

The Effect of Unobservables on Labour Supply Decisions: The formal and informal sector during transition

Ceema Zahra Namazie

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Centre for Analysis of Social Exclusion
London School of Economics
Houghton Street
London WC2A 2AE
CASE enquiries – tel: 020 7955 6679

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Fax:	UK+20 7955 6951
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Editorial Note

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Abstract

The transition from a command economy in the FSU resulted in increased activities in the informal sector. However despite prevalent delays in wage payments many workers were still observed to be working full-time in the formal sector. Here a model of workers' labour supply decisions incorporates unobservable features of informal activities in both sectors; namely unofficial payments within the formal sector and stigma associated with the informal sector. These extensions result in non-trivial changes to workers' reservation wage conditions and reconcile the unexpected outcomes of workers' labour supply decisions. A limited empirical analysis of Kyrgyz data, for 1993 and 1996, provides support for the implications of this framework.

Keywords: transition; informal activities; labour supply decisions.

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Correspondence:

C.Z.Namazie, CASE/LSE, Houghton St, London, WC2A 2AE.

Tel.No: +44 (0)20 7955 7429, Fax: +44 (0)20 7955 6951

email:(c.namazie@lse.ac.uk).

1 Introduction

The collapse of the Soviet Union in the late 1980s initiated political and economic changes throughout the region that was to result in years of turmoil. The upheavals in the labour market in the form of delays to wage payments, reduced working schedules, involuntary leave and changes in the provision of social benefits within the enterprise, have been analyzed in the context of the effects to the demand for labour. These mechanisms have been shown to form a rational adjustment strategy for employers, (see Namazie (2003)). Little work has been done on the effects of these adjustment mechanisms from the supply side. This issue is addressed here by explicitly defining the nature of formal and informal sector activities to examine how workers' labour supply decisions are affected over the transitional period. The analysis presented here has foundations in the literature related to moonlighting and secondary employment.

Here we focus on the effects of the transition process on the labour market on one of the poorer and less developed of the five Republics in Central Asia, the Kyrgyz Republic. The Kyrgyz Republic is a small land-locked mountainous country of approximately 4.6m people. In the early 1990s this highly rural economy embarked on what was considered a rapid process of reform to a market economy.

The presence of an informal sector in the FSU, including the Kyrgyz Republic, is not a new phenomenon arising as a result of the reforms but has increased over the transition period, with workers needing to engage in secondary employment just to survive. Informal sector activities provide an opportunity to supplement low or non-existent wages and hence are an important coping mechanism for families facing economic hardship. In the Kyrgyz Republic the size of the informal private sector was roughly estimated to include 300,000 people, see I.M.F. (1995). Although the informal sector has been described as an alternative sector to the formal sector, many activities are not a substitute for full-time work. The nature of employment in the informal sector is often part-time, or infrequent, and work can be largely characterized into either low skilled, manual, work, such as repair work or selling goods from stalls or alternatively highly paid such as interpreter/translator, official driver, tour guides and most notably taxi driving. There are workers who work wholly in the informal sector but excluding illicit activities and those for purposes of tax evasion these activities may be rather limited, particularly in highly agricultural republics

of Central Asia within the FSU. Here we do not consider *illegal* activities.

Although an increase in informal sector activity has been reported in other studies on the Kyrgyz Republic, there is empirical evidence from the household survey data indicating that workers continued to work in the formal sector, often full-time, in spite of delays in payment and reduction in hours worked (see Table 2 on page 26). Why do workers continue to work when they do not receive a wage, and for such long hours? Why do they not work longer hours in the informal sector where they are likely to be paid, particularly now that monetary wages are more important than before the reform process began? It is evident that reasons other than purely monetary wage differences play an important role in workers' labour supply decision and it is these considerations that are explored in this paper. Here we explicitly define the nature of informal activities, both in the formal and the informal sector, in order to isolate un-observable factors. These factors include unofficial payments in formal employment and stigma associated with the informal sector, which affect workers' reservation wage. Here we present a theoretical model of workers' decisions across the two sectors but due to data limitations empirically focus only on those workers already employed in the formal sector who then engage in additional activities in the informal sector, and not those workers working wholly in the informal sector.

The paper is structured as follows; section 2 briefly reviews the previous literature on multiple job holdings and secondary employment and applications to transition countries. Section 3 provides an overview of the nature of informal activities and specifies the difference between informal activities in the formal and informal sectors. Section 4 presents a model of workers' labour supply decisions under different assertions. Section 5 briefly describes the Kyrgyz survey data, while section 6 presents the empirical results of descriptive statistics and cross-tabulations. Section 7 concludes.

2 Previous Literature

Traditional models of multiple job holdings have examined labour supply decisions under varying assumptions about both the nature of the primary and secondary job. Shishko and Rostker (1976) examine decisions to moonlight, or engage in secondary employment, when hours at the primary employment are constrained. Conway and Kimmel (1998) build on this recognizing that hours in primary employment may not be constrained and

also that primary and secondary jobs may be heterogenous, hence moonlighting decisions are responsive to wage changes in both jobs. Several studies have examined labour supply decisions in the informal sector in Russia over the transition period. Foley (1997) examines workers' decisions to supply labour in secondary employment. His paper claims that institutional changes and specific economic developments in Russia during transition; low earnings, nonpayment of wages or forced administrative leave lower workers second-job reservation wage. Divestiture of social benefits in terms of child-care in particular affect women workers by increasing the shadow value of non-labour time and leads to an increase in the reservation wage. Kolev (1999) considers workers' decisions to work across both sectors, formal and informal, as well as considering workers who undertake a second job. Although the general findings of these papers are consistent with the model presented here, the authors neglect the importance of the non-pecuniary aspects of activities in the different sectors which will be shown to be important in altering both the reservation wage as well as hours of labour workers are willing to supply between the two sectors. Johnson, Kaufmann, and Ustenko (1997) have modelled employee work intensity inside and outside the enterprise as a simultaneous model where employers and employees decide on choices of work intensity based on past behaviour. The continuum of variation in work intensity through both employers' means and the employees' ability to find work outside the enterprise is a departure from the usual discrete model of transitional labour markets, where firms decide whether to hire or release the worker. The employer may be more likely to reduce the hours of workers who are working more intensely outside the enterprise; similarly workers may be more keen to search for work outside if they feel the employer will have to reduce hours or put them on leave. Their study shows that workers more likely to work outside the firm are likely to engage in strategies of survival that allow them to improve their well-being significantly. Commander and Tolstopyatenko (1996) model workers' choice between working for de novo or privatized firms and State enterprises which provide benefits. Privatized firms may have to pay higher wages to attract workers from state enterprises in which workers have a minimum level of commitment to work and for which wages may be low wages, or subject to delays, but where workers have access to social benefits. If the wage is high enough in the non-state sector, the worker may prefer to work in one firm rather than working across sectors (state and non-state)

in order to gain the social benefits. The less responsibility firms have in supplying these facilities/services, the more important wage income becomes to enable workers to pay for these services. The provision of social benefits through the firm and the subsidies from the State to enterprises for workers will certainly effect workers and employers decisions. The model presented here is again consistent with the notion of employer and employee cooperation although the decision to work outside of primary employment is taken in light of decisions to continue to work in the formal sector but here the formal sector is defined in a broader context, detailed later below.

