EGDI
EXPERT GROUP ON DEVELOPMENT ISSUES

United Nations University
WIDER
World Institute for Development Economics Research

Research Paper No. 2005/14

Inter- and Intra-household Linkages Between the Informal and Formal Sector

A Case Study for Urban Burkina Faso

Michael Grimm[1] and Isabel Günther[2]

April 2005

Abstract

Given the current focus of international development policy on pro-poor growth and poverty reduction, the role of the informal sector in the process of economic development is again at the top of the research and policy agenda. A key question is if pro-poor growth policies have to address the informal sector specifically and in any particular way or if the informal sector evolves like the rest of the economy and that therefore good growth policies are also good informal sector policies. Therefore, it is of crucial importance to understand the linkages – in quality and magnitude – between the informal sector and the rest of the economy. We argue that linkages between the formal and informal sector can exist on a macro as well as on a micro level. Empirically, we analyze both levels for urban areas in Burkina Faso using households as an observation unit. We show that in this country macro or inter-household linkages between the formal and informal economy are rather weak and that it is the performance of the whole economy in general which matters most for the informal sector. In contrast, micro or intra-household linkages between informal and formal labour supply and earnings seem more important and their understanding seems extremely useful when thinking about pro-poor growth strategies.

Keywords: informal labour market, dual economy, poverty, pro-poor growth
JEL classification: D1, J2, O1

[1] University of Göttingen, Germany, DIAL Paris, France and DIW Berlin, Germany; [2] University of Göttingen, Germany.

This study was presented at the EGDI–WIDER Conference on Unlocking Human Potential – Linking the Informal and Formal Sectors in Helsinki, 17-18 September 2004.

UNU-WIDER gratefully acknowledges the support and collaboration of the Expert Group on Development Issues (EGDI) of the Swedish Ministry of Foreign Affairs. UNU-WIDER also acknowledges the financial contributions to its research programme by the governments of Denmark (Royal Ministry of Foreign Affairs), Finland (Ministry for Foreign Affairs), Norway (Royal Ministry of Foreign Affairs), Sweden (Swedish International Development Cooperation Agency – Sida) and the United Kingdom (Department for International Development).

ISSN 1810-2611 ISBN 92-9190-693-X (internet version)

Acknowledgements

We thank participants at the EGDI-WIDER Conference on 'Unlocking Human Potential: Linking the Informal and Formal Sectors' for useful comments and suggestions.

Tables appear at the end of the paper.

UNU World Institute for Development Economics Research (UNU-WIDER)
Katajanokanlaituri 6 B, 00160 Helsinki, Finland

Camera-ready typescript prepared by Janis Vehmaan-Kreula at UNU-WIDER

1 Introduction

The role of the informal sector in the process of economic development was quite a popular question throughout the 1970s when, among others, the International Labour Office (ILO) started to undertake studies focused specifically on this segment of the labour market (ILO 1972). Given the current focus of international development policy on pro-poor growth and poverty reduction – and given the fact, that the informal sector is generally being considered as the economy of the poor – this topic is again on the top of the research and policy agenda. A key question is if pro-poor growth policies have to address the informal sector specifically and in any particular way or if the informal sector evolves like the rest of the economy and that therefore good growth policies are also good informal sector policies.

To answer these questions two issues are of crucial importance. First, what are the linkages – in quality and magnitude – between the informal sector and the rest of the economy, i.e., the agricultural sector and the formal sector? Second, and this is linked to the first question, what is the perspective which we see in the informal sector? More precisely, do we see the informal sector as a source of growth and do we want to keep it with all its characteristics, or, do we sight its transformation to the formal sector. Whereas the first question is clearly of a positive nature the second one is to a large extent normative.

Here, we focus on the first question and limit our analysis to linkages in the urban economy and between the informal and the formal sector. In our empirical part we examine Burkina Faso between 1994 and 2003. Burkina Faso is one of the poorest countries in the world. Real GNI per capita was estimated at US$220 in 2002, on the basis of its Human Development Index, the country was ranked 164th out of 168 countries (UNDP 2003) and poverty measured by the headcount index was 47.2 per cent in rural areas and 20.3 per cent in urban areas in 2003 (Grimm and Günther 2004). Although Burkina Faso knew considerable economic growth throughout the 1990s and with a rather moderate increase of the urban population of 2 percentage points between 1994 and 2003, Burkina Faso had to support a strong increase in urban poverty which was mainly caused by a stagnation – and in some cases a decrease – in real earnings across all sectors. The question is if we can explain this development with the interrelationship that exists between informal and formal sector earnings. In the nineties Burkina Faso knew a real devaluation of the CFA Franc by 50 per cent relative to the French Franc. In addition the country implemented several structural adjustment programmes (SAP). Both shocks led 'on-impact' to a substantive decline of real formal earnings in the urban economy, which might in return have had a severe negative impact on informal sector earnings.

We think that linkages between the formal and informal sector can exist on a macro (market) as well as on a micro (household) level and that these two levels can also be interlinked. How formal and informal sector earnings are linked on the macro and micro level as well as between the two levels can be determined by both the product market as well as the factor market. In a first step, we analyze if and to what magnitude formal and informal sector earnings are linked on a macro level by looking at inter-household linkages. In a second step, we then consider intra-household linkages. In each case we focus only on urban areas and use households as an observation unit, which to our knowledge has only rarely been done in the literature. However, we argue that these inter- and intra-household linkages are of particular importance for the understanding of

formal-informal linkages and especially when addressing issues of pro-poor growth and poverty reduction.

Our paper is organized as follows. In Section 2, we briefly review the literature on linkages between the formal and informal sector in developing economies and based on this develop some research hypotheses. In Section 3, we provide a short overview of the Burkinabè context. In Section 4, we present our data sources. In Section 5, we analyze empirically the linkages between the formal and informal economy on two levels: between and within households. In Section 6, we conclude and draw some policy implications with respect to pro-poor growth.

2 Linkages between the formal and informal sector

If we want to analyse the linkages between the informal and formal sector we first need to provide a more or less clear-cut definition of the informal sector, which separates it from the formal economy. Maybe the broadest definition of the informal sector is to say that it covers all economic activities which cannot be classified under the organizational standards of the industrialized countries (Hemmer and Mannel 1989). And probably one of the most detailed definitions is the one of the ILO Kenya report from 1972 (ILO 1972), which comprises seven criteria. According to this report, the informal sector is any family owned small scale economic activity in very competitive markets, being very labour intensive, using skills acquired outside the formal school system and relying on indigenous resources. It is also characterized by ease of entry and falls under no governmental regulations, such as minimum wage or tax laws. In what follows it is however sufficient to keep in mind the first and rather broad classification. In our empirical part, we then retain a closer and relatively pragmatic definition.

The very first literature about the informal sector was primarily concerned with theories on its origin and empirical analyses of its status quo, with both theoretical as well as empirical writings looking at the informal sector as an isolated segment of the economy. But soon the importance of the nature of linkages between the informal and formal sector and a call for an integrated framework, for both an understanding of the informal sector and for effective policy recommendations, was emphasized by several authors (see e.g., Tokman 1978; Stark 1982; Hemmer and Mannel 1989; Harriss 1990; Lachaud 1990; Xaba *et al.* 2002). However, although many authors have written on the theoretical linkages which might exist, surprisingly little empirical analysis so far exists on those linkages. In this section we begin with a review of literature on the linkages between the informal and formal sector and how the understanding of the concept of interaction has changed over time. Based on this, we then develop our linkages framework.

The theoretical concept of the informal sector can be seen as an expansion of the dual economy or dichotomy literature originating in Lewis (1954) and Todaro (1969), with the informal sector traditionally being considered as the 'residual sector' of a segmented urban market (e.g., Fields 1974 or Mazumdar 1976). The reasons given for this dualism or segmentation of urban labour markets, with apparently homogenous workers being paid different wages depending on the sector of the economy in which they are employed, basically fall into two explanatory categories, institutional and market (e.g., Stiglitz 1974) explanations, of which the former dominates most writings and discussions (Charmes 1990). As a result, for a long time empirical research on the

informal sector, with the ILO Kenya mission report of 1972 (ILO 1972) probably being the first prominent one, has focused on static comparisons of earnings differentials (Maloney 1997), which tended to support the theory of segmented labour markets.

The only relationship between the formal and informal sector which is generally described in this very early literature is a top-down (formal to informal) relationship within the labour market. The usual assumption being made is that formal sector size and wages are exogenously fixed and that a function of both determine the extent of rural-urban migration. Informal sector size is then defined as the labour surplus, which cannot be absorbed by the urban formal economy (Fields 1974). Hence the size of the informal sector expands with the size (and wages) of the formal sector. But given that informal sector income is shared among an 'ever-growing' informal sector labour force competing in the same market, this leads to ever-diminishing informal sector earnings (Mazumdar 1976). Besides this relationship, sector dichotomy is assumed, with the informal sector being a more or less autonomous segment, with little linkages to the rest of the economy.

Evidently, this also means that most of the time, these early writings assume strict dualism in the product market (Livingstone 1971; Harriss 1990), where the formal and informal sector produce and offer similar goods but at different price levels, serving different markets; segmented by different income categories. With the demand for informal products mainly coming from the informal sector, one of the reasons given for the low potential of the informal sector is then its poor 'informal' customer base (Harriss 1990).

However, today there seems to be broad consensus, that the informal and formal product markets are densely interlinked on various levels. A useful framework for analysis seems to be the distinction between complementary, competitive and indifferent markets (Van Dijk 1980) on the one hand and between final product and intermediate product markets (see e.g., Harriss 1990) or forward and backward linkages (see e.g., Xaba *et al.* 2002) on the other hand. A good example for complementary markets is commercial sub-contracting, where the informal sector is selling products of the formal sector. Competitive markets occur in the case where the two sectors compete within the same product market and their respective market share being determined by sector product prices (see e.g., Hemmer and Mannel 1989) and/or real sector wages (see e.g., Cogneau *et al.* 1996). Last, markets might neither be complementary nor competitive (Sethuraman 1997), with the two sectors co-existing in different product markets (but with an overlapping formal-informal customer base). The intermediate input market, generally, constitutes any backward linkages whereas the final product market in most cases comprises any forward linkages between the two sectors.

For the case of sub-Saharan Africa there seem to be strong inter-linkages in the final product market, with both sectors being a strong supply as well as demand base of the other sector (see e.g., Xaban *et al.* 2002; Charmes 1996), with rising wages leading to lower propensity to consume informal sector goods (Lachaud 1990). However, whereas forward linkages (i.e. markets beyond the borders of the respective sectors) are strong for both sectors, backward linkages (i.e. inputs from beyond the respective sectors) only seem to be significant from the informal to the formal sector but are of little importance from the formal to the informal sector (Harriss 1990). Hence an asymmetry of relationship between the two sectors seems to exist on the intermediate African product market (Hugon 1990), where the informal sector buys many of its input from the formal

sector, but where a close interconnection between small informal production units and formal enterprises is almost not existent. Or put differently, linkages on the African product market seem to be very strong between formal and informal households on the final product market but rather weak and unequal between formal and informal enterprises on the intermediate product market.

