THE SHADOW ECONOMY: ILLICIT WORK AND HOUSEHOLD PRODUCTION: A MICROANALYSIS OF WEST GERMANY

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This microanalysis of the shadow economy is on informal family income achieving strategies. In particular we analyze both sexes' paid illicit work as well as unpaid work in household production based on the representative West German Sfb3-Secondary Occupation Survey 1984. We estimate the influence of various socioeconomic variables including a legal occupation. As a result, illicit work and household production "Do-It-Yourself" activities are important informal family income achieving strategies. The respective regional state of the formal economy or one's own activities in social networks is of greater importance for informal economic activities than an individual income from formal economic activities.

INTRODUCTION

In the last decade, informal activities have increasingly emerged from the shadow of the official economy into the limelight and into the focus of social sciences (Gershuny, 1983). This study analyzes informal activities as (additional) income achieving strategies of private households in the FRG contributing to an extended individual economic well-being approach. Whereas paid formal labor supply has been the subject of a multitude of studies for various countries world-wide, only a few microanalyses of household production and/or illicit work have been carried out.[1] We target both informal income components: the non-market household production with an estimated value of avoided market expenditures, as well as the individual illicit work with nondeclared income from paid market work.

This study analyzes the importance of both legal and illegal informal income achieving strategies for various types of families/households and, in addition to this, at quantifying the influence of family characteristics and further explanatory factors for such engagements within a multinomial logit approach. In analyzing both descriptives and microeconometrics separately for men and women, we take into consideration possible gender specific impacts well-known from formal legal

[1] A recent international overview and comparison of microanalyses concerning household production is given by Fitzgerald and Wicks (1990), and Quah (1989). Glatzer and Berger-Schmitt (1986) focus on West German microanalyses on household production. An overview on illicit work studies in market economies is given by Wolff (1991). The shadow economy in general is the topic of Gaertner and Wenig (1985). Merz (1989a) encompasses market and non-market activities of private households including formal and informal economic activity pattern.

labor supply. Our analysis is based on representative microdata[2] from the FRG with a sufficient number of cases; microdata which are collected in the Sfb 3-Secondary Occupation Survey 1984 of the Sonderforschungsbereich 3 (Sfb 3, Special Collaborative Program 3) "Microanalytic Foundations of Social Policy" of the Universities of Frankfurt and Mannheim funded by the German National Science Foundation (DFG). One result is that illicit work and "Do-It-Yorself" (DIY) activities of household production are important informal family income achieving strategies. Concerning the explanation of a participation in informal activities, income from formal economic activities is less important than e.g. the regional formal economic performance or than own activities in social networks.

1. THE SHADOW ECONOMY AND FAMILY INCOME ACHIEVING STRATEGIES

Single paid legal work is the traditional way for achieving economic well-being for the broad majority of the population. Whereas in the past the main emphasis of the economic analyses of households was the investigation of the

A: Measured by GDP
B: Not measured by GDP; because of measurement errors
C: Not measured by GDP; hidden because of evasion of taxes and/or social security contribution
D: Not measured by GDP; hidden
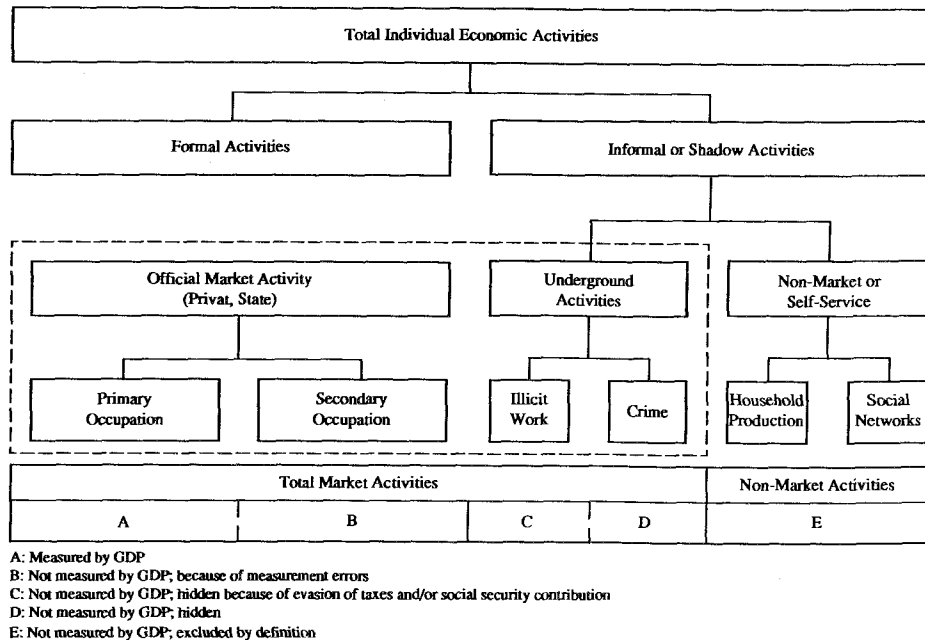E: Not measured by GDP; excluded by definition

Figure 1. Market- and Non-Market Activities in the Formal and Informal Economy: An Overview

employment behavior of such single primary occupations of their members, and especially on female labor supply[3], some of more recent household related economic approaches are extended to multiple labor supply. First, individuals may carry out several paid market activities (multiple job holding, Shisko and

[2]For a microanalysis of household production and illicit work but with a small sample of nonrepresentative microdata for the FRG see Niessen and Ollmann (1987).
[3]An overview is given by Killingsworth and Heckman (1986).