Another important observation is that it is often claimed that the informal wage needs to be above a minimum level before a worker will engage in work in the informal sector. However given that formal wages are often paid with delay, often over a long period of time, the reservation wage will in fact be lower than initially specified. Despite these models of multiple job holdings providing minimum reservation wage conditions, individuals can be seen working full-time in the formal sector without being paid. How do we reconcile these occurrences? Models of moonlighting or labour supply in the informal sector fail to reconcile these occurrences and it is these issues that are addressed here.

The problem is addressed by explicitly specifying the nature of the work in the formal and informal sector, something which is not done in current models of labour supply in transitional economies. The model presented here distinguishes between informal activities carried out in the formal sector, and activities in the informal sector. Firstly some workers may be able to earn unofficial payments while in formal employment. This could be from unofficial charges, e.g. doctors or medical assistance, or for work related to formal duties, such as for administrative procedures. Since the nature of the work in the informal sector tends to be less skilled than formal sector employment workers may be averse to working in such activities, particularly if they are highly qualified or hold positions of authority in their primary employment. This will have a negative impact on their decision to work in the informal sector. The provision of social benefits only through the enterprise also has consequences to labour supply decisions since it increases workers' attachment to the formal place of employment. In the model presented here, the nature of the activities in the formal and informal sector as well as the specific non-pecuniary benefits associated with working in each sector are specified and this can lead to non-trivial differences in

outcomes. The extensions to the regular framework of labour supply decisions in the model presented here are thus three-fold; the ability to earn additional payment from informal activities in formal employment, stigma associated with working in the informal sector, and the provision of social benefits through formal employment.

This paper formalizes a worker's labour supply decisions, explicitly accounting for the heterogeneity between the different employment options, with the aim of providing a more thorough explanation of workers' labour supply decisions in economies in the process of reform. After a description of the nature of the activities in the two sectors a model of workers' labour supply decisions is presented. For a rigorous empirical analysis detailed data on activities in the informal sector and informal activities is needed. Information pertaining to the informal sector is often scarce and when available is often limited in depth or reliability. This is also the case for data on informal activities and the informal sector in the Kyrgyz Republic. However there is some limited information from the KMPS at two points in time, 1993 and 1996, on primary and secondary activities which allow for some limited empirical investigation of the model presented here and to examine the extent of these activities. It is felt that the reliability of the data would not support the application of rigorous statistical techniques.

3 Overview of Informal Activities

Informal labour activities were an integrated part of the labour market that benefited both workers and employers. From the firm's perspective informal activities provided additional flexible labour to ensure centrally planned targets are met given the previously rigid rules on hiring and production levels. From the worker's perspective it provides a means by which many workers can supplement their livelihood and improve their welfare given the incidence of low or delays in wages. In general for the population such activities provide a market for obtaining goods and services that would otherwise not exist. Most of these activities during the Soviet period were illegal, and in fact the second economy was termed as those activities that were carried out for private gain (Grossman 1977). A large exception to this were activities on private plots of land which were tolerated and relatively widespread, particularly in the highly rural areas of Central Asia.

However the selling and bartering of produce were deemed illegal and since the collapse

of the Soviet Union there has been an increase in private plot production. Informal activities were prevalent from small scale bazaar activities to well organized groups of workers contracting themselves out to organizations for specific jobs. Building and repair work was an area where this was a frequent occurrence with often groups of workers, referred to as *shabashniki* (free-time workers), contracted to work on construction sites in order to meet enterprise targets (Grossman 1977). In certain occupations additional activities were endured and seen as a recompense for the low salaries earned in regular employment, such as teachers engaging in private lessons to students about to take university entrance exams. Many activities, particularly in rural areas, were in the less skilled areas of repair and maintenance, private exchange of second hand and foreign goods, personal services, such as hair dressing, cleaning, electrical repair (Dallago 1990). The very nature of these activities meant that these were part-time activities. Also many activities were carried out during the working day, considered as the “theft” of time, with workers engaging in paid activities while at work, or engaging in agricultural activities for their own good rather than for the work collective or kholkoz (Braithwaite 1995). As noted in Dallago (1990), Trembl estimated the participation in the second economy to be as high as 10.2% of the Soviet work-force.

Another phenomenon documented in Grossman (1977) refers to gratuitous gifts to superiors in order to ensure the effectiveness of a procedure or official action, known as *prinosheniye*, a tradition expected by both parties. Although this was a regular gesture with authoritative figures, the payment for services above regulated fees has become relatively widespread across a variety of occupations in the process of transition, particularly with the falling value of real wages. For example, a doctor may accept or require a substantial unofficial payment for treatment or diagnosis as part of his/her regular payment. Although the doctor may not report that he is working in the informal sector but working full-time in the formal sector, he is undertaking an informal activity. The ability to command such additional payments for informal activities whilst working in primary employment often occurs in an area where a service is required, for example educational fees, medical services, cleaning etc. The undeclared nature of these activities make them difficult to quantify. A recent study of informal activities at the workplace termed these activities as “covert earning schemes” and described how complex these activities can be

with some workers able to fully exploit the potential of making private gain for themselves at the expense of the employer (Birdsall 2000). Although these are informal activities and should be designated to the informal sector the activities are often complementary to the formal occupation and hence need to be treated differently.

3.1 Differences in the formal and informal sector

This section provides an explanation of the differences between the sectors that are incorporated in workers' supply side decisions.

Here a distinction is made between the informal *sector* and informal *activities*. The standard approach to classifying informal activities is to include all additional activities outside of formal employment. Workers either have secondary 'employment'¹ in addition to the primary formal job or can work wholly outside the formal sector. In this analysis, an *informal activity* is defined to be an activity that accrues private gain to the worker at the formal place of employment, referred to as 'covert earning schemes' in Birdsall (2000). Workers often engage in informal activities in formal employment when services or a particularly skill is required. Informal sector activity is termed as an activity that takes place wholly outside the formal sector. The informal sector is necessarily characterized by informal activities, but an informal activity can be undertaken in a formal setting. Informal activities are not subject to wage arrears, by their very nature they are activities that are paid for in cash.