With this new understanding of the linkages on the product market also a new light is shed on the relationship between formal and informal sector labour markets. The traditional view suggests that informal sector employment, absorbing rural-urban migration surplus and off-setting economic shocks, would show a counter-cyclical pattern, i.e. expanding in size in economic downturns and contracting in economic up-swings, with average informal earnings being a function of informal sector size with a negative elasticity coefficient (Charmes 1990). Also, earlier writings, which at least partly explain the existence of the informal sector as a result of institutions setting formal wages above market clearing prices, would support the argument that higher formal wages, everything else kept constant, generally leads to a larger informal sector, with lower informal wages. However, taking both the complementary as well as competitive forward and backward product linkages into account, the described phenomena need not necessarily be true, with the direction of the economic impact of formal sector size and earnings on the informal sector remaining uncertain. In fact, Maloney (2004) shows, that informal sector size, depending on the country studied, might react both pro- as well as anti-cyclical, with average informal earnings diminishing or growing independent of the evolution of informal sector size (see also Livingstone 1971).

In addition, recent empirical evidence of urban labour markets in developing countries has also contradicted the traditional concepts of the informal sector and hence also its relationship to the formal sector. The most important criticism of earlier studies is that the heterogeneity of the informal sector is not appropriately taken into account. Earnings of informal sector workers are lower on average than earnings in the formal sector, but not uniformly so and considerable overlap of the two distributions exist. Charmes (1990) therefore distinguishes between the low wage or 'lower-tiers' and high wage or 'upper-tiers' informal sector. This distinction is partly correlated with the 'involuntary entry' and 'voluntary entry' informal sector concept of Maloney (2004) and partly with the primary and secondary (to a main job in the formal sector or in relation to the structure of household income) informal activity concept mentioned by Lachaud (1990). This heterogeneity does not only explain the higher variation of informal sector earnings but might also mean that the various informal sector sub-groups are linked to the formal sector quite differently (see Blunch *et al.* 2001 and Charmes 1996), with the aggregated direction and magnitude of the relationship unknown.

Second, until today most of the empirical work about the nature of the informal sector as well as about its inter-linkages with the formal sector used enterprises or individuals as the unit of observation. However as Lachaud (1990) states, in the context of sub-Saharan Africa, where most social systems are organized around households, households would be a much more useful unit of observation to understand the functioning of urban labour markets. Many households in LDCs are engaged in both the formal and informal sector (Blunch *et al.* 2001) and the sector of employment of the household head might have a high influence on the labour supply and sector choice of other household members (see Lachaud 1990 and Pradhan and Soest 1997). However,

even more important than household decisions concerning collective labour supply is the household as an observation unit for standards of living. Charmes (1990), for instance, emphasizes the importance of intra-household transfers. For the case of West-Africa, Azam (2004) finds some evidence for high investments of formal sector employees into informal enterprises. He also claims that on average 40 people are supported by one formal sector income. Hence, given that labour supply decisions and the generation of income by individuals happen within their respective households and simultaneously with the decisions of other household members, the notion of 'dichotomy' between the formal and informal sector loses some of its significance and the value of an assessment of the relationship between the informal and formal sector based on an analysis of individuals or enterprise surveys becomes questionable (Lachaud 1990).

Our hypotheses is, that urban informal and formal sector earnings are linked on a macro (market) level as well as on a micro (household) level and that these levels are also interlinked. The observed linkage coefficient (which might be positive or negative in total) might be determined by the (final and input) product and (labour and capital) factor market. However, in this study we only focus on analysing if and to what magnitude informal and formal labour earnings and supply are linked on a macro as well as on a micro level. We then give an interpretation what the drivers behind these linkages might be, but leave a more detailed empirical analysis of those drivers for a second study. Given our primary interest in poverty reduction and pro-poor growth (and not only individual earnings growth) we argue that households and not enterprises or individuals should be used as an observation unit for both the macro- as well as the micro level and hence analyse inter- as well as intra-household linkages.

3 The economic context in Burkina Faso

3.1 Macroeconomic growth and urban poverty

Macroeconomic data suggests that over the last decade Burkina Faso knew relatively strong growth and a good macroeconomic performance. Real GDP per capita began to rise after the devaluation of the CFA Franc in January 1994 and averaged 2 per cent per year between 1994 and 2003 (IAP 2004).[1] Since 1991, in the framework of stabilization and structural adjustment programmes (SAP), the country has implemented a wide range of economic reforms, including a price and trade liberalization. The country then established its first Poverty Reduction Strategy Paper (PRSP) in May 2000 (Ministère de l'Economie et des Finances 2000), reaching its completion point in the HIPC II Initiative in April 2002. As a mainly agricultural and cotton exporting country, Burkina Faso's economic performance depends heavily on climatic conditions and the world market price for cotton. During the last ten years those parameters were, except for some years, rather favourable and in connection with the devaluation growth mainly arose from agriculture and especially cotton exports.

---

[1] IAP stands for 'Instrument Automatisé de Prévision'. It is a macroeconomic consistency framework based on National Accounts data developed by the Burkinabè Ministry of Economy and Development with technical assistance of the German 'Gesellschaft für Technische Zusammenarbeit' (GTZ). For details see Ministère de l'Economie et des Finances (1997).

However, whereas one can observe considerable economic growth rates for rural areas, the urban population has not sufficiently participated in the Burkinabè growth process; at least not the years following the devaluation. In contrast, it seems that the urban population had to take a large part of the burden connected to the devaluation and structural adjustment via stagnating and in some cases declining real earnings. According to our estimates, the urban poverty headcount index increased substantively between 1994 and 1998 from 14.7 per cent to 27.3 per cent[2] before declining to 20.3 per cent in 2003. The increasing urban poverty is certainly of concern, since, as in most West-African countries, the urban economy has become more and more important: population census data indicates that the urbanization rate increased between 1978 and 1985 from 6.4 per cent to 12.7 per cent and then between 1985 and 1996 to 15.5 per cent (INSD 2000). The phenomenon of an 'urbanization of poverty' is however not specific to the Burkinabè case. There is important empirical evidence for other African countries as well; especially for those which also had to support the devaluation of the CFA Franc in 1994 (see e.g., Haddad *et al.* 1999; Grimm *et al.* 2002; Azam 2004).

Given the objective of this study, it is now worthwhile to look in more detail at the effects of the devaluation and the structural adjustment process on the urban labour market.

3.2 Macroeconomic shocks, policy reform and the urban labour market

The devaluation in 1994 increased the level of foreign prices measured in CFA Francs and thus the prices of tradable goods relative to non-tradable goods. The resulting effect on aggregate growth was without doubt significantly positive. In particular, exports of cotton increased after the devaluation given the gain in competitiveness. However, the impact of the devaluation on other export products was rather small, even if some exporting formal enterprises benefited from better terms of trade while keeping nominal wages more or less constant. In urban areas the devaluation led, at least in the short and medium term, to a decrease of real earnings since prices of imported goods increased and wages (public and private formal) were not indexed to inflation. This had positive and negative repercussions on the informal economy. On the one hand households of the formal sector substituted to a certain extent imported goods with informal goods, but on the other hand, had to reduce their total demand for informal goods given their lower real wages. A massive destruction of urban formal employment following the SAP cannot be observed (see Table 1), among other things, because privatizations were counterbalanced by large public investment programmes and recruitment of public employees in social sectors (Konaté and Raffinot 1998).

For urban Burkina Faso we find empirical evidence (see Tables 1 and 2) that stagnating and in some cases decreasing real earnings in all sectors, but especially in the formal private sector, pushed formerly inactive household members into the labour market, trying to maintain initial household income levels.[3] Accordingly, the average

---

2 This massive increase in poverty in 1998 was also partly driven by the severe drought which Burkina Faso had to support in 1997/1998.

3 Table 2 shows that one finds a quite different evolution whether we consider the evolution of average earnings or median earnings. Part of this difference is linked to measurement error especially in the upper

dependency ratio within households decreased. Higher labour market participation has most likely further lowered (and particular informal) wages and also resulted in a rise of unemployment. Increased labour supply was however not sufficient to maintain urban household incomes per capita at their level of 1994. In consequence for all socio-economic groups poverty increased. However, urban poverty still mainly concerns the informal sector (see Table 2), which accounts for more than 30 per cent of total GDP and employs around 70 per cent of the total urban work force (Grimm and Günther 2004). During the same time working conditions worsened for many employees, e.g., a much higher proportion of the labour force is now confronted with short term working agreements (see Table 1).

All these changes suggest that there are substantial interactions between the formal and informal economy, especially on the labour market. These interactions will be analyzed and discussed in Section 5 after having presented our data sources.

4 Data sources

We use three household surveys, all undertaken by the Institut National de la Statistique et de la Démographie (INSD) with financial and technical assistance of the World Bank within the last 10 years, namely in 1994 (EPI) 1998 (EPII) and 2003 (EPIII). The respective sample sizes are 8642 (of whom 2718 urban households), 8478 (2593) and 8500 (2600) households. These surveys contain socio-economic information about households and their members, data on employment, wages, agricultural and non-agricultural activity and profits, housing, expenditures, and about some assets possessed by the households. Some problems arise because the three surveys have not been undertaken during the same season reducing the comparability of expenditure data, especially for agricultural households, but less so for urban households. Furthermore, the questionnaires have slightly been modified from one survey to the other by reducing the recall period from 30 days to 15 days for food items and by applying a higher disaggregation for some expenditure categories. According to empirical evidence of other countries, the first bias will most likely result in lower expenditures in 1998 and 2003, compared to 1994. The shorter recall period in 1998 and 2003 will however result in rather higher declared expenditures in 1998 and 2003 compared to 1994, thus generating a bias in the opposite direction. Finally the higher disaggregation will most likely also lead to higher reported expenditure in 1998 and 2003 with respect to 1994. These problems are in detail analysed and discussed in Grimm and Günther (2004). However, given that our concern is not to provide a poverty assessment over the whole period, but instead to examine linkages between the formal and informal economy, these problems are of less importance for this study.

More important is the fact, that wages and profits have not been declared by all occupied individuals and that they are most likely affected by higher measurement error than household expenditures. Furthermore, whereas the used recall period for household income was 12 months in 1994 and 1998, it was only 30 days in 2003. Therefore we have to be careful when relying with our interpretations on these data sources. The used expenditure aggregate excludes expenditures for durables, but includes self-

---

tail of the earnings distribution in 1994, but it seems also likely that especially some of the employees in the higher earnings segment had to support substantive cuts in their real wages.

consumption, made transfers and imputed rents for those who own their housing. To compare expenditures and earnings over several years, they are deflated by regional and temporal price changes, for details see again Grimm and Günther (2004).

