability of the CTS was done through a model of utility family maximization based on labour market participation choice, using the approach to evaluate in-work-benefit schemes by Gerfin and Leu (2003); Eggink, Hop and Van Praag (1995); Blundell, Duncan, McGrae and Meghir (2000) and Duncan and Giles (1998); and the effect of economic shock on labour market participation by De Hoyos (2006).

Using as a base the multivariate probit approach to simulate the effects on the labour market choice, four policies were analysed: Case 1: free availability of 50% of the CTS; Case 2: free availability of 75% of the CTS; Case 3: free availability of 100% of the CTS; and Case 4: annulations of the CTS and increase of the wages in 8.03%. And the last one seemed to

perform better because a more pronounced effectiveness reducing poverty (from 25.6% to 18.6%) in comparing with the other cases (to 20.2, 20.4 and 19.9% respectively).

The case 4 has in favour the fact that does not need administrative costs, because it would be a benefit received for all those workers in the formal labour market. And in the other cases the administrative costs should have to be evaluated in order to determine their affordability. Unfortunately the counterfactual case, how the CTS performances as a unemployment benefit, could have not been evaluated yet due to the lack of the ENAHO survey of a module with the appropriate questions, issue that would be definitely very useful to complement the evaluation of the policy proposed.

As it was mentioned, the application of the free availability of the CTS generates not only effects on poverty but it affects the willingness of the people of working in formal labour market in order to be entitled to received this benefit in case they could need it. In this sense, all the alternatives simulated present increases in the probability of working in the formal labour market but it should be taken into account that this is an analysis of supply. In this sense nothing guarantees that all these workers wanted to change to the formal labour market will find a job in it.

This exercise not only shows a new alternative to deal with temporary poverty but the need to count with policies that promotes the formalization of labour relationships in the labour market. Finally, dealing with poverty it is not only a matter of giving resources it is a mater to do it efficiently, allowing people to do it by their selves and helping to those that do not have the skills to do it alone. In this sense, this thesis does not pretend to be the recipe to be followed, but gives evidence of a new alternative and serve as a tool for deeper analysis.

VIII. References

Alonso, I. (2006) “Una propuesta para reformar la CTS” [A proposal to reform the CTS]. *Sociedad Libre* No. 6, Febrero 2006.

Bingley, P. and I. Walker. (1995) “Labour supply, unemployment and participation in in-work transfer programmes”. Institute for Fiscal Studies Working Papers No W95/16.

Birgsten, A.; P. Collier; S. Dercon; M. Fafchamps; B. Gauthier; J. W. Gunning; A. Oduro; R. Oostendorp; C. Pattillo; M. Söderbom; F. Teal; and A. Zeufack. (2003) "Risk Sharing in Labor Markets". *The World Bank Economic Review*, Vol. 17, (3): 349-366.

Blanchflower, D. G., A. J. Oswald, and P. Sanfey. (1996) "Wages, Profits and Rent-Sharing". *Quarterly Journal of Economics* 111: 227-251.

Blundell, R., A. Duncan, J. McGrae and C. Meghir (2000), "The Labour Market Impact of the Working Families Tax Credit", *Fiscal Studies*, 21, 65-74.

Borjas, G. J. (2000) "Labor Economics". Mc GrawHill: New York.

Bourguignon, F., F. Ferreira, and P. G. Leite. (2003) "Conditional cash transfers, schooling, and child labour: microsimulating Brazil's Bolsa Escola program". *The World Bank Economic Review*, Vol. 17, No. 2, 229-254.

Brown, C. (1992). "Wage Levels and Methods of Pay." *Rand Journal*, 23(3), pp. 366 – 375.

Cahuc, P.; and A. Zylberberg. (2004) "Labor Economics". The MIT Press: Cambridge, Massachusetts.

Cappellari, L. and Jenkins, S.P. (2003) "Multivariate probit regression using simulated maximum likelihood". *The Stata Journal*, 3(3), 278–294.

Cichon, M.; W. Scholz; A. Van de Meerendonk; K. Hagemeyer; F. Bertranou; and P. Plamondon. (2004) "Financing social protection". Geneva: ILO/ISSA.

Chacaltana, J. (2001) "Reforma en la contratación y despidos en el Perú de los 90: Lecciones y perspectivas" [Reform in hiring and dismissal legislation in Peru in the 90's: lessons and perspectives]. *Revista de Economía* Vol. 24 No. 48: 133- 151. PUCP: Lima.

Chacaltana, J. (2003) "Desafíos de las Políticas de Empleo" [Challenges of employment policies]. In: CIES, *Revista Economía y Sociedad* No. 48.

Chacaltana, J. (2004) “Impacto del programa A Trabajar Urbano: ganancias de ingreso y utilidad de las obras”. [Impact of the program A Trabajar Urbano: income gains and the utility of the buildings] CEDEP-CIES.

Chacaltana, J. (2005) “¿Se puede prevenir la pobreza?”. [Could the poverty be foreseen?] CEDEP-CIES.