Another distinguishing feature between the informal sector work and informal activities is not merely the payment for work in the informal sector and the ability to earn additional payments in formal employment, but the very nature of informal sector activities. Work in the informal sector is typically low-skilled and manual. To many individuals engaging in such work may be considered degrading. Workers may associate a stigma with working in low skilled jobs, or jobs requiring less skills than they are trained for, and workers are unlikely to be indifferent between the two types of work, even if the payments were identical. An alternative way of regarding this aversion to the informal sector is the ignominy associated with being outside the formal sector. Although stigma is more a psychological

¹Employment is used broadly here since in the informal sector there is unlikely to be a contract or specified wage.

barrier for workers, and difficult to quantify, it is an important aspect when considering workers' supply decisions. Over the years the Soviet system emphasized the significance of being part of the formal labour force and instilled a sense of social importance. Being outside this 'official working community' is likely to bring some disutility to individuals, although the importance of this is likely to diminish over the course of the reform process.

One reason for workers wishing to remain in formal employment is the provision of benefits which form a social safety net for workers. Attachment to enterprises entitle workers to benefits, such as creches, kindergartens, hospitals. Some benefits are specific to the individual e.g. uniform allowance, transportation costs, while others may be open to family members, such as medical facilities. Many fringe benefits were provided through the enterprise to employees that are otherwise provided by the local or central government in many industrialized countries. Despite the privatization programme and the fall in revenues, fringe benefits are still an important part of remuneration, although the extent and nature of provision can differ across the size of the enterprise and privatized firms, see (Commander and Jackman 1997), (Rein, Friedman, and Worgotter 1997) and (Fajth and Lakatos 1997) which looks at fringe benefits in Hungary and (Estrin, Schaffer, and Singh 1997) in Poland. If access to certain facilities is limited to enterprise provision only then workers may wish to maintain some attachment to enterprises in order to benefit from these facilities, even when they are not formally paid their wage. Individuals may put in a minimum number of hours, turning up at work to show they are still willing to work, and then returning to work in the informal sector. The quantity and quality of benefits vary across workers but are not dependent on the number of hours above the minimum number the individual needs to put in. When a worker is entitled to these benefits his or her family members can also benefit from these facilities. Hence it is not unreasonable to assume that at least one worker from each household will wish to remain attached to an enterprise in the formal sector. The access to such facilities when they are available provide workers and their families with services and facilities that they would not otherwise easily afford and hence it is important to incorporate this aspect into workers' decisions. However, in this paper the theoretical model is restricted to an individual optimization problem and therefore does not consider decisions of other household members which could impact upon the individual's decision. This is considered a more appropriate model since given

the tight labour market conditions (labour demand is rationed during this period, see Namazie (2003)) it is unlikely employment choices are carried out as group decisions and hence the individual optimization framework specified here is likely to remain valid.

4 A model of labour supply decisions

What are the possible outcomes of a worker's labour supply decision?

For the worker, there are four possible outcomes that could result:

- worker remains in the primary place of employment and has the potential to engage in undeclared informal activities *within* formal employment.
- worker remains in the primary place of employment and in addition works in the informal sector *outside* of the primary place of employment.
- worker works wholly in the informal sector.
- worker leaves the labour force.

In the case of economies undergoing transition it can be claimed that workers have little choice over employment decisions when labour demand is rationed. It is argued here that workers already in formal employment may be able to choose to engage in additional activities, whether within the formal place of employment or outside, since they are formally employed and may have opportunities to be part of a network where potentials for informal activities could be pursued, see Birdsall (2000). Some workers may have the opportunity to earn additional income engaging in informal activities while at work and other workers may not. Similarly, some workers may have more opportunities to find informal work.

Given the incidence of wage arrears and the provision of benefits through enterprises, it is reasonable to assume that workers would remain attached to their formal place of employment, and indications of additional activities would show in reduced hours at the primary place of work, or whether covert activities may appear through higher hours regardless of wage arrears or wages or may depend on position and occupation. Hence it is assumed workers are unlikely to leave formal employment unless the wage was significantly

higher and paid regularly in the informal sector. The fourth outcome, to leave the labour market, is again unlikely to be a choice given the Soviet philosophy of employment and given that unemployment benefits were so low, often paid with delay, as well as having stringent eligibility requirements. For most workers (voluntarily) leaving the labour force is likely to be a last resort.

Although evidence on Russia and other countries suggest a sizeable informal sector, there is little information on the diversity of the informal sector and informal activities in rural economies such as the Kyrgyz Republic and in other Republics in Central Asia. It is not clear that opportunities for informal activities actually exist to the extent that they do in other less agricultural economies such as Russia, although there is evidence of informal payments being made for health and educational services. The empirical analysis presented here looks at the prevalence of the informal sector in the Kyrgyz Republic, which has not been looked at previously in this way and will provide some indication of how extensive secondary activities are.

4.1 The theoretical framework

An individual's decision to supply labour between the primary place of employment in the formal sector and the informal sector result from utility maximizing behaviour. Labour supply decisions are assumed to be sequential, and not simultaneous, with an individual's primary employment taken as exogenous, a reasonable assumption as jobs are likely to have been largely pre-determined under the Soviet regime. Since the two possible states of employment, formal employment and the informal sector are so different they enter separately in the individual's utility function.

Although based on the model in Conway and Kimmel (1998), several extensions are made to their model to make it more reflective of labour supply decisions in transition economies of the FSU, namely the ability to earn informal payments in the formal sector, the provision of social benefits in the formal sector, and social stigma associated with work in the informal sector. Although these aspects can be incorporated into differences in non-pecuniary benefits between the two sectors it is necessary to treat them separately. Since the ability to earn informal payments, referred to as A in this model, is a monetary component from formal sector activities, it should be distinguished from the other non-

pecuniary benefits, U_1 , associated with working in the formal sector. Stigma associated with working in the informal sector is defined as B in this model. Similarly although B could be incorporated in U_2 , the non-pecuniary benefits associated with working in the informal sector, it is necessary to specify stigma as a ‘cost’ to working in the informal sector and in this model it enters negatively in the expression for the informal sector ‘wage’. Here four cases are examined illustrating workers’ supply decisions. The first case, Case 1, provides a foundation for examining decisions across the formal and informal sector and the other 3 cases are extensions following this basic setup.