In order to identify workers in the informal sector we proceeded in three steps. First, we limit the potentially active population to individuals older than 14 years. This seems a quite reasonable and practical assumption for urban areas. Children below that age working from time to time or even regularly present a very heterogeneous group. The inclusion of children in our study would mix our research focus with issues regarding child work. Second, we determine occupation status – occupied, unemployed (self-declared), student and inactive – by using the corresponding questions in the surveys. Third, we determine for the occupied individuals the type of activity they carry out. We distinguish: wage earners in the public sector, wage earners in the private formal sector, informal workers, individuals working as family help and other non-remunerated workers and trainees. The last two groups can, to a large extent, be seen as a sub-group of the informal sector. Whether somebody works in the public sector or as a family helper, trainee or non-remunerated worker is directly observed in all three surveys. To separate wage earners in the private formal sector from informal workers we proceeded as follows. In 1994 and 1998, we classify declared 'wage earners in the private sector' as 'wage earners in the private formal sector' and declared 'independent workers' and 'employers' as 'informal workers'. Of course the risk is here to classify informal dependent workers as formal workers and, vice versa, formal employers as informal workers. We checked our classification using information on social security, labour contracts and the existence of firms and non-farm profits in the concerned households. It turns out that our procedure works quite well and that there should be only a few miss-classifications. For 2003 we know if the employer of an occupied person is a private enterprise or a single individual or household. In addition we know if this individual is a white collar, skilled blue collar or unskilled blue collar worker or an independent worker. To achieve consistency with 1994 and 1998 we define 'independent working individuals' in 'private firms' or 'households' as 'informal workers'. The residual is defined as 'wage earners in the formal sector'.

In some of our analyses we work with individual earnings in other cases we work with household income. To limit the effect of measurement error in household incomes and to achieve consistency with household expenditures, we use the structure of income by source (agricultural, public, formal, informal, transfers and other) and compute the nominal household income components by source by multiplying these shares with total household expenditures (excluding auto-consumption). This procedure will provide satisfying results, if the measurement error over the different income sources is proportional to the corresponding income level, i.e. if the income level is biased, but not the income structure. Of course we have to assume that savings are quite unimportant for most of the population, which is however a reasonable assumption in the Burkinabè context.

Unfortunately our data is not panel data, so if we want to analyze inter-temporal developments the lowest disaggregation level is constituted by regions (10 in total).[4] The provinces level cannot be used for inter-temporal comparisons, because the divide

4 In 2003 the number of regions was increased to 13 regions, but it is possible to recover the former divide into 10 regions, therefore we work in the dynamic analysis with 10 regions.

of the country into provinces changed between 1994 and 1998. In 2003 the province of households' residence was not even collected in the survey.

5 Linkages between the informal and formal sector in Burkina Faso

5.1 Inter-household linkages between informal and formal earnings

Research hypotheses and methodology

Initially we try to analyze if and to what extent informal and the formal sector earnings are linked on a macro level. If any of these linkages exist between the informal and the formal sector, then we should observe some impact from formal earnings on informal earnings. In contrast, if the informal sector is an autonomous sector not linked to the rest of the economy, formal earnings should play no role for informal earnings. Hence, ideally one would try to test if the growth of formal earnings is linked in any systematic and causal way to informal earnings. One should think that such causal relationships will be specific to some local markets especially in a country like Burkina Faso, which has a relatively high spatial segmentation of its economy with relatively low spill over effects across regions (see Grimm and Günther 2004). Put differently, such linkages should be examined on the basis of some spatially defined clusters: villages, provinces or regions.

Of course, when we make this assumption, the problem arises how we can disentangle the effect of formal earnings from the effects of local characteristics. More precisely, in case we find a positive spatial correlation between formal and informal earnings, we should test between three competing hypotheses:[5]

Formal and informal earnings are correlated because there exist forward and backward linkages between formal and informal earnings via demand for final goods (forward linkage) and intermediate inputs (backward linkage), and via intra-household linkages, with the formal sector household members investing in the informal sector and increasing by this the marginal productivity of the informal sector and with households' collective decision determining informal labour supply. Important to note, that such a linkage between the formal and informal sector could be completely simultaneous or involve some time lag.

Formal and informal earnings are correlated because both depend on similar observed and unobserved household and individual characteristics and people with similar characteristics concentrate spatially (free household mobility assumed). In other words good craftsman, good traders and otherwise talented people cluster in the same region causing relatively high earnings in all segments of the (local) economy, whereas in other regions people with rather unfavourable characteristics live together and cause thus lower earnings. Under these circumstances formal and informal earnings can be correlated, but there is no direct causal link between them, both depend on third variables, i.e. the local socio-economic population structure.

---

5 The theoretical framework has some similarities with that used in the literature on poverty traps. See for instance De Vreyer *et al.* (2003) or Jalan and Ravallion (2002).

Formal and informal earnings are correlated because both depend first of all on geographic endowments like ecological conditions, or the supply of local public goods and infrastructure determining the marginal productivity of private inputs and therefore formal and informal earnings. In this case two otherwise identical informal workers do not experience the same growth in their living standards, if they live in areas with different endowments of geographic capital. Likewise, under these circumstances formal and informal earnings can be correlated, but there is no direct causal link between them, again both depend on third variables.

Empirically, it is not easy to distinguish between these three competing hypotheses. Given the data we have for Burkina Faso, we cannot go very far: simply regress household specific informal earnings, $\Pi_{IF,h}$, on observed individual and household characteristics, X_h, including the number of persons involved in the informal activity, L_h and the 'local' level of formal earnings, $\Pi_{F,P}$. As 'local' we define here the average within provinces. For 1994, we have 16 provinces containing urban areas which sample between 20 and 1,494 households. For 1998 we have 19 provinces comprising urban areas which sample between 20 and 1,253 households. Unfortunately for 2003, the province of residence cannot be identified; therefore we have to take region specific variables, which are one level above the province level, i.e. 45 provinces make up 13 regions. The equation to estimate writes in logarithmic form as follows:

$$\log \Pi_{IF,h} = \alpha \log L_h + \beta X_h + \gamma \log \Pi_{F,P} + u_h \qquad (1)$$

This regression involves of course the problem that the OLS estimates of the coefficient γ of formal earnings can be biased due to the two issues discussed above: (i) unobserved heterogeneity in individual and province specific household characteristics correlated with formal earnings and (ii) unobserved local endowments correlated with formal earnings. To solve this problem, we would need panel data, which would allow an estimation in differences cancelling out the effect of local population patterns and geographic endowments, supposing that they are less or more constant over a ten year period.

Given the absence of panel data for Burkina Faso, the best we can do is to control for province specific characteristics, as far as it is possible, and to compare the coefficient γ with the coefficient we obtain if we put in the equation instead of the province average level of formal earnings the province average level of non-labour income or total income less informal earnings.[6]

Given that the sample of households involved in the informal sector cannot be assumed representative for the whole sample of households, we control for this potential selection bias using a selection model in the spirit of Heckman (1979), but estimated via the maximization of the full likelihood. As dependent variable we use the log of household informal earnings per capita. The per capita basis is here preferable to the per household basis given that almost all household members might to some extent be involved in the business and that in terms of impact of informal earnings on individual well-being it is the household per capita basis, which interests us the most. The log of

6 Alternatively, we could try to find an instrument for formal earnings, i.e. a variable explaining formal earnings, but being uncorrelated with geographical variables and with province specific household characteristics. However, given our data, such an instrument seems out of reach.

the declared number of employed persons, for which we also control, is more a measure of constantly and with a substantive amount of time involved persons. Furthermore, we include in the estimation equation sex, age and education of the household head and dummy variables indicating if there is a person in the household working in the public or private formal sector.

Results

Table 3 presents the estimation results. The control variables have all the expected signs and are relatively stable over time. An increase of the labour force employed in the business by 100 per cent increases the per capita earnings by 45 per cent to 60 per cent. Households headed by a man have on average higher earnings. Age of the household head is not significant, but age effects are partly captured by the household size variable and education variables. The log of household size has a negative sign as expected. Whereas some primary education or completed primary education has no significant effect on earnings, lower and higher secondary education as well as some technical education have a significant and positive impact. Knowledge of the French language enters also positively in the estimation equation. Over time, returns to education first decrease and then increase. This might among other things reflect that the stabilization of the urban economy after 1998 offered more possibilities for workers to use their human capital as production factor, i.e. via better investment opportunities. The dummy variables indicating if there is a person in the household working in the public or private formal sector are both negative, showing, that households drawing income from the formal economy are less involved in the informal economy and therefore have lower per capita informal earnings.

The effect of the log of the province specific average of formal earnings (per capita) has a significant and positive effect on informal earnings. However, the 'linkage coefficient' is smaller than one and if we put the average of non-labour income or of total household income less informal earnings in the estimation equation we also find a positive impact and an even higher regression coefficient. More precisely, whereas a one per cent increase in formal earnings increases informal earnings by 0.16 per cent to 0.20 per cent, a one per cent increase in non-labour income increases informal earnings by 0.48 per cent to 0.79 per cent. The effect of total household income less informal earnings lies in-between. If we put formal income and non-labour income together in the estimation equation, we find that the return to the province average of non-labour income is higher in 1994 and 1998. In 2003 the coefficient of non-labour income is slightly lower and not significant. However, both income sources are of course correlated. The correlation coefficient amounts to 0.77 in 1994, 0.33 in 1998 and 0.46 in 2003. If we control in addition for the province specific share of workers involved in the formal sector, we find no uniform result across years. In 1994 this share has a huge positive impact on informal earnings, in 1998 the effect of this variable is not significant and in 2003 both variables, formal earnings and the share of formal workers, are not significant when they enter together in the equation. Likewise, it is not very conclusive if we put the province specific share of informal workers in the equation. For 1994 and 1998 its effect is strongly positive and outweighs the effect of formal earnings, but for 2003 this variable is not significant. All this might suggest, that the inter-household linkages between informal and formal earnings even if present are rather low, and it seems that it is the province specific income level in general which matters most.

Finally, it should again be emphasized that we have to be cautious with the interpretation of these estimations, given that we cannot appropriately control for the effects of unobserved province specific household characteristics and geographic endowments. We tried to create some variables reflecting features of the provinces as for instance the province specific age, education and employment structure and the share of households connected to electricity or modern water facilities, but the consideration of these variables in the estimation equation did not yield any reliable results.

To examine however some temporal variations in income sources, we compare now region-specific growth rates of different earning categories and compute correlation coefficients between them. As mentioned the region is the lowest spatial level, for which we have a consistent divide in 1994, 1998 and 2003. Given that we have only three points in time and ten regions we cannot perform any type of panel or pseudo-panel regression analysis, so we offer here a purely descriptive analysis.