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Rostker, 1976; Merz, 1989*a,b*; Schwarze, 1990). Second, non-market household production is explicitly taken into account ("new home economics," Becker, 1965; Gronau, 1980; 1986).

Within this approach, production of goods and services for consumer purposes uses goods and services purchased on the market as goods input and unpaid work as time input. Both extensions can be summarized as follows: Individuals in the household may carry out a multitude of paid (market) activities as well as household (non-market) activities. A combined treatment of multiple market and non-market activities with respect to microeconomic comparative statics and microeconometric estimation is given in Merz, 1989*a*.[4]

Different formal and informal income achieving strategies within an individual time budget are described in Figure 1. Paid formal work is the traditionally recognized object of the official statistics and serves at financing the national budget and the social security systems through its general liability to taxation and social security contributions. When analysing economic activity as paid work, it has to be distinguished whether income achieving activities are based on primary or secondary work—which in the official formal economy is combined with payment of contributions (social security, taxes)—or whether they are evaded. The latter activity is generally described as illicit work[5] and is, as a part of underground activities, assigned to paid informal activities. Concerning household production, all its legal activities belong to the non-market or self-service sector being part of the informal or shadow economy since the achieved surplus value therein is not included in official statistics per definition.[6]

Based on these definitions, our gender specific microanalysis of income achieving strategies in the formal and informal economy has two objectives. First, to descriptively show how different socioeconomic groups carry out informal additional activities besides the usual market activities and, second, to show and to quantify different decision patterns of men and women on legal and/or illegal income achieving activities.

2. The SFB 3-Secondary Occupation Survey and the Informal Economy Survey Concept

The Secondary Occupation Survey 1984 of the aforementioned Sonderforschungsbereich 3 (Sfb 3) (Helberger, Merz and Schneider 1985 for a detailed description of the database) is a representative cross-section of the FRG to obtain representative information concerning participation and working hours of formal and informal income achieving strategies as well as the types of activities carried

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[4]See Merz (1988*a, b*) also for a microsimulation analysis of individual formal and informal economy impacts of the recent German tax reform.

[5]This term constituting illicit work as evasion from contributions comprises more than e.g. the West German legal term which is, however, only indirectly operationalised by the law against illicit work. This law only includes handicrafts and abuses of unemployment benefits of the Federal Bureau of Labor.

[6]On the classification of household production as a part of the shadow economy, cp. Glatzer and Berger, 1985; Gershuny, 1983; Gronau, 1986 or Krüsselsberg et al., 1986 and the discussion of national accounts. We would like to point out the recent attempts of the German Federal Statistical Office for a nationwide time budget survey, a 1992 microdatabase to include "household production" in the National Accounts via a satellite system (Ehling and v. Schweitzer, 1991).

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out. Besides a primary occupation, secondary occupation—carried out legally or as illicit work—and near-market household production (in an open question) which, according to the reported answers can further be classified as "Do-It-Yourself" (DIY), occupy the central position in this survey.

Apart from being the first representative survey of illicit work and DIY-household production in the FRG for itself and as individual combinations, the Sfb 3-Secondary Occupation Survey offers further advantages. The secondary occupation complex of the survey also contains information on secondary occupation for those groups of persons which do not carry out a primary occupation, but another activity which they consider as a main one (for housewives/-men, pupils/students, unemployed or pensioners).

In addition, the Sfb 3-Secondary Occupation Survey takes account for seasonal influences (with four respective sub-samples in a three months interval of 2,000 cases each) and pursues an extended reporting scheme of secondary occupation. Thus, instead of a weekly reported concept like in the official statistics (e.g. the microcensus or the EC labor force survey), secondary engagement in the respective past quarter was sampled. The same extended reporting scheme was used for household production. Compared with a weekly or daily reporting concept (Alden and Spooner, 1982), with this procedure less frequent activities carried out irregularly and/or seasonally in secondary occupation and household production is also taken into account. A further original feature of the Sfb 3-Secondary Occupation Survey is asking for an evaluation of household production. Thus, both time and money information is individually available for each of the multiple formal and informal activities.

To incorporate the regional economic performance and to include labor demand information of the respondents, in addition, regional data were finally (exactly) merged with the Sfb 3-Secondary Operation Survey (Merz and Wolff, 1992a).