4.1.1 Case 1: Formal and Informal Sector

The model presented here looks at an individual’s decision to work in the formal and informal sector, S_1 and S_2 respectively. The worker maximizes utility, U , over consumption C , leisure l , and the non-pecuniary benefits of working h_i hours in sector S_i , where $i = 1, 2$ for the formal and informal sector respectively, subject to the budget constraint and the time constraint. T is the total hours in the day and l represents hours of leisure. Y_0 are the non-labour assets, A represents income from informal activities in the formal sector and B stigma associated with working in the informal sector. The non-negativity conditions hold for the four constraints. The individual’s optimization problem is thus;

$$\begin{aligned} & \underset{h_1, h_2}{Max} U(C, l, h_1, h_2) \\ 0 & \leq C \leq h_1(w_1 + A) + h_2(w_2 - B) + Y_0 \end{aligned} \tag{1}$$

(budget constraint)

$$0 \leq T = h_1 + h_2 + l \tag{2}$$

(time constraint)

$$h_1 \geq 0 \tag{3}$$

$$h_2 \geq 0 \tag{4}$$

The Kuhn-Tucker conditions state that for a feasible and optimal outcome, (h_1^*, h_2^*) , $\exists \lambda_i \geq 0$, $i = 1, \dots, 4$ such that ;

$$\begin{aligned}
\lambda_1(h_1(w_1 + A) + h_2(w_2 - B) + Y_0 - C) &= 0 \\
\lambda_2(T - h_1 - h_2 - l) &= 0 \\
\lambda_3 h_1 &= 0 \\
\lambda_4 h_2 &= 0
\end{aligned} \tag{5}$$

and

$$\begin{aligned}
&(U_1, U_2) + \lambda_1((w_1 + A), (w_2 - B)) + \lambda_2(-1, -1) \\
&+ \lambda_3(1, 0) + \lambda_4(0, 1) \\
&= 0
\end{aligned} \tag{6}$$

From Equation 5, for $\lambda_3 h_1 = \lambda_4 h_2 = 0$ to hold (other than the trivial case where both $h_1 = h_2 = 0$) either $h_1 > 0$ and $h_2 = 0$, or $h_2 > 0$ and $h_1 = 0$. The resulting optimal choice of hours of work will always be the corner solution. Thus the worker will work wholly in one of the sectors.

The First Order Conditions for the two outcomes are,

Outcome 1: Worker works wholly in the formal sector: $h_1 > 0$ and $h_2 = 0 \Rightarrow \lambda_3 = 0, \lambda_4 \geq 0$

$$\begin{aligned}
U_1 + \lambda_1(w_1 + A) - \lambda_2 &= 0 \\
-(w_1 + A) &= -\frac{(\lambda_2 - U_1)}{\lambda_1}
\end{aligned} \tag{7}$$

Outcome 2: Worker works wholly in the informal sector: $h_2 > 0$ and $h_1 = 0 \Rightarrow \lambda_3 \geq 0, \lambda_4 = 0$

$$\begin{aligned}
U_2 + \lambda_1(w_2 - B) - \lambda_2 &= 0 \\
-(w_2 - B) &= -\frac{(\lambda_2 - U_2)}{\lambda_1}
\end{aligned} \tag{8}$$

The λ 's can be interpreted as the shadow prices and hence the reservation wages can be re-written in the more familiar format;

Outcome 1:

$$-(w_1 + A) = -\frac{(U_l - U_1)}{U_c} \quad (9)$$

and

Outcome 2:

$$-(w_2 - B) = -\frac{(U_l - U_2)}{U_c} \quad (10)$$

where U_c is the marginal utility of consumption and U_l is the marginal utility of leisure. These first order conditions determine the hours of work undertaken in each sector.

The reservation wages for working in the formal and informal sectors, respectively are defined in equations 9 and 10. It can be seen from these equations that the magnitude of A and B can greatly alter the outcomes, which is important since both these aspects tend to be unobservable (although additional payments can be quantified, it is not a transparent income source). If the ability to earn additional payments is large, this will lower the reservation wage for formal sector employment than in the conventional model which does not allow for A . Similarly if a worker associates a significant amount of stigma to working in the informal sector this will lower the reservation wage, even in the presence of a relatively high wage for informal sector work. The varying degrees of stigma the worker associates with working in the informal sector affects the reservation wage, with a higher reservation wage needed to compensate workers for the disutility (stigma) associated with the work. If $U_1 = U_2$ then there are no differences between the nature of the work in the two sectors, other than specified in A and B , and workers would work wholly in either the formal or informal sector whichever sector paid the highest wage according to the specifications, $(w_1 + A)$ or $(w_2 - B)$. If $U_1 > U_2$ or $U_1 < U_2$ then there are differences in the non-pecuniary benefits between the two sectors, and again workers would work in the sector for a wage satisfying the above conditions, depending on the magnitude of A , B , and U_1 and U_2 . The reservation wage will be lower in the sector with the higher non-pecuniary benefit U_i . The nature of A and B being unobservable make it necessary that a model of labour supply decisions incorporate these aspects.

4.1.2 Case 2: Social benefits in the formal sector

Now suppose that the precise nature of the non-pecuniary benefit in the formal sector employment, or at least part of it, is of a specific form. Suppose workers are entitled

to a (social) benefit $f(h_{\min})$, after working a certain number of minimum hours, h_{\min} . The non-pecuniary benefits associated with working in S_1 would be of the form $U_1 = f(h_{\min}) + U'_1$, where U'_1 represents non-pecuniary benefits associated with S_1 *other than* $f(h_{\min})$. Substituting the new expression for U_1 into Equation 9, the first order conditions are now;

$$-(w_1 + A) = -\frac{(U_l - (f(h_{\min}) + U'_1))}{U_c} \quad (11)$$

$$-(w_2 - B) = -\frac{(U_l - U_2)}{U_c} \quad (12)$$

Again hours of work in each sector are determined by the first order conditions above. As in the first case, the optimal outcome is the corner solution. The only difference here is the inclusion of the value of the social benefits provided in the formal sector in Equation 11. The higher the value of the social benefits, the lower the dis-utility associated with working an additional hour in S_1 . Workers will again decide to work in which ever sector pays the higher wage to cover the sector-specific reservation wage.

4.1.3 Case 3: Social benefits not provided outside the formal sector

Case 2 has assumed that the benefits received after working h_{\min} hours are accessible to all workers and hence workers are willing to work in S_2 for a reservation wage that covers the value of these non-pecuniary benefits. Suppose however that the benefits are in fact only provided in the formal sector. This would be the case where employers provide, for example, health care, education facilities or child care, within the enterprise in the formal sector but where such facilities are not provided outside of the formal sector. In this case $f(h_{\min})$ cannot be obtained by working any $h_2 > 0$, and so workers would work h_{\min} hours in the formal sector in order to receive the benefit $f(h_{\min})$ and then will decide to work in either the formal or informal sector for the remaining hours. This changes the time constraint, which now becomes, $T - h_{\min} = \tilde{T} = h_x + h_2 + l$. The total income from working h_{\min} hours in the formal sector would be $f(h_{\min}) + h_{\min}(w_1 + A)$. Hours worked in the formal sector are now $h_1 = h_{\min} + h_x$, where $h_{\min} > 0$. In this case, h_{\min} is fixed and no longer a choice variable.