Table 4 shows growth rates of income by region and different income sources (in parentheses the shares in total income of each income source). One can note that during the period 1994 to 1998 in seven out of ten regions growth of informal earnings had the same sign than growth of formal earnings. If we look at the link with other income sources, we state that this is only the case for four regions. This is also confirmed by the regression coefficient which is obtained if we regress the growth rate of informal earnings on the growth rates of the different income categories. It is 0.04 for formal earnings and -0.07 for other income sources. The correlation coefficient between the different sources of earnings also seems to indicate that the link between informal and formal earnings is the strongest of all. However, we obtain an even higher correlation if we compare growth of informal earnings with growth of total income. So again, it could also be income in general which matters most, i.e. the sum of informal and formal earnings. In almost all regions more than 70 per cent of total income comes from informal and formal activity. Furthermore, we can state that in most cases of positive growth of formal earnings, the growth rate of informal earnings was lower, but, that in contrast, in most cases of negative growth of formal earnings, the contraction of informal earnings was higher. This suggests that during economic downturns the informal sector suffers more than the formal sector and that during booms the informal sector benefits less than the formal sector. Finally, we see that the period's initial level of informal earnings, formal earnings and total income is negatively related to the growth rate of informal earnings.

If we look at the period 1998 to 2003, the correlation between informal and formal earnings is less clear. The sign of informal and formal growth rates is only in five of the ten regions identical. The correlation coefficients between growth of informal earnings and growth of formal earnings on the one hand, and growth of informal earnings and growth of other income sources, on the other hand, have almost the same magnitude. As mentioned earlier the period between 1994 and 1998 was a period of increasing urban poverty, whereas between 1998 and 2003 urban poverty declined, this might be a reason for the changed correlation. But this would mean that there are some effects coming from the overall rate of economic growth modifying regional linkages between informal and formal earnings.

If we examine the whole period 1994 to 2003, we have again only for five regions identical signs of the growth rates of informal and formal earnings. But the regression

coefficient and correlation coefficient between both are significantly higher than for other income sources. However, the negative correlation between the initial level of the different earnings categories and the growth rate of informal earnings disappeared.

To conclude on these correlations: It seems that there is a stronger link between informal earnings and formal earnings than between informal earnings and other income sources. However this link seems not particularly strong and is not uniform across regions and time. A higher level of income seems not necessarily to favour a higher growth rate of informal income. It is also worth to emphasize that this link seems not to depend on cotton production, i.e. in the major cotton producing regions informal earnings did not systematically grow more than in other regions. More cannot be drawn from this exercise. Especially it is hard to say anything on causalities, given that we cannot appropriately control for the influence of regional characteristics – as public expenditures or a favourable evolution of the socio-demographic population structure – on the growth rates of the different income sources.

5.2 Intra-household linkages between informal and formal labour and earnings

Research hypotheses and methodology

In this section we analyze if and to what magnitude intra-household linkages between the informal and formal sector exist. Taking into account the socio-economic importance of household units in the sub-Saharan African context, we consider households as the centre of labour supply decisions and earnings. Our hypotheses is, that household position as well as other household's members' activity and earnings have a high impact on individuals' labour participation and earnings in the informal sector. For simplicity we only distinguish between first household position (referred to as household head here on), which we determine by taking the individual with the highest earnings within a household. The 'second household position' (or second order income) is given to all other household members older than 14 years. Concerning sector employment we only distinguish between formal (which includes the private formal as well as the public sector), informal (which includes both self-employment as well as family help and other non-remunerated work) and non-occupied (which includes unemployed as well as inactive persons). This analysis comprises two parts.

First, we undertake an examination to what extent labour supply and sector choice are determined by the individual's position within the household as well as by the household head's sector of occupation and earnings. Our hypothesis is that informal income in many households constitutes a secondary household income and hence the percentage of informal labour participation is much lower if one only considers individuals with a first household position and much higher if one only considers members with a secondary household position. Also, we assume that secondary household members will increase their labour market participation with decreasing earnings of the household head to retain the overall household income level (buffer function of the informal sector via intra-household linkages). In addition we test for correlation between sector of employment of the household head and the sector choice of secondary household members. Again, the assumption is, that we will find a positive correlation, which should even increase if we do not control for education, assuming that household heads employed in the formal sector can afford higher investments in education for other household members, which in return will increase their probability

to find a job in the formal sector. To analyze this issue, we estimate the following multinomial logit model:

$$\text{Prob}\,(L_i = j) = [\exp(\lambda_{jX} X_{ihj} + \lambda_{jS} S_{iHeadj} + \lambda_{jW} \log W_{iHeadj})] /$$

$$[\sum_{j=1} \exp(\lambda_{jX} X_{ihj} + \lambda_{jS} S_{iHeadj} + \lambda_{jW} \log W_{iHeadj})] \qquad (2)$$

giving the probability that individual i takes the occupational choice $L_i = j$, where X_{ih} is a vector of individual and household characteristics, as age, education and sex. S_{head} is a vector of dummy variables indicating the sector of employment of the household head and log W_{Head} is the log of monthly earnings of the household head. To test the robustness of this chosen functional form, we also estimate a simple probit model by regressing a binary variable taking the value one if the individual is in the informal sector and zero if the individual is in the formal sector. The option 'being not-occupied' is included by estimating this function simultaneously with a selection equation, where the selection variable indicates the value one if the individual is occupied and zero otherwise. The selection model can then be used to analyze the determinants of labour market participation.

Second, we analyze the impact of household position, the household head's sector of employment and the household head's earnings on other household members' earnings. Evidently, since we put household members with the highest earnings on first position, individuals with a secondary household position will have lower earnings. However, here we try to give an estimate to what magnitude informal earnings can differ (controlled for socio-economic characteristics) if undertaken as a main activity (first household position) or to supplement the main household income (second household position). If we can observe substantial differences, this would support the argument that we should indeed be more cautious when analyzing the informal sector as one homogeneous group, since household informal income might then not only differ in terms of level but also how it is linked to the formal sector on a macro level. Further, we test the impact of the household head's sector of employment and earnings on secondary member's earnings. If intra-household investments indeed take place, secondary household member's informal earnings should be higher (controlled for education and experience) if the household head is occupied in the formal sector and hence has a higher wage he can invest into the informal business of other household members.[7]

$$\log W_{ih,} = \beta X_{ih} + \psi C_{ih} + \alpha S_{ihead} + \gamma log\, W_{iHead} + u_{ih} \qquad (3)$$

where $\log W_{ih}$ is the log of individual earnings of person i belonging to household h, X_{ih} are individual and household characteristics as before but also indicator variables for the branch of activity (primary, secondary, tertiary, administration) and the sector of employment. C_{ih} is a dummy variable taking the value one if individual i is not the earner of the main income in household h. In a last step we examine if the impact of the household head's earnings increase if we do not control for education, since higher informal earnings might also take place through higher investments into the education of secondary household members.

---

7 Most of informal sector activity in Burkina Faso is independent and self-employed and not informal wage earnings. Hence we can assume that intra-household investments can easily take place.

When estimating the equations, we also control for selection into the group of occupied persons using the usual Heckman selection model, but estimate it by maximization of the full likelihood. Of course, and as already mentioned in section 5.1, we cannot control for unobserved household characteristics which might influence all household member's occupational choices as well as earnings and hence lead to a correlation of earnings and labour market participation of household members. Unfortunately, we also do not have any variables concerning hours worked. However, we could somewhat control for infrastructure differences by including the residence of households as an independent variable. Since we do not have any panel data, we have to rely on cross sectional regressions for 1994, 1998 and 2003. However we can use those different coefficients to analyze if intra-household linkages have changed over time and to conclude about their robustness.

Last, as a complementary analysis, we examine how the formal and informal sector is linked in terms of individual well-being. Linkages between the formal and informal sector can be observed in terms of earnings or in terms of per capita expenditure, i.e. well-being. The former are important to understand labour markets, but only give a partial insight into individual well-being. A useful mean to complement an analysis of linkages between the formal and informal sector for a well-being or poverty assessment, seems then to be an examination how the per capita expenditure (and not earnings) of people involved in the informal sector is linked to the formal sector. If we make the hypothesis that earnings of individuals within a household are also used by other household members (for poverty analysis normally a uniform intra-household expenditure distribution is assumed), an analysis of the impact of the household's employment structure on per capita household expenditure, E_h, should give useful insights. Hence, we estimate the following equation:

$$\log E_h, = \beta X_h + \alpha S_{head} + \gamma \log W_{Head} + u_h \qquad (4)$$

where X_h is a vector of household characteristics, as the pattern of labour supply (in terms of sectors of employment across household members), the sex and age composition of the household and also the fact if the household received some monetary transfers. S_{head} is a vector of dummy variables indicating the sector of employment of the household head and $\log W_{Head}$ is the log of monthly earnings of the household head. Furthermore, a comparison of individuals' sector of *employment* with individuals' sector *dependence* (in terms of how many people are connected to formal or informal sector income via other household members) should be an interesting issue to analyze.

Results

Tables 5-8 show the estimation results of intra-household linkages between the informal and formal sector. All control variables have the expected sign and are most of the time relatively stable over time. Age has a positive impact on overall labour market participation but a negative impact on informal labour market participation, i.e. with increasing age a person is more likely to be occupied and more likely to be found in the formal sector. The same is true for education, with higher education leading to both higher labour market participation and higher chance of finding a job in the formal sector. However in 2003 we find more people with higher education in the informal sector than in 1994 and 1998. Concerning wage rates, secondary as well as technical education has a significant and positive impact on wage levels in both the formal as well as in the informal sector. However, and as already mentioned in section 5.1, primary

education has no significant impact on wage rates. Again, overall returns to education seem to have decreased between 1994 and 1998 and then increased again between 1998 and 2003. However if one only observes the informal sector employment, it seems, that returns to education have decreased over the whole period 1994-2003.

In Table 5 and Table 6 we tried to analyze the role of intra-household linkages in determining formal and informal labour supply. We used both the multinomial logit model as well as the Heckman selection model, which both led to the same conclusions. Since we set those household members with the highest income on first position, we would expect that we find formal wage earners less likely than informal sector earners and informal sector earners less likely than inactive persons on secondary household positions (see Table 6 (1)).[8] However, we do not find uniformly formal sector employment – if existent within a household and controlled for socio-economic characteristics of individuals – as the main labour income. The coefficients changed significantly between 1994 and 2003. For instance comparing the coefficients of a secondary household member being formal or informal, then within the last 10 years it has become more likely that we find a formal wage earner on secondary position, indicating that informal earnings – controlled for socio-economic characteristics – have caught up in relation to formal wages (which would also be supported by the descriptive statistics in Table 2).

Next, we assessed, what impact the household head's occupation and earnings have on labour market participation of other household members. Both the Heckman selection model as well as the multinomial logit model suggest that formal earnings of the household head as well as general higher earnings of the household head lead to a lower labour participation rate of other household members but to a higher probability to be found in the formal labour market, i.e. to a lower informal labour market participation (Table 5 and Table 6 (2)).[9] The estimated coefficients are highly significant over all three years and approximately equal in magnitude.