De Hoyos, R. (2006) “Structural Modelling of Female Labour Participation and Occupation Decisions”. Cambridge Working Paper.

Deaton, A. (1997) “The Analysis of Household Surveys”. The World Bank & John Hopkins University Press.

Dhanani, S. and I. Islam . (2002) “Poverty, Vulnerability and Social Protection in a Period of Crisis: The Case of Indonesia”. *World Development* Volume 30, Issue 7 , July 2002, Pages 1211-1231

Duncan, A. and C. Giles. (1998) “The labour market impact of the working families tax credit in the UK”. Paper presented to the 1998 IIPF Conference, Argentina.

Eggink, E.; J. P. Hop and M. S. Van Praag. (1995) “A symmetric approach to the labour market with the household as the unit of observation”. In: H. K. Van Dijk, A. Monfort and W. Brown (Ed.) “Econometric inference using simulation techniques”. John Wiley & Sons Ltd.

Espinoza, H. y V. Rios. (2004) “Protección Social en Salud para trabajadores del Sector Informal Urbano: Conceptos, mecanismos y una propuesta” [Social protection in health for workers in the informal sector: concepts, mechanisms and a proposal]. CIES.

Espinoza, H. (2006) “¿Risk Sharing?: Un Análisis de Remuneraciones, Shocks y Legislación Laboral en el Sector Manufacturero – Perú 1970-1996”. [Risk-Sharing?: An analysis of wages, shocks and labour legislation in the manufacturing sector – Peru 1970-1996] CIES. Mimeo.

Gerfin; M. and R. E. Leu. (2003) “The Impact of In-Work Benefits on Poverty and Household Labour Supply A Simulation Study for Switzerland”. IZA Discussion Papers, No 762.

Harding, A. (1996) “Microsimulation and Public Policy”. Amsterdam: Elsevier Science B.V.

Jaramillo, M. (2004) “La Regulación del Mercado Laboral en Perú” [Regulation in the Peruvian Labour Market]. Grade

Kaufman, B., and Hotchkiss, J. (2003) “The Economics of Labor Markets”, Dryden.

McConnell, C. R.; S. L. Brue; and D. A. Macpherson. (2003) “Contemporary Labour Economics”. McGraw-Hill: New York.

Pages, C. (2004) “A cost-benefit approach to labour market reform”. *Economic Review*, 2004, issue Q 2, pages 67 - 85

Rama, M. and D. MacIsaac. (2001) “Mandatory severance pay: its coverage and effects in Peru”. The World Bank Policy Research Working Paper Series No 2626.

Ravallion, M.; G. Pannushy and F. Ferreira. (1999) “Protecting the poor from macroeconomic shocks”. The World Bank Policy Research Working Paper Series No 2160.

Saavedra, J. (2000) “Generación de Empleo y Evolución de los Ingresos y la Productividad en el Perú, 1990-1998” [Employment generation and evolution of income and productivity in Peru, 1990-1998]. In: Egger, P. and N. García. *Apertura Económica y Empleo: Los Países Andinos en los Noventa* [Economic Openness and Employment: Andean countries in the 1990's]. Lima, OIT:

Saavedra, J. y E. Maruyama. (2000) “Estabilidad laboral e indemnización: Efectos de los costos de despido sobre el funcionamiento del mercado laboral peruano” [Labor Stability and Indemnification: Effects of the Dismissal Costs over Peruvian Labor Market performance]. Lima: GRADE, 2000 – Documento de Trabajo 28.

Saavedra, J. and M. Torero. (2000) “Labor Market Reforms and their Impact on Formal Labor Demand and Job Market Turnover: the case of Peru”. Inter-American Development Bank Research Network Working Paper # R-394.

Scholz, W; M. Cichon and K. Hagemejer. (2000) "Social Budgeting". Geneva: ILO/ISSA.

Velazco, J. (2004) “La Protección Social para Trabajadores Informales en el Perú: Estimación de su cobertura a partir de la ENAHO-2002” [Social Protection for informal workers in Peru: Estimation of coverage using ENAHO 2002]. CIES.

Yamada, G. (2004) “Horas de trabajo: determinantes y dinámica en el Perú Urbano” [Hours worked: determinants and dynamics in Urban Peru]. Lima: CIES.

Yi-Ping T.; and R. K. Wilkins. (2003) “Reliance on Income Support in Australia: Prevalence and Persistence”. *The Economic Record*, 2003, vol. 79, issue 245, pages 196-217.

IX. Annexes

Table A1. Effects on Different policies on poverty rate

	Status Quo	Free availability 50% CTS	Free availability 75% CTS	Free availability 100% CTS	CTS - wage increase
Ext. Pov. Rate (%)					
Two Adult Household	2.97	3.77	3.77	3.77	3.82
One Adult Household	3.00	1.72	1.72	1.72	1.72
Total	2.98	3.13	3.13	3.13	3.16
Non Ext. Pov. Rate (%)					
Two Adult Household	30.47	27.17	27.05	26.75	24.91
One Adult Household	15.04	4.97	4.97	4.97	4.86
Total	25.63	20.20	20.04	19.91	18.61