The optimization problem can then be expressed as;

$$\begin{aligned}
& \underset{h_x, h_2}{Max} U(C, l, h_x, h_2) \\
0 & \leq C \leq f(h_{\min}) + h_1(w_1 + A) + h_2(w_2 - B) + Y \\
0 & \leq \tilde{T} = h_x + h_2 + l \\
& \text{(new time constraint)}
\end{aligned}$$

where,

$$\begin{aligned}
0 & \leq h_x = h_1 - h_{\min} \\
0 & \leq \tilde{T} = T - h_{\min} < T
\end{aligned}$$

The first order conditions are now,

$$\begin{aligned}
U_c(w_1 + A) - U_l + U_{1+} & = 0 \\
-(w_1 + A)^* & = -\frac{(U_l - U_1)}{U_c}
\end{aligned} \tag{13}$$

$$\begin{aligned}
U_c(w_2 - B) - U_l + U_2 & = 0 \\
-(w_2 - B)^* & = -\frac{(U_l - U_2)}{U_c}
\end{aligned} \tag{14}$$

where $(w_1 + A)^*$ and $(w_2 - B)^*$ are the new minimum reservation wages needed for worker i , to participate in sector S_i , respectively. Since workers are not optimizing over h_{\min} hours the value of $h_{\min}, f(h_{\min})$, does not enter the first order conditions. The worker now maximizes over a smaller time constraint since s/he is compelled to work in the formal sector for h_{\min} hours to ensure access to social benefits sector for $f(h_{\min})$. Again the optimal outcome, (h_x, \hat{h}_2) is the corner solution and the worker will either continue to work in the formal sector, or work in the informal sector over and above the minimum number of hours required to qualify him or her for the social benefits. Although the optimization conditions are the same as in the original case, Case 1 on page 11, the number of hours workers maximize over are now smaller, since $\tilde{T} < T$ and $\hat{h}_2 < h_2^*$ (from Case 1).

It is important to appreciate that the availability of social benefits $f(h_{\min})$ provided in the formal sector represents a *vertical shift* upwards of the consumption of the line for $(w_1 + A)$, [or (w_p) in Figure 1 on page 18 described later] rather than a *change in the slope* of the line.

4.1.4 Case 4: Wage arrears in the formal sector

The main purpose of the analysis is to try and explain why workers continue to work in the formal sector S when there are wage arrears. Here it is important to fully appreciate the inclusion of A , the ability to earn additional payments from informal activities in the formal sector. Allowing for other non-pecuniary benefits contained in U_1 and U_2 , if A was not included, the prevailing wage for formal sector employment would be zero in the presence of wage arrears. It would be expected that workers would work in the informal sector for all hours of work above the minimum h_{\min} . However when the reservation wage conditions are ‘correctly’ specified to include A and B , the worker’s decision to work wholly in the informal sector are no longer obvious. The inclusion of A and B can alter the outcome.

The first order conditions now become,

$$-A = -\frac{(U_l - U_1)}{U_c} \quad (15)$$

$$-(w_2 - B) = -\frac{(U_l - U_2)}{U_c} \quad (16)$$

Despite the reduction in the reservation wage for S_1 , the magnitudes of the ability to earn additional payments in the formal sector, A , and the stigma associated with working in the informal sector, B , are very important.

Taking a very basic case, assume $U_1 = U_2$ so that all non-pecuniary benefits other than A and B are the same and $A > 0$ and $B \geq 0$. Even when there are wage arrears, $w_1 = 0$, the ability to earn additional payments in the formal sector, A , may be a significant source of income and delays in wage payments may not affect workers’ decisions to work in the formal sector. The stigma associated with informal sector work could be quite large, resulting in a high reservation wage for the individual to work in that sector. The magnitude of B could in fact vary (inversely) depending on the worker’s alternative opportunities. If A was small or non-existent in the face of wage arrears, it is likely that B may also fall and the worker would have a lower reservation wage for the informal sector if there are no other opportunities to earn income. In this situation the worker would work the remaining hours in the informal sector, i.e. in desperate times all types of work would be considered. This would be the outcome if A and B were not specified in the presence of wage arrears.

The model has shown that by including A and B, workers' labour supply decisions are no longer just dependent on observable factors. The inclusion of additional payments in the formal sector leads to a fall in the reservation wage and the presence of stigma when working in the informal sector leads to an increase in the reservation wage for the informal sector than is usually accounted for in models of labour supply decisions. In addition, incorporating social benefits provided only in a particular sector leads to a reduced time constraint over which workers maximize their utility, which could result in shorter time engaged in the informal sector than if there were no limitations on benefit provision.

4.2 A Graphical explanation

The problem is represented graphically below.

Figure 1 examines the decision to work in the formal and informal sector when income from informal activities A and social benefits $f(h_{\min})$ are available in the formal sector and there is stigma B associated with the informal sector. Y_0 represents non-labour income. An individual worker with utility curve U_α is employed in the formal sector for a wage $w_p [= (w_1 + A)]$. After working h_{\min} hours the individual is eligible for social benefits, valued at $f(h_{\min})$, and the line with slope $-w_p$ shifts vertically up by $f(h_{\min})$. The worker maximizes utility along the indifference curve U_α by working h_1^* hours in the formal sector. The individual will need a wage $w_s [= (w_2 - B)]$ to tempt him/her to work an additional $h_1^* - h_2$ hours in the informal sector, at point B .

If social benefits are available outside of the formal sector, for a sufficiently high wage, of at least \hat{w} , a worker with utility U_γ would not work in the formal sector, since his/her reservation wage \hat{w} is higher than the wage prevailing in the formal sector, w_p . The individual could reach a higher indifference curve U_γ for a wage $\hat{w}' > \hat{w}$ and work positive hours in the informal sector since wage from working in the informal sector is high enough to cover the value of the social benefits $f(h_{\min})$.