Last, we assessed the impact of household position (Table 7) and the household head's sector of occupation and earnings (Table 8) on formal and informal wage earnings. Again, it is evident, that secondary household position has a negative impact on labour earnings, since we set first and second household members endogenously by their respective monthly wage rate. However we can observe that this coefficient is much higher if we only consider informal earnings (Table 7 (2)). Hence the earnings differential between informal first income and informal secondary income – controlled for socio-economic characteristics of individuals – is much higher than the wage differential between formal first and formal secondary income, supporting the hypothesis of 'upper-tiers' or 'first income' and 'lower-tiers' or 'second-income' informal earnings. Second, this informal 'dichotomy' coefficient has decreased over time. However we cannot say if this is due to the fact that main informal incomes have

---

8 An additional interesting descriptive statistics might be the following: Of all informal sector earners only around 25-30 per cent provide the 'first order' income within their households, whereas among public and private formal wage earners 70-80 per cent and 55-70 per cent respectively provide the main or 'first order' household income source for their households.

9 Those coefficients increase if one does not control for education (not shown here), suggesting that formal (higher) earnings also have a positive impact on formal labour market participation of other household members via increased investment into education.

decreased (with formal wages) or because 'side' informal incomes have increased. Examining those two 'sub-sectors' of the informal sector in more detail could form interesting further research.

Concerning the impact of the household head's sector choice and earnings and labour earnings of other household members, we observe a strong positive impact of the household head's wage level on other household member wages levels (Table 8 (1)), which is slightly larger if we only examine the impact of the main wage on second order informal wages (Table 8 (2)). This could indicate that 'intra-household investments' of household members employed in the formal sector into informal sector enterprises do indeed take place. However, besides the generally higher wage level of formal wage earners, the additional fact that the household head generates this higher wage from the formal sector has no impact (Table 8 (1)) or even a negative impact (Table 8 (2)) on the wage level of other household members. This does not necessarily question the existence of positive intra-household linkages between formal and informal sector earnings. It only implicates that if such positive linkages do exist, they are only established via the generally higher formal income. This means, that a high first order income, which is earned in the informal sector has the same positive impact on other household members' earnings.

As a complementary analysis we then assessed the linkages between the formal and informal sector in terms of individual well-being. Table 9 shows the dependency ratio of urban household members on sector specific labour earnings. Approximately 40 per cent of the total urban population lives in households, where the main income comes from the formal sector (public or private formal). Comparing this number with those in Table 1, which shows that only 25 per cent of the active urban population is employed in the formal sector, suggests that formal sector earnings might play a much more important role for urban household incomes, or well-being, than sector employment rates would indicate. In addition, the 25 per cent of urban households, which receive labour income from both the formal as well as informal sector (Table 9), indicates that linkages between the formal and informal sector in terms of individual well-being (or expenditure) play a very important role and we can make the assumption that at least within those households informal labour employees might benefit from higher formal wages irrespective of the fact if their personal informal earnings increase or not.

In Table 10 we then regressed the log of per capita household expenditure on various variables for the labour structure of households. Of course these regressions should be seen as a purely descriptive analysis revealing some interesting correlations, but not as evidence for any causality, given the problem of endogeneity and omitted variable bias. Throughout all years per capita household expenditure is positively correlated with the percentage of active household members, with the percentage of those being employed in the formal sector relative to household members employed in the informal sector (however with diminishing returns over the years) and with the level of earnings of the main income source. More precisely, if the households head's earnings increase by 1 per cent, the per capita expenditure of all other household members increase by 0.29-0.39 per cent (Table 10 (2)) – irrespective if their earnings increase or not or if they are part of the active work force. Moreover if the percentage of household members occupied in the formal sector increases by 1 per cent, per capita expenditure will increase by 0.30 per cent (Table 10 (2)). However, it does not seem to be important if the main income is coming from the formal or informal sector (Table 10 (1)). This could show that informal earnings, that constitute the major income for households do not

differ significantly from formal sector income, as informal sector activities, that are undertaken as secondary household activity, do. Hence, when we observe that households, where the household head is employed in the informal sector, are poorer on average than households, where the household head is employed in the formal sector, this has probably more to do with the fact that if the household head is employed in the formal sector, other household members are also more likely to be employed in the formal sector (see Tables 5 and 6). As a result, for poverty assessments we should be more interested in a classification of households by their household occupation structure than by the household head's sector occupation.

To conclude, intra-household linkages seem to play an important role in labour market participation. Where the first household income comes from the formal sector, other household members are less likely to work and less likely to be found in the informal than in the formal sector. Second, with decreasing wages of the household head, secondary household members will increase their labour supply and will mostly be found in the informal sector. Concerning wage levels of secondary household members working in the informal sector, it is less the sector of employment of the household head but more the level of earnings of the household head that has a high impact on other household members' earnings. However, since generally average formal wages are higher than informal wages, we find a positive impact of formal wages on informal earnings of other household members. In addition, we have shown that intra-household linkages are not only important concerning formal and informal sector earnings but equally important concerning formal and informal sector well-beings. Last, we think that this analysis has also shown, that one should distinguish between informal income, that constitutes the main income of a household and informal income that only complements the main revenues of a household.

6 Conclusion and implications for pro-poor growth policies

Although much has been written on the possible linkages between the formal and informal sector and their importance for informal sector policy recommendations, to our knowledge, relatively little empirical analysis on those linkages exists so far. Therefore, in this study we tried to analyse the linkages between formal and informal sector earnings on a macro (inter-household linkages) as well as on a micro (intra-household linkages) level for the case of Burkina Faso. We showed that informal sector earnings are in deed positively linked to formal sector earnings on both the macro as well as on the micro level. However, this linkage coefficient is much stronger within households than between households. In addition, on a macro level it seems to be more the overall economic performance than the formal earnings that matter for informal sector earnings.

In sum this indicates, that the formal and informal sector in Burkina Faso are primarily linked through the final product market (forward linkages) and through the informal capital factor market (formal sector earnings being invested into informal business of other household members), but less through the input product market (backward linkages) and the labour market. This would also explain, why in Burkina Faso we saw stagnating or decreasing informal labour earnings despite formal economic growth, which was however accompanied by stagnating or decreasing formal sector wages. However, a detailed analysis of the product and factor market and their impact on the linkages between formal and informal sector earnings, constitutes a next step in the course of this broader linkages research question.

We have also shown, that intra-household linkages play an important role in determining labour supply and sectoral choice and that it would be useful to distinguish between informal sector earnings that constitute the main income source of households and informal sector earnings that only complement the main (informal or formal) income within households. Both findings might also explain part of the linkages we observe on the macro level. Again, this research could be extended and also the impact of inter-household linkages on intra-household linkages could be analysed.

For pro-poor growth policies in Burkina Faso, and in particular if we see the informal sector as the economy of the poor, all this would mean, that since the informal sector is positively linked to the formal sector, good (formal) growth policies are also good pro-poor growth policies. But, since we consider backward linkages as rather weak, this is only the case if this formal economic growth comes along with increasing formal wages and does not only benefit enterprise profits. However, this study has also shown that the linkage coefficient for both inter- as well as intra-household linkages is smaller than one and hence good formal growth policies might not be enough for sufficient informal sectoral growth. Also, this analysis has shown that formal sector growth policies will be more beneficial for informal sector earners that are linked to the formal sector via households – i.e. intra-household linkages – and less to informal sector earners that are only linked to the formal sector via the market. As a result, pure 'informal' households might be left out of the overall economic growth process. Hence a deeper analysis of this differential linkage coefficients and their impact on pro-poor growth might be another further interesting issue.

Last, intra-household linkages become even more important if one does not only consider earnings linkages but also individuals' well-being (per capita expenditure) linkages, which might even be more important for pro-poor growth and poverty reduction. If we assume that formal earnings have a direct – and not only indirect via the product or factor market – impact on individuals' well-being if earned within the same household, then growth of formal labour earnings might have a direct positive impact on informal labour earners without even increasing their personal informal earnings. However this would further increase the dichotomy not between informal and formal wage earners but between 'formal and informal' households.

References

Azam, J. P. (2004). 'Poverty and Growth in the WAEMU after the 1994 Devaluation'. *Journal of African Economies*, 13 (4) December: 536-62, for UNU-WIDER.

Blunch, N. H., S. Canagarajah and D. Raju (2001). 'The Informal Sector Revisited: A Synthesis Across Space and Time'. *Social Protection Discussion Paper Series* No. 0119, Washington, DC: World Bank.

Charmes, J. (1990). A Critical Review of Concepts Definitions and Studies in the Informal Sector, in D. Turnham, B. Salomé and A. Schwarz (eds), *The Informal Sector Revisited* (pp. 10-48), Paris: OECD Publication.

Charmes, J. (1996). Le secteur informel au Burkina Faso: Evolution sur longue période et suivi conjoncturel. Report prepared for the GTZ and the Ministère de l'économie des finances et du plan, Ouagadougou: GTZ.

Cogneau, D., M. Razafindrakoto and F. Roubaud (1996). 'Le secteur informel urbain et l'ajustement au Cameroun'. *Revue d'économie du developpement*, 3: 27-63.

De Vreyer, P., J. Herrera and S. Mesplé-Somps (2003). 'Consumption Growth and Spatial Poverty Traps: An Analysis of the Effects of Social Services and Community Infrastructures on Living Standards in Rural Peru'. DIAL Working Paper DT/2002/17, Paris: DIAL.

Fields, G. S. (1974). 'Rural-urban Migration, Urban Unemployment and Underemployment, and Job-search Activity in LDCs'. *Journal of Development Economics*, 2: 165-187.

Grimm, M., C. Guénard and S. Mesplé-Somps (2002). 'What has Happened to the Urban Population in Côte d'Ivoire since the Eighties? An Analysis of Monetary Poverty and Deprivation over 15 years of Household Data'. *World Development*, 30 (6): 1073-95.

Grimm, M. and I. Günther (2004). 'How to Achieve Pro-poor Growth in a Poor Economy. The Case of Burkina Faso'. Report for the 'Operationalising Pro-Poor Growth' Project, Eschborn: University of Göttingen, GTZ and Washington, DC: World Bank.

Haddad, L., M. T. Ruel and J. L. Garrett (1999). 'Are Urban Poverty and Undernutrition Growing? Some Newly Assembled Evidence'. *World Development*, 27 (11): 1891-1904.

Harriss, J. C. (1990). 'Linkages Between the Formal and the Informal Sectors in Developing Countries: A Review of Literature'. World Development Programme Research Working, Geneva: ILO.

Heckman, J. (1979). 'Sample Selection Bias as a Specification Error'. *Econometrica*, 47 (1): 153-161.

Hemmer, H.-R. and C. Mannel (1989). 'On the Economic Analysis of the Urban Informal Sector'. *World Development*, 17 (10): 1543-52.

Hugon (1990). 'The Informal Sector Revisited (in Africa)', in D. Turnham, B. Salomé and A. Schwarz (eds), *The Informal Sector Revisited* (pp. 70-87), Paris: OECD Publication.

Jalan, J. and M. Ravallion (2002). 'Geographic Poverty Traps? A Micro Model of Consumption Growth in Rural China'. *Journal of Applied Econometrics*, 17: 329-46.