Figure 2 illustrates what happens when a worker experiences wage arrears in the formal sector. An individual with utility U_δ earning \bar{w}_p will work h_1 hours in the formal sector, at point D . Suppose the worker then experiences delays in wage payments. The wage line associated with working in the formal sector has slope $-A = -\underline{w}_p < -\bar{w}_p$ and the worker

Figure 1: Labour supply decisions in the formal and informal sector

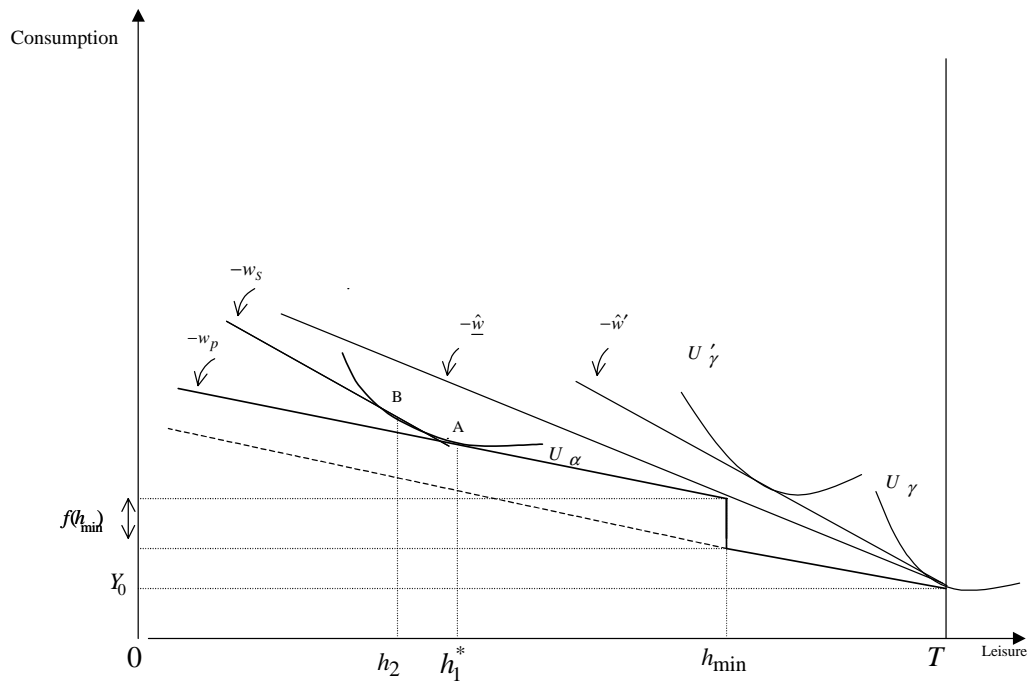
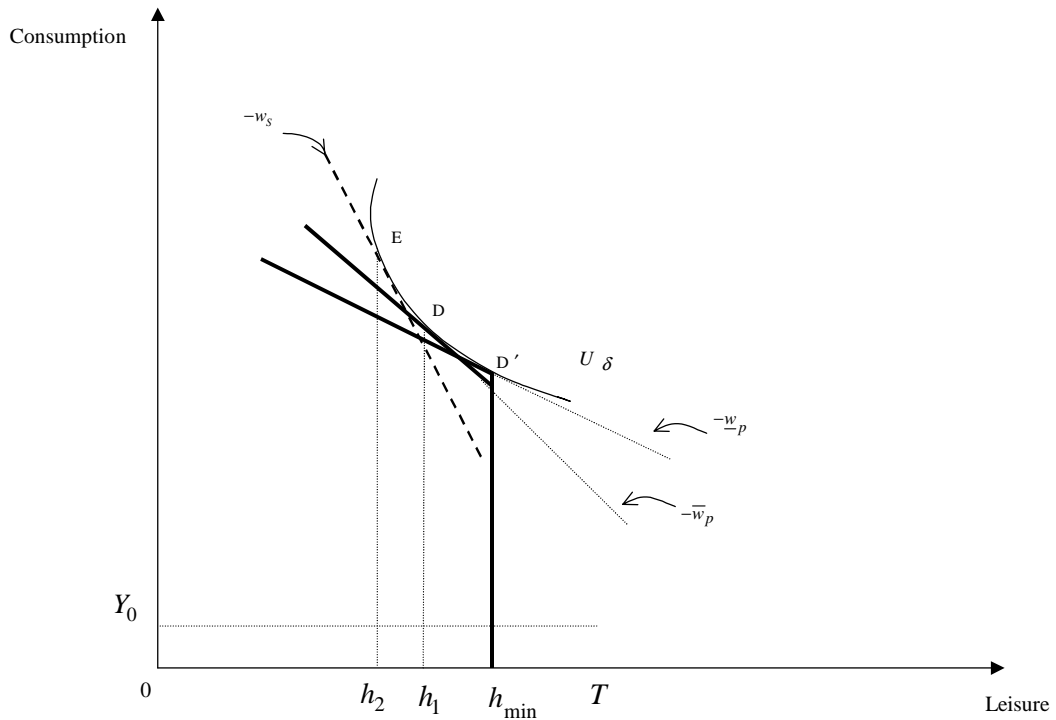


Figure 2: Labour supply decisions in the formal and informal sector, with wage arrears



is limited to working the minimum number of hours h_{\min} and shifts down to point D' . If the worker associates a high level of stigma with working in the informal sector, s/he may need a wage $w_s > \bar{w}_p > \underline{w}_p$ to entice her/him to work additional hours in the informal sector. So despite wage arrears in the formal sector, the reservation wage for working in the informal sector may be so high that a worker does not engage in additional work which would take him/her to point E , but may remain at point D' .

The theoretical model above provides a framework for analyzing labour supply decisions in an economy going through a process of transition, as in the case of the Kyrgyz Republic. Below we turn to an empirical analysis of the Kyrgyz Republic to examine the incidence of secondary employment in the informal sector, given workers are employed in the formal sector, to see if the labour supply model presented here can explain these observations.

5 Data

The empirical analysis is based on nationally representative data from the Kyrgyz Multipurpose Poverty Survey for the Fall of 1993 and 1996. The KMPS are World Bank sponsored household surveys, based on the World Bank's well-established Living Standard Measurement Survey. The 1993 survey was designed for purposes of identifying the poor while the 1996 Survey was more in line with the standard LSMS format.

A stratified multi-stage sampling procedure was followed so that in principle, every household had a non-zero random chance of falling into the sample. This paper draws largely from the Adult Questionnaire, and in particular the section related to time use or employment for those respondents aged 16 years and older. In both years roughly 2,000 households and 10,000 individuals were interviewed. The total sample sizes in 1993 and 1996 were 9,547 and 8,989 respectively. The number of observations used in this analysis was based on the number of employed workers and not the self-employed or entrepreneurs. In 1993, of the 2,949 individuals that were classified as employed, based on criteria consistent with ILO definitions, the number of workers was 2,696. In 1996, only 1,682 respondents were identified as workers amongst the 2,167 classified as employed. The analysis of labour supply decisions focuses on workers, excluding entrepreneurs and students, over the age of 16 years old.

Neither the 1993 nor 1996 survey provides information on informal activities *within* the formal place of employment though there is information on additional activities that workers may have engaged in, *in addition* to formal employment. In 1993 information on activities *in addition* to primary employment was based on responses from those who answered yes to “*Please tell me whether you presently work for hire at any enterprise, in any organization, on any collective farm or state farm, or in any cooperative?*”. Those who answered yes were then asked the following three questions;

“*Please tell me whether you hold an additional paid job at any other enterprise or organization?*”

“*Now I would like to ask several questions about entrepreneurial activity. I would like to find out whether you engage in any kind of entrepreneurial activity, regardless of whether your enterprise is registered or not. Do you have your own business? Do you produce equipment, tools, make clothes, shoes, sell food products or other goods, provide medical*

services, tutor, work privately as a hair dresser, shoe repairman, etc.”

“During the last 30 days, have you performed any work other than that about which we have already spoken, for which you were paid. Perhaps you sewed a dress for someone, took someone somewhere in a car, helped someone repair an apartment or car, purchased and delivered goods, took care of people who were ill, or did something else for which you were paid” .

Income from additional activities was calculated as the sum of all income reported in response to these three questions.

The 1996 Survey contained only one question pertaining to involvement in additional activities outside of formal employment which was asked after questions related to the primary work place. Those who were classified as employed were asked at the end of the section referring to the respondents main work during the past 7 days, *“Did you have a second job or activity in the past 7 days?”*. Income from these activities was derived from the responses to two questions. The first was addressed to those who classified themselves as self-employed or an independent entrepreneur in their additional activities, *“During the past 30 days, how much did you earn in this work, including salary, bonuses, awards, or other payments in goods and services?”* and the second question was addressed to those who did not classify themselves as either self-employed nor an independent entrepreneur, *“In the past 30 days, what are the total earnings that you received from this work” .*

Despite the rigid grid system determining the level of wage income for workers, based on such aspects as occupation, qualifications and seniority, enterprises often pay workers above their official state wage in order to retain more competitive workers and would conceal additional payments by providing more in-kind benefits or by paying extra payments on top of their regular wage that were not declared on the enterprise’s official wage bill. In addition to their official state determined salary and the salary the enterprise pays, workers who are able to earn additional income through their employment will in fact have an actual wage income that differs between the previous two. Given that workers were asked to report the amount of wage income they received over the previous month, it could be that workers report their official state-determined salary and not the amount paid by the enterprise, of which the latter is likely to be larger. It is unlikely that workers report these additional payments that make up their actual wage income. The incidence

of these payments can only be indirectly inferred from the results. It is necessary to keep this in mind when interpreting wage income information.

Another problem encountered with the 1993 data was the large number of missing observations for hours worked over the previous week. There are 877 respondents who reported positively to working for an enterprise or organization and who specified a type of enterprise they worked for but did not report working any hours over the previous week in the Fall of 1993. Workers with missing hours have been included in the sample as workers with formal employment but working 0 hours in the primary place of employment. The summary statistics in the next section present both figures for 1993. Here again women on maternity leave and on official leave are excluded.

6 Empirical Results

It is recognized that quantifying work in the informal sector is difficult due to the unwillingness of workers to openly admit engaging in unofficial activities, see for example Kaufmann and Kaliberda (1996) who estimate the approximate size of the shadow economy through electricity use. Hours worked in both the primary sector and in the informal sector, as well as total income earned in both sectors, would be necessary for informative results from regression analysis. The lack of extensive and reliable data on informal activities in the Kyrgyz data means limited analysis can be undertaken only of those already employed in the formal sector and prevents a more detailed empirical analysis of workers' labour supply decisions across both sectors. Despite this drawback, some useful inferences can be made from information captured in the number of hours worked and reported wage income of workers. This will at least provide a picture indicating the sort of decisions workers' take between the two sectors. Here the Kyrgyz labour market is examined using the KMPS for 1993 and 1996. Due to the (un-)reliability of data it was necessary to combine all income from secondary activities together. This will limit the extent that activities in the informal sector can be distinguished from informal activities in the formal sector, but still does shed light on the importance of these activities.

Table 1 provides some interesting results on the incidence of workers engaging in secondary activities and those experiencing wage arrears and reductions in hours of work.

Table 1: Selected Characteristics of the Labour Market, 1993 and 1996

(s.e. in parenthesis)	1993		1996
	A (%)	B	(%)
<i>Workers (out of the total labour force)</i> ¹	91.1	70.2 ²	77.6
	(0.005)	(0.007)	(0.010)
Secondary activities	23.5	17.2	2.6
	(0.009)	(0.008)	(0.004)
Wage Arrears	57.5	52.1	23.8
	(0.010)	(0.011)	(0.010)
Reduced schedule	1.7	1.5	4.3
	(0.003)	(0.002)	(0.005)
% of workers out of total reporting 0 hours	3.0	4.2	9.8
	(0.003)	(0.004)	(0.006)
% of workers not reporting hours in 1993	20.81		
	(0.008)		

¹Statistics excludes those on maternity leave.

²Excludes 582 (20.81%) workers who did not report hours of work during the reference week in 1993.

Source: Author's calculations based on KMPS 1993 and 1996

For 1993 two sets of results have been derived, one includes information from workers who claim to be employed but do not report any hours of work, column A, and the other column, B, excludes these observations. The difference in the results between including those workers who report 0 hours and excluding these workers is quite significant, with the incidence of secondary activities falling from 24% to 17% when these workers are excluded. Due to the absence of essential information on primary employment, we focus on the results in column B.

Between 1993 and 1996 the incidence of secondary activity fell from 17% in 1993 to approximately 3% in 1996. This is a lot lower than the estimate of around one-third of the economically active (using estimates by NSC for 1995). Although this would be expected, since the analysis here focuses only on those already employed and working in secondary activities, the disparity (3% compared to 33%) illustrates how difficult such activities are to quantify. Also over the period 1993 and 1996 the incidence of wage arrears has fallen from 37% to 24% of workers though the percentage of workers on reduced working schedule has increased from a relatively low level of 2%, to 4%. This reflects an economic improvement, albeit relatively minor, in the economy. In comparison, using labour force survey data for Russia, Foley (1997) reports that the percentage of male workers holding additional jobs, increased from 5.8% in 1993 to 12.0% in 1996. For women, the figures were found to be 5.6% in 1993 increasing to 8.2%. Looking at the percentage of workers engaging in informal activities, Kolev (1999) found that in 1995 depending on the definition of informal activities used, around 8-10% of Russian workers, 10%-12% of men and 6-7% of women, were engaged in informal activities. The percentage of those working and engaged in informal activities was 8% while those who classified themselves as unemployed was found to be as high as 23%. Paxson and Sicherman (1996), using U.S. data, found that on average over the period 1976-1989, around 20% of working men and 12% of working women held an additional job to their main job. So although the estimates for the Kyrgyz Republic are relatively low they do not represent the whole picture of informal sector activities and more detailed survey information would be needed to estimate those engaged wholly in the informal sector.