INSD (2000). 'Analyse des résultats du Recensement Général de la Population et de l'habitation de 1996', Vol. 1. Institut National de la Statistique et de la Démographie, Burkina Faso.

International Labour Office (1972). 'Employment, Incomes and Equality: A Strategy for Increasing Productive Employment in Kenya'. Geneva: ILO.

Konaté, S. and M. Raffinot (1998). 'Politique économique et lutte contre la pauvreté: Le cas du Burkina Faso'. Burkina Faso: Ministère de l'Economie, des Finances and GTZ.

Lachaud (1990). 'The Urban Informal Sector and the Labour Market in Sub-Saharan Africa', in D. Turnham, B. Salomé and A. Schwarz (eds), *The Informal Sector Revisited* (pp. 111-130), Paris: OECD Publication.

Lewis, W. A. (1954). 'Economic Development with Unlimited Supplies of Labour'. *Manchester School*, 28: 139-191.

Livingstone, I. (1971). 'A Reassessment of Kenya's Rural and Urban Informal Sector'. *World Development*, 19 (6): 651-670.

Maloney, W. F. (1997). 'Labour Market Structure in LDC. Time Series Evidence on Competing Views'. Mimeo, Washington, DC: World Bank.

Maloney, W. F. (1999). 'Does Informality Imply Segmentation in Urban Labour Markets? Evidence from Sectoral Transitions in Mexico. *World Bank Economic Review*, 13 (2): 275-302.

Maloney, W. F. (2004). 'Informality Revisited'. *World Development*, 32 (7): 1159-78.

Mazumdar, D. (1976). 'The Urban Informal Sector'. *World Development*, 4/8: 655-79.

Ministère de l'Economie et des Finances (1997). Une Maquette Macro-économique pour gérer l'Economie du Burkina Faso. L'instrument Automatisé de Prévision. Tome 1, Présentation Générale. Ministère de l'Economie et des Finances, Burkina Faso.

Ministère de l'Economie et des Finances (2000). Burkina Faso: Poverty Reduction Strategy Paper. Ministère de l'Economie et des Finances, Burkina Faso.

Pradhan M. and A. Soest (1997). 'Household Labour Supply in Urban Areas of Bolivia'. *Review of Economics and Statistics*, 79 (2): 300-10.

Sethuraman, S. V. (1997). 'Urban Poverty and the Informal Sector. A Critical Assessment of Current Strategies'. Mimeo, New York: UNDP.

Stark, O. (1982). 'On Modelling the Informal Sector'. *World Development*, 10 (5): 413-16.

Stiglitz, J. E. (1974). 'Alternative Theories of Wage Determination and Unemployment in LDCs: The Labour Turnover Model'. *Quarterly Journal of Economics*, 88: 194-227.

Todaro, M. P. (1969). 'A Model of Labour Migration and Urban Unemployment in Less Developed Countries'. *American Economic Review*, 59: 138-148.

Tokman, V. E. (1978). 'An Exploration into the Nature of Informal-Formal Sector Relationships'. *World Development*, 6 (9/10): 1065-75.

UNDP (2003). *Human Development Report 2003*. Millennium Development Goals: A Compact Among Nations to End Human Poverty. New York: UNDP.

Van Dijk, M. P. (1980). De informele sector van Ouagadougdou en Dakar. Doctoral dissertation, Free University of Amsterdam.

Xaba, J. P. Horn and S. Motala (2002). 'The Informal Sector in Sub-Saharan Africa'. *Working Paper on the Informal Economy,* 2002/10, Geneva: ILO.

Table 1
Occupation and employment of the urban adult population (15 years and older)

	1994	1998	2003
Occupied	53.2	58.7	58.2
of whom			
(1) Public wage earner	12.8	12.3	12.7
(2) Private formal wage earner	13.6	16.8	17.0
(3) Independent (informal)	41.3	(37.5)	40.6
of whom			
Trade sector	62.6	69.3	72.6
Manufactory sector	17.4	15.3	13.2
Other commercial services	11.1	5.7	2.6
(4) Family help	25.6	(29.0)	21.7
(5) Non-remunerated (outside family)	6.8	4.4	8.1
of whom (only cat. 1-3)			
Permanent contract	85.9	91.2	75.5
Seasonal	6.3	3.5	13.8
Daily	1.8	0.9	8.8
Other temporary	6.0	4.5	1.9
Unemployed (open)	8.9	9.4	12.8
Enrolled in school/university	14.3	14.5	13.5
Inactive	23.7	17.4	15.5
Dependency ratio (over households) [a)]	63.1	57.4	57.4

Notes: All figures are percentages. Occupation and activity concerns those carried out the seven days before the survey. However, we computed the same statistics for the main activity the last 12 month; the results were not significantly different. Numbers in parentheses signify that we presume strong measurement error. [a)] The dependency ratio is computed over households, it is defined as the number of inactive and unemployed persons divided by the household size.

Source: Grimm and Günther (2004); Database used: EPI, EPII and EPIII (see section 4).

Table 2
Average urban real monthly earnings
(000 CFAF, at 1994 level, in Ouagadougou)

	1994	1998	2003
(1) Public wage earner			
Total average	130	74	81
(1994 = 100)	(100)	(56.9)	(62.3)
Median	65	57	62
(1994 = 100)	(100)	(87.6)	(95.4)
Average first quintile	32	24	25
Average second quintile	51	43	49
(2) Private formal wage earner			
Total average	97	37	48
(1994 = 100)	(100)	(38.1)	(49.5)
Median	27	20	24
(1994 = 100)	(100)	(74.0)	(88.9)
Average first quintile	7	7	9
Average second quintile	17	13	18
(3) Independent (informal)			
Total average	75	36	36
(1994 = 100)	(100)	(48.0)	(48.0)
Median	10	12	15
(1994 = 100)	(100)	(120)	(150)
Average first quintile	2	2	3
Average second quintile	5	6	7
Ratios between median earnings			
(2)/(1) in per cent	41.5	35.1	38.7
(3)/(1) in per cent	15.4	21.1	24.2
(3)/(2) in per cent	37.0	60.0	62.5
Percentage of workers living in a poor HH			
Public wage earner	1.0	4.0	2.5
Private formal wage earner	6.6	13.3	12.8
Independent (informal)	14.3	26.4	20.3

Note: The monthly minimum wage is currently at 25,000 CFAF (≈ 19,000 CFAF at 1994 level). In 1994, 1998 and 2003 18.8 per cent, 13.7 per cent and 9.3 per cent of all public, private formal and informal workers declared no earnings. Those who declared no earnings are almost all workers in the informal sector; older than the average, often head of a household (except in 2003) and less educated than the average. Another bias is due to the fact that the recall period for wages in 1994 was 7 days, whereas in 1998 and 2003 the interviewed person was allowed to choose the recall period. Most declarations were then made per month (25-30 per cent) or per year (60 per cent).

Source: Grimm and Günther (2004); Data base used: EPI, EPII and EPIII (see section 4).

Table 3
Estimation of informal earning functions
Urban areas only, selection model (Full MLE), 1994, 1998, 2003

Dependent variable log of household informal earnings per capita	(1)	(2)	(3)	(4)	(5)	(6)
1994						
Log no. of workers [a]	0.506***	0.509***	0.509***	0.508***	0.548***	0.518***
Head male	0.235**	0.241**	0.235**	0.238**	0.194*	0.225**
Age of head	-0.003	-0.005	-0.004	-0.004	-0.003	-0.006
Squared age of head	0.123	0.272	0.180	0.248	0.101	0.398
Log HH-size	-0.759***	-0.753***	-0.756***	-0.755***	-0.754***	-0.746***
Education level HH head						
No schooling	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Some primary educ	-0.033	-0.041	-0.034	-0.036	-0.025	-0.024
Primary compl	-0.021	-0.037	-0.026	-0.032	-0.045	-0.041
Some or compl low sec	0.517***	0.499***	0.510***	0.505***	0.527***	0.513***
Some or compl high sec	1.497***	1.480***	1.488***	1.483***	1.462***	1.473***
Technical educ	0.416*	0.363	0.415*	0.382	0.447*	0.374
Speaks/writes French	0.675***	0.689***	0.675***	0.681***	0.686***	0.688***
Public worker in HH	-0.867***	-0.863***	-0.871***	-0.867***	-0.886***	-0.873***
Private formal worker in HH	-0.518***	-0.537***	-0.529***	-0.535***	-0.574***	-0.553***
Province average log formal earnings [b]	0.178***			0.069	-0.180**	0.014
Province average log non-labour inc [b]		0.483***		0.329**		
Province average log tot non-informal income [b]			0.310***			
Province share of formal workers [b]					7.382***	
Province share of informal workers [b]						2.902***
Intercept	10.648***	7.449***	8.967***	8.334***	13.856***	12.068***
rho [c]	-0.910***	-0.903***	-0.907***	-0.905***	-0.893***	-0.900***
No. of observations	2706	2706	2706	2706	2706	2706
No. of non-censored observations [d]	1249	1249	1249	1249	1249	1249
Log-likelihood	3808	3806	3805	3805	3794	3802
1998						
Log No. of workers [a]	0.583***	0.601***	0.581***	0.590 ***	0.583***	0.585***
Head male	0.502***	0.474***	0.498***	0.481***	0.502***	0.499***
Age of head	0.010	0.007	0.009	0.008	0.010	0.009
Squared age of head	-1.476	-1.285	-1.388	-1.284	-1.467	-1.395
Log HH-size	-0.933***	-0.929***	-0.930***	-0.926***	-0.933***	-0.925***
Education level HH head						
No schooling	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Some primary educ	-0.098	-0.115	-0.102	-0.106	-0.098	-0.087
Primary compl	-0.228	-0.234	-0.222	-0.227	-0.228	-0.218
Some or compl low sec	0.136	0.137	0.141	0.138	0.137	0.147
Some or compl high sec	1.007***	1.042***	1.012***	1.024***	1.006***	1.017***
Technical educ	0.922***	0.929***	0.926***	0.941***	0.921***	0.918***
Speaks/writes French	0.490***	0.520***	0.490***	0.496***	0.490***	0.486***
Public worker in HH	-1.057***	-1.061***	-1.055***	-1.063***	-1.057***	-1.054***
Private formal worker in HH	-0.460***	-0.420***	-0.461***	-0.454***	-0.461***	-0.465***
Province average log formal earnings [b]	0.168***			0.100***	0.161**	0.080
Province average log non-labour inc[b]		0.785***		0.568***		

Table 3 (*continued*)

Province average log tot non-informal income [b)]			0.355***			
Province share of formal workers [b)]					0.096	
Province share of informal workers [b)]						1.844*
Intercept	10.388***	3.994***	8.106***	5.171***	10.453***	11.165***
rho [c)]	-0.897***	-0.903***	-0.900***	-0.901***	-0.897***	-0.897***
No. of observations	2583	2583	2583	2583	2583	2583
No. of non-censored observations [d)]	1300	1300	1300	1300	1300	1300
Log-likelihood	3533	3530	3532	3527	3533	3532
Dependent variable log of household informal earnings per capita	(1)	(2)	(3)	(4)	(5)	(6)
2003						
Log no. of workers [a)]	0.456***	0.449***	0.455***	0.453***	0.454***	0.450***
Head male	0.188*	0.205*	0.194**	0.191**	0.190**	0.192**
Age of head	-0.011	-0.009	-0.010	-0.011	-0.011	-0.012
Squared age of head	0.186	0.076	0.106	0.160	0.199	0.228
Log HH-size	-0.803***	-0.794***	-0.803***	-0.801***	-0.801***	-0.799***
Education level HH head						
No schooling	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Some primary educ	-0.237	-0.226	-0.235	-0.235	-0.238	-0.237
Primary compl	-0.001	0.021	0.014	0.005	0.000	-0.002
Some or compl low sec	0.214	0.216	0.216	0.214	0.212	0.210
Some or compl high sec	1.163***	1.203***	1.181***	1.169***	1.161***	1.158***
Technical educ	0.732**	0.816***	0.742**	0.746**	0.730**	0.737**
Speaks/writes French	0.405**	0.417**	0.409**	0.410**	0.408**	0.408**
Public worker in HH	-0.572***	-0.605***	-0.581***	-0.580***	-0.572***	-0.578***
Private formal worker in HH	-0.304***	-0.296***	-0.310***	-0.308***	-0.307***	-0.306***
Regional average log formal earnings [b)]	0.201***			0.162***	0.144	0.134**
Regional average log non-labour inc [b)]		0.528***		0.156		
Regional average log tot non-informal income [b)]			0.440***			
Regional share of formal workers [b)]					0.934	
Regional share of informal workers [b)]						1.281
Intercept	10.727***	7.168***	7.719***	9.458***	11.256***	11.323***
rho [c)]	-0.852***	-0.863***	-0.861***	-0.856***	-0.853	-0.853***
No. of observations	2556	2556	2556	2556	2556	2556
No. of non-censored observations [d)]	1341	1341	1341	1341	1341	1341
Log-likelihood	3268	3274	3266	3267	3267	3267

Notes: *, **, *** coefficient significant at the 10, 5 and 1 per cent levels respectively. [a)] log of the number of employed workers from inside and outside the household in the informal activity of the household. [b)] The Province specific variables are computed without considering the household itself. [c)] *rho* is the correlation coefficient between the residuals of the earnings regression and the selection function. As explanatory variables in the selection function we use variables for the age and sex composition of the household, knowledge of French, education and age of the household head: [d)] censored households are those who declared not have had earnings from informal activity.

Source: EPI, EPII and EPIII; estimations by the authors.

Table 4
Annual growth of real per capita income by region and source between 1994, 1998 and 2003 in urban areas

Incomes are deflated by the general consumer price index
(in parentheses the share of each income source in total income)

Region	Growth of					Per cent		
	Informal earnings	Formal earnings	Other income	Total income without informal earnings	Total income	Total survey pop.	Total survey income	Major cotton producing region
1994-98								
Ouest (Bobo)	-0.018	-0.014	-0.058	-0.030	-0.020	0.200	0.192	Yes
	(0.318)	(0.4249)	(0.258)	(0.682)	(1.000)			
Nord-Ouest	-0.172	-0.089	0.039	-0.038	-0.063	0.034	0.027	Yes
	(0.432)	(0.371)	(0.197)	(0.568)	(1.000)			
Sahel	-0.341	0.104	0.178	0.115	-0.006	0.011	0.009	No
	(0.425)	(0.497)	(0.079)	(0.575)	(1.000)			
Est	-0.195	-0.116	-0.092	-0.111	-0.119	0.017	0.022	No
	(0.316)	(0.533)	(0.151)	(0.684)	(1.000)			
Sud-Ouest [a]	0.060	-0.485	0.187	-0.238	-0.166	0.006	0.008	Yes
	(0.054)	(0.815)	(0.132)	(0.946)	(1.000)			
Centre-Nord	0.056	0.208	-0.187	0.042	0.035	0.031	0.020	No
	(0.251)	(0.329)	(0.420)	(0.749)	(1.000)			
Centre-Ouest	-0.002	-0.100	0.110	-0.034	-0.006	0.063	0.068	No
	(0.212)	(0.594)	(0.194)	(0.788)	(1.000)			
Centre (Ouaga)	-0.023	0.092	-0.058	0.050	0.016	0.533	0.600	No
	(0.305)	(0.472)	(0.224)	(0.695)	(1.000)			
Nord	0.014	0.216	0.077	0.160	0.121	0.076	0.039	No
	(0.449)	(0.302)	(0.248)	(0.551)	(1.000)			
Centre-Est	0.106	0.261	-0.134	0.090	0.204	0.030	0.014	No
	(0.280)	(0.312)	(0.409)	(0.720)	(1.000)			
β (gr-gr) [b]		0.041	-0.367	-0.091	0.492			
φ_1 (gr-gr) [c]		0.065	-0.343	-0.076	0.378			
φ_2 (gr-lev) [d]	-0.783	-0.019	0.613	0.094	-0.184			
1998-2003								
Ouest (Bobo)	-0.023	0.017	0.016	0.017	0.006	0.242	0.211	Yes
	(0.329)	(0.446)	(0.226)	(0.671)	(1.000)			
Nord-Ouest	-0.058	-0.152	-0.102	-0.127	-0.066	0.051	0.031	Yes
	(0.294)	(0.372)	(0.334)	(0.706)	(1.000)			
Sahel	0.183	-0.182	0.168	-0.076	-0.061	0.014	0.012	No
	(0.083)	(0.761)	(0.156)	(0.917)	(1.000)			
Est	-0.108	-0.062	0.074	-0.022	0.014	0.029	0.022	No
	(0.237)	(0.580)	(0.182)	(0.763)	(1.000)			
Sud-Ouest [a]	0.136	0.313	-0.111	0.030	0.035	0.008	0.005	Yes
	(0.175)	(0.148)	(0.677)	(0.825)	(1.000)			
Centre-Nord	0.103	-0.020	0.139	0.022	0.083	0.037	0.027	No
	(0.261)	(0.586)	(0.153)	(0.739)	(1.000)			
Centre-Ouest	0.035	-0.139	0.006	-0.065	-0.030	0.069	0.071	No
	(0.235)	(0.435)	(0.330)	(0.765)	(1.000)			
Centre (Ouaga)	-0.002	-0.004	0.092	0.019	0.014	0.444	0.526	No
	(0.247)	(0.596)	(0.156)	(0.753)	(1.000)			
Nord	-0.037	-0.092	-0.028	-0.068	-0.029	0.059	0.047	No
	(0.323)	(0.449)	(0.228)	(0.677)	(1.000)			
Centre-Est	-0.098	0.066	0.140	0.085	-0.011	0.048	0.047	No
	(0.292)	(0.548)	(0.160)	(0.708)	(1.000)			
β (gr-gr) [b]		0.095	0.109	-0.105	0.337			
φ_1 (gr-gr) [c]		0.138	0.110	-0.068	0.153			
φ_2 (gr-lev) [d]	-0.524	0.072	0.324	0.254	-0.172			

Table 4 (*continued*)

Region	Growth of					Per cent		
	Informal earnings	Formal earnings	Other income	Total income without informal earnings	Total income	Total survey pop.	Total survey income	Major cotton producing region
1994-2003								
Ouest (Bobo)	-0.021	0.003	-0.026	-0.014	-0.006	0.245	0.210	Yes
	(0.286)	(0.474)	(0.239)	(0.714)	(1.000)			
Nord-Ouest	-0.111	-0.124	0.017	-0.017	-0.065	0.054	0.022	Yes
	(0.378)	(0.284)	(0.338)	(0.622)	(1.000)			
Sahel	-0.088	-0.066	0.075	0.049	-0.037	0.010	0.006	No
	(0.237)	(0.344)	(0.420)	(0.763)	(1.000)			
Est	-0.147	-0.086	-0.042	-0.051	-0.047	0.024	0.019	No
	(0.164)	(0.516)	(0.319)	(0.836)	(1.000)			
Sud-Ouest [a)]	0.101	-0.134	0.079	-0.114	-0.060	0.006	0.004	Yes
	(0.257)	(0.450)	(0.293)	(0.743)	(1.000)			
Centre-Nord	0.082	0.075	-0.088	0.019	0.061	0.029	0.029	No
	(0.341)	(0.423)	(0.236)	(0.659)	(1.000)			
Centre-Ouest	0.019	-0.122	0.048	-0.015	-0.019	0.065	0.055	No
	(0.339)	(0.250)	(0.411)	(0.661)	(1.000)			
Centre (Ouaga)	-0.011	0.038	-0.026	0.022	0.015	0.492	0.596	No
	(0.228)	(0.546)	(0.226)	(0.772)	(1.000)			
Nord	-0.014	0.034	0.034	0.068	0.035	0.037	0.024	No
	(0.361)	(0.373)	(0.266)	(0.639)	(1.000)			
Centre-Est	-0.013	0.149	-0.062	0.039	0.079	0.039	0.034	No
	(0.140)	(0.610)	(0.249)	(0.860)	(1.000)			
β (gr-gr)[b)]		0.178	0.022	-0.273	0.588			
φ_1 (gr-gr)[c)]		0.219	0.016	-0.185	0.378			
φ_2 (gr-lev)[d)]	0.089	0.234	0.431	0.303	0.005			

Notes: [a)] The numbers for the region 'Sud-Ouest' should be taken with caution, because they rely on only 20 households. [b)] β is the regression coefficient between the growth rate of informal income and the growth rate of the other income sources, i.e. a coefficient of 0.04 indicates that one percentage point more growth of formal income per capita is linked with 0.04 points more growth of informal income. [c)] φ_1 indicates the correlation coefficient between the growth rate of informal income and the growth rate of the other income sources. [d)] φ_2 indicates the correlation coefficient between the growth rate of informal income and the initial level of the different income sources.

Source: EPI, EPII and EPIII; computations by the authors.

Table 5
Occupational choice of urban second order labour income earners
Multinominal logit model

Dependent variable	Informal sector wage earner			Formal sector wage earner		
occupational choice	1994	1998	2003	1994	1998	2003
Age	0.182***	0.184***	0.221***	0.327***	0.402***	0.467***
Squared Age	-0.002***	-0.002***	-0.003***	-0.004***	-0.005***	-0.006***
Female	-0.765***	-0.530***	-0.613***	-1.050***	-1.760***	-1.372***
Highest education level						
No schooling	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Some primary educ	0.795***	0.806***	0.101	1.051***	1.327***	0.516***
Primary compl	0.348***	0.789***	-0.097	0.929***	1.378***	0.788***
Some or compl low sec	0.071	0.647***	-1.145***	1.570***	1.741***	0.219***
Some or compl high sec	0.176	0.428	-2.057***	2.467***	2.593***	0.617***
Technical educ	0.158	0.509	-1.235***	2.475***	2.150***	1.010***
HH head labour income						
Informal earnings	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Formal earnings	-0.596***	-0.691***	-0.785***	0.367***	0.285**	0.417***
Log monthly earnings (Head)	-0.125***	-0.176***	-0.145***	0.145***	0.197***	0.112**
No. of observations	5233	4711	5540	5233	4711	5540
Pseudo R Square	0.169	0.214	0.224	0.169	0.214	0.224

Notes: *, **, *** coefficient significant at the 10, 5 and 1 per cent levels respectively; the model only includes individuals, which are not specified as household heads, i.e. individuals not accounting for the main labour earning of a household; besides the variables noted in the table, the model includes the following explicative variable: city, household size, per cent of occupied household members (without accounting for the individual itself) and transfers received.