Examining hours worked can provide some indication of where workers' spend their time, whether in the primary place of employment or outside in the informal sector. Table

2 looks at hours worked under differing cases of wage arrears and secondary activities. It appears that hours of work in the primary place of employment falls less due to secondary activities than compared to wage arrears, in both 1993 and 1996. The difference between those engaging in secondary employment and those not was only an hour in 1993 while in 1996 the difference was 3 hours. In both cases the absolute number of hours worked in the primary place is still relatively high, over 44 hours in 1993 and over 30 hours in 1996. However in 1993, irrespective of whether a worker was engaged in secondary activities or not, those experiencing wage arrears worked longer in their primary place of employment compared to those workers who do not experience wage arrears. Although those working secondary activities reduce their hours in primary employment if they are engaged in secondary activity, the reduction is smaller compared to those experiencing wage arrears. In 1996 the trend was the same with secondary activities leading to a reduction in hours worked in primary employment, and for those experiencing wage arrears the reduction in primary hours of work was even more. The fall in secondary activity would appear to coincide with the decrease in the incidence of wage arrears, which fell from 57.5% in 1993 to 23.8% in 1996. Interestingly the number of hours worked in primary employment in general is fewer in 1996. By 1996 firms had started to reduce the provision of some facilities through the enterprise, although not all benefits. This is consistent with a reduction in a minimum level of attachment to primary employment in order to qualify for benefits, as described in Case 4 of the theoretical model presented here.

Table 3 illustrates the average wage in the primary employment and income from secondary activities, deflated to November 1993 figures. It is important to bear in mind that reported wage data may greatly underestimate the actual wage received, since workers may only report their official wage. So caution should be drawn when interpreting wage and income results. Average wages of workers appear to have increased in 1996 but when looking at those who were actually paid, workers were, on average, paid 129 soms in 1993 compared to 137 Soms per month in 1996. The high standard errors for these estimates reflects the large amount of noise there is in measuring these variables. The figures for average wage across all workers indicates the large number of workers who received zero wages in 1993. Average income from secondary activities in 1996 was substantially higher

Table 2: Average hours worked in the primary place of employment, 1993 and 1996

<i>(standard deviation in parenthesis)</i>	1993¹	1996
	(hrs/wk)	(hrs/wk)
Across all workers	46.88 (21.48)	37.17 (14.2)
No Arrears	44.31 (16.66)	39.07 (13.11)
Arrears	49.23 (23.55)	31.01 (18.41)
No secondary activities	47.23 (21.44)	37.24 (14.87)
Secondary activities	45.80 (21.61)	34.43 (16.70)
No secd. act., no arrears	44.54 (18.23)	39.14 (13.01)
No secd. act., arrears	49.60 (23.61)	31.04 (18.48)
Secd. act., no arrears	43.09 (18.75)	36.10 (16.68)
Secd.act., arrears	48.10 (23.57)	29.73 (16.60)

¹Excludes 582 workers who did not report hours of work during the past week in 1993.

Source: Author's calculations based on KMPS 1993, 1996

Table 3: Average primary wage and income by activities, 1993 and 1996

	1993¹	1996
	(mth/TR)*	(mth/TR)*
Average wage received across all workers	61.73	107.18
	(107.47)	(126.80)
Average wage received, no arrears	128.58	137.19
	(124.37)	(128.31)
Income from secondary activities	121.77	238.11
	(254.01)	(490.82)
Average wage, no secd activities	133.66	136.29
	(131.73)	(127.45)
Average wage, secd activities	112.03	172.80
	(95.00)	(156.95)

* deflated to November 1993

¹Excluding workers with missing hours.

Source: Author's own calculations based on KMPS 1993 and 1996

than in 1993, with workers who engaged in these activities earning, an average, 238 soms per month in 1996 compared to 122 soms in 1993. Interestingly the average wage in 1993 received by those workers not engaging in secondary activity was higher than for those workers actually working additionally, 134 soms compared to 112 soms. This could imply “less-skilled” workers on low wages supplementing their income by working in secondary activity. The timing is also consistent with the dire situation of the macroeconomic effects on the economy which are only just beginning to show, so the necessity to engage in secondary activities is only beginning to emerge in 1993. In 1996 the reverse is true and workers working in secondary activities receive a higher wage in their primary place of employment compared to those workers who engaged wholly in primary employment. This may indicate better paid outside opportunities for the most highly skilled workers.

7 Conclusion

The main purpose of this paper was to provide a comprehensive model of workers' labour supply decisions in light of the affects of the reform process on the Kyrgyz labour market. In particular the model tried to explain why workers may continue to work in formal employment despite wage arrears. Here we have shown that specifying the precise nature of the work in the formal and informal sector can alter labour supply outcomes in non-trivial ways. The features included in this labour supply model that are not included in other models of labour supply applied to transitional economies, are the inclusion of additional payments in addition to the formal wage whilst working in formal employment, aversion to working in the informal sector, and the provision of social sector benefits through formal employment only (whilst this applies). The former feature leads to a lowering of the formal sector reservation wage, while the latter increases the reservation wage for informal sector work. The restricted provision of benefits has been shown to lead to a reduction in the total number of hours workers optimize over and hence also reduce the hours workers are willing to engage in secondary activity outside the formal sector.

Incorporating these unobservable features provides a labour supply model that reconciles the empirical findings, that workers tend to work relatively long hours in formal employment, even when experiencing wage arrears. In general the results provide some support for lower paid workers supplementing their income with informal activities in 1993, when the economy was doing particularly badly in terms of inflation and high wage arrears. This is also consistent with the patterns found in the 1996 data, by which time there was economic growth and signs of stability in the economy seen in lower inflation. Higher paid workers appear to be earning higher income from secondary activities, implying that the higher reservation wage for informal sector work is being matched by high paid work in the informal sector.

The empirical analysis here has been limited due to the lack of data. More extensive data on the informal sector and additional payments in formal employment would be needed for an in-depth analysis than can otherwise be done here. Nevertheless, the empirical findings suggest that the theoretical model presented does reconcile labour supply outcomes, given the particular setup of employment during transitional times and provides a clear framework within which to understand worker labour supply decisions.

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