Source: EPI, EPII and EPIII; estimations by the authors.

Table 6
Occupational choice of urban population, secondary household members only
Selection model (Full MLE)

Dependent variable	1994		1998		2003	
binary informal = 1	(1)	(2)	(1)	(2)	(1)	(2)
Heckman probit model: informal = 1, formal = 0						
Age	-0.110***	-0.051**	-0.096***	-0.105***	-0.082***	-0.094***
Squared Age	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
Female	0.560***	0.242***	0.723***	0.813***	0.453***	0.528***
Highest education level						
No schooling	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Some primary educ	-0.289***	-0.105	-0.369***	-0.271**	-0.349***	-0.114
Primary compl	-0.550***	-0.312***	-0.555***	-0.318***	-0.670***	-0.431***
Some or compl low sec	-1.111***	-0.837***	-1.036***	-0.623***	-0.888***	-0.565***
Some or compl high sec	-1.733***	-1.445***	-1.784***	-1.362***	-1.830***	-1.522***
Technical educ	-1.898***	-1.454***	-1.609***	-1.089***	-1.689***	-1.282***
HH head labour income						
Informal earnings		Ref.		Ref.	Ref.	Ref.
Formal earnings		-0.579***		-0.521***		-0.715***
Log monthly earnings (Head)		-0.123***		-0.221***		-0.085***
Second order labour income	0.964***		0.749***		0.548***	
Selection model: probability of being occupied						
Age	0.117***	0.105**	0.124***	0.111***	0.138***	0.151***
Squared Age	-0.001***	-0.001***	-0.001***	-0.001***	-0.002***	-0.002***
Female	-0.625***	-0.489***	-0.639***	-0.476***	-0.616***	-0.500***
Highest education level						
No schooling	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Some primary educ	0.445***	0.516**	0.490***	0.520***	0.023	0.101
Primary compl	0.237***	0.300***	0.462***	0.542***	-0.054	0.015
Some or compl low sec	0.240***	0.325***	0.473***	0.586***	-0.549***	-0.514***
Some or compl high sec	0.526***	0.775**	0.644***	0.915***	-0.550***	-0.438***
Technical educ	0.575***	0.691***	0.460***	0.692***	-0.168	-0.182
HH head labour income						
Informal earnings		Ref.		Ref.	Ref.	Ref.
Formal earnings		-0.266***		-0.305***		-0.291***
Log monthly earnings (Head)		-0.039***		-0.073***		-0.072***
Second order labour income (Dummy)	-1.520***		-1.647***		-1.551***	
rho[a)]	-0.462***	-0.022	-0.732***	-0.243	-0.347***	-0.100
No. of observations	9971	5233	8791	4711	8928	5540
No. of non-censored estimations	5411	1915	5145	1884	5210	2595
Log-likelihood	6641	3588	6003	3267	6469	4056

Notes: *, **, *** coefficient significant at the 10, 5 and 1 per cent levels respectively. The dependent variable in the selection model distinguishes between occupied = 1 or inactive = 0 and the dependent variable in the Heckman probit model distinguishes between occupied in the informal sector = 1, and occupied in the formal sector = 0. Col. (1) total urban labour force; Col. (2) including only those individuals which are not specified as household heads, i.e. individuals not accounting for the main labour earning of a household. Besides the variables noted in the table, the model includes the following explicative variable: city, and the following explanatory variables: age and sex composition of the household, per cent of occupied household members (without accounting for the individual itself) and transfers received. [a)]*rho* is the correlation coefficient between the residuals of the probit model and the selection function.

Source: EPI, EPII and EPIII; estimations by the authors.

Table 7
Estimation of urban monthly earning functions
Total urban labour force, Selection model (Full MLE)

Dependent variable	1994		1998		2003	
log monthly earnings	(1)	(2)	(1)	(2)	(1)	(2)
Age	0.079***	0.096***	0.029***	0.048***	0.061***	0.031
Squared Age	-0.001***	-0.001***	0.000***	0.000***	-0.001***	0.000**
Female	-0.632***	-0.583***	-0.524***	-0.785***	-0.439***	-0.655***
Highest education level						
No schooling	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Some primary educ	0.109	0.189	-0.073	-0.031	0.206***	0.220**
Primary compl	0.477***	0.405***	0.208**	0.190	0.211***	0.159*
Some or compl low sec	0.830***	0.829***	0.455***	0.546***	0.419***	0.258**
Some or compl high sec	1.522***	1.933***	0.895***	1.142***	1.038***	0.585***
Technical educ	1.300***	1.716***	0.874***	0.774***	1.078***	1.008***
Sector						
Primary	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Secondary	0.464***	0.771***	1.406***	1.617***	0.985***	1.049***
Tertiary	0.354***	0.562***	1.496***	1.885***	1.110***	1.211***
Admin	0.718***	1.523***	1.756***	2.046***	1.241***	1.009***
Informal Sector	Ref.		Ref.		Ref.	
Formal Sector	0.498***		0.199***		0.078***	
Second order labour income (Dummy)	-0.582***	-1.584***	-0.066	-0.901***	-0.563***	-0.643***
Intercept	8.368***	7.512***	8.533***	7.893***	8.140***	9.129***
rho[a)]	-0.021	0.732***	-0.456***	0.189	-0.042	-0.102
No. of observations	9950	4002	8789	3646	8927	3621
No. of non-censored estimations	2919	1590	2952	1518	3354	1903
Log-likelihood	8331	4546	7649	4053	8171	4363

Notes: *, **, *** coefficient significant at the 10, 5 and 1 per cent levels respectively; Col. (1) total urban labour force; Col. (2) informal urban labour force, only. Besides the variables noted in the table, the model includes the following explicative variable: City. As explanatory variables in the selection function we use variables for the age and sex composition of the household, for the age, sex, education and household position of the individual, for per cent of occupied household members (without accounting for the individual itself) and for transfers received. *rho*[a)] is the correlation coefficient between the residuals of the earnings regression and the selection function.

Source: EPI, EPII and EPIII; computations by the authors.

Table 8
Estimation of urban monthly earning functions
Secondary household labour earnings only, selection model (Full MLE)

Dependent variable	1994		1998		2003	
log monthly earnings	(1)	(2)	(1)	(2)	(1)	(2)
Age	0.089***	0.015	0.131***	-0.061***	0.098***	-0.065***
Squared Age	-0.001***	0.000**	-0.002***	0.001***	-0.001***	0.001**
Female	-0.516***	-0.917***	-0.168***	-1.206***	-0.344***	-0.792***
Highest education achieved						
No schooling	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Some primary	0.076	-0.042	0.108	-0.191	0.113	0.157
Completed primary	0.356***	0.368**	0.273***	0.161	0.137	0.234
Some or compl. junior high	0.870***	0.468**	0.385***	0.232	0.206***	0.085
Some or compl. senior high	1.627***	1.516***	0.794***	0.484	0.734***	-0.027
Technical	1.418***	1.638***	0.628***	0.147	0.746***	0.795
Informal Sector	Ref.		Ref.		Ref.	
Formal Sector	0.635***		0.370***		0.429***	
HH head labour income						
Informal income	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Formal income	0.023	-0.373***	-0.504***	-1.019***	0.103	-0.529***
Log monthly earnings (Head)	0.324***	0.311***	0.570***	0.603***	0.431***	0.516***
Intercept	3.886***	7.467***	7.926***	7..586***	2.836***	7.816***
rho[a)]	0.430	-0.374	-0.957***	-0.902***	0.190	-0.919***
No. of observations	7263	2702	6203	2371	6338	2312
No. of non-censored estimations	944	639	920	536	1167	704
Log-likelihood	3913	2127	3409	1652	4082	2091

Notes: *, **, *** coefficient significant at the 10, 5 and 1 per cent levels respectively; the model only includes individuals, which are not specified as household heads, i.e. individuals not accounting for the main labour earning of a household; Col. (1) total urban labour force; Col. (2) informal urban labour force, only. Besides the variables noted in the table, the model includes the following explicative variable: city and sector employment. As explanatory variables in the selection function we use variables for the age and sex composition of the household, for the age, sex and education of the individual, for per cent of occupied household members (without accounting for the individual itself), for the sector employment of the household head and for transfers received. *rho*[a)] is the correlation coefficient between the residuals of the earnings regression and the selection function.

Source: EPI, EPII and EPIII; estimations by the authors.

Table 9
Household labour sector dependence, in percentages
(urban population older than 14 years)

	1994	1998	2003
(1) HH main labour income			
Public wage	23.4	21.1	19.7
Private formal wage	19.5	20.8	21.2
Informal earnings	49.9	45.6	56.2
(2) HH labour structure			
Formal earnings only	19.4	22.5	20.0
Informal earnings only	53.8	52.7	54.5
Formal and informal earnings	26.8	24.8	25.6

Notes: (1) percentage of urban population living in households where the main (highest) labour income comes from the respective sector. (2) percentage of population living in households with only formal, only informal and 'mixed' sector income.

Source: EPI, EPII and EPIII; computations by the authors.

Table 10
Estimation of per capita household expenditure functions
Urban areas only, OLS

Dependent variable	1994		1998		2003	
log per capita HH expenditure	(1)	(2)	(1)	(2)	(1)	(2)
Percentage of active HH members	0.554***	0.710***	0.348***	0.625***	0.281***	0.422***
HH-size	-0.133***	-0.135***	-0.220***	-0.198***	-0.150***	-0.156***
Transfers received (Dummy)	0.123***	0.169***	0.033	0.140***	0.077**	0.168***
HH labour structure						
Per cent of formal workers to all workers	0.807***	0.311***	0.628***	0.288***	0.166***	0.317***
HH head labour earnings						
Non-labour income	Ref.		Ref.		Ref.	
Informal income	0.089		0.000		-0.291*	
Formal income	0.114		0.025		0.195*	
Log monthly earnings (Head)		0.259***		0.326***		0.392***
Intercept	11.507***	9.211***	11.786***	8.609***	11.990***	7.918***
No. of observations	2485	2485	2428	2428	2398	2398
Adjusted R Square	0.331	0.429	0.313	0.472	0.299	0.477

Notes: *, **, *** coefficient significant at the 10, 5 and 1 per cent levels respectively; besides the variables noted in the table, the model includes the following explicative variable: city and age and sex composition of the household

Source: EPI, EPII and EPIII; estimations by the authors.