Measurement of Household Production

From the two informal complexes, household production and illicit work, the first is relatively easier to acess for interviews.[7] Among other reasons, this part of the shadow economy is completely legal and not connected with tax and social security contributions evasion. Instead of sampling a multitude of unpaid work and activities in the household,[8] the Sfb 3-Secondary Occupation Survey 1984 is restricted to sample only those unpaid activities in the household which, in the evaluation of the respondent, could also be alternatively purchased on the market (near market household production). The question was: "In the past three months, viz; since end of . . . , (besides normal housework), did you produce something for your own household which other people mostly buy (e.g. knit pullover, build wardrobe, make toys or grow fruits and vegetables etc.)? Did you carry out activities for which other people normally hire a skilled manual worker (e.g., renovate flat, repair car)?" The analysis shows that the activities indicated

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[7]Cp. also Merz, (1989a) and Merz and Wolff, 1988.

[8]For results on a more extended household production frame cp. e.g. Glatzer and Berger-Schmitt, 1986, or Statistisches Bundesamt, 1989; Merz and Wolff, 1991.

here by the respondents[9] can be characterized as DIY activities. The potential substitutability of household production and market goods and services should also enable the respondent to better estimate the value of household production as a further expenditure avoiding income part, and hence, an income achieving component.[10]

Measurement of Illicit Work

Illicit work, being a sensitive activity since it is connnected with the evasion of taxes and social security contributions, can hardly be sampled directly.[11] Its microanalytical sampling was hence made indirectly by embedding it in the secondary occupation complex. Concerning the question of expenditures for a secondary occupation, several types of costs/expenditures (e.g. material costs) as well as the terms "social security contributions" and/or "taxes" were operationalised as "costs." Since illicit work is mainly prosecuted in jurisdiction as evasion of taxes and/or social security contributions, we then individually examined whether or not paying contributions on secondary work is in accordance with individual West German tax and social security rules for low paid employment allowing to work freed from social security contributions (Social Security Law: SGB IV, Section 8) and only being taxed by a flat-note tax rate to be paid by the employer (Income Tax Law: EStG, Section 40a). As a result of these computations we identified all the secondary active persons who should have paid taxes and/or social security contributions but did not do so as black or illicit workers.[12]

3. DESCRIPTIVE RESULTS ON ILLICIT WORK AND HOUSEHOLD PRODUCTION

Our analysis of informal activities and components of individual budget starts with participation in household production and illicit work in the FRG. Based on this, both the time involved and the income which can be achieved thereof will show the importance of informal activities according to individual time allocation and economic well-being. In the FRG, as in many industrialized countries, women have a lower participation in the official labor market than men. Therefore we ask whether this gender specific participation pattern continues in the informal sector, or whether different behavioral patterns prevail. A further aspect of our family economic analysis is the distinction between different types of families/household units, which surely allows conclusions on how far a family specific need is covered by informal activities. For the evaluation of the relative importance and size of the above mentioned informal activities, we also discuss the figures of formal legal occupation. The latter consists of primary occupation and/or legal secondary activities.

[9]The definition of a near-market household production is different from a broader understanding of household production in general, which contains all kinds of unpaid work in the household including e.g. housework or childcare which usually are less open for an alternative market purchase.
[10]A synopsis of different evaluation possibilities and the underlying concepts for household production can be found in Hawrylyshyn (1976) or Chadeau (1985).
[11]In an international framework microdata of illicit work are scarce. Only information on Belgium (Pestieau, 1985); the Netherlands (van Eck and Kazemier, 1989); Norway (Isachson and Strøm, 1985); or the U.S. (Smith, 1985) are available.
[12]For a detailed description see Wolff (1991).

With respect to participation, Table 1[13] contains important basic information on household production (E), illicit work (S) and a legal occupation (L) in the FRG. Taking a look at the participation rates, Table 1 shows that about 42 percent of the West German resident population at the age of 14 and older pursue a legal occupation, a figure which corresponds to the official statistics. Every fourth person is active in unpaid household production (25 percent) and every twenty-fifth person works illicitly (4 percent) i.e. almost each second person with a secondary occupation is working illicitly;[14] these results are remarkable.

TABLE 1

INCOME ACHIEVING STRATEGIES IN THE FORMAL AND INFORMAL ECONOMY: PARTICIPATION IN LEGAL WORK, ILLICIT WORK AND HOUSEHOLD PRODUCTION AND COMBINATIONS OF THESE ACTIVITIES FOR ALL, MEN AND WOMEN IN THE FRG

Activity	Participation as %		
	All	Men	Women
Legal work (L)[1]	42.1[2]	59.8	27.5
Illicit work (S)	4.4	5.7	3.3
Household production (E)	25.2	24.9	25.5
Combinations[3]			
L, E	13.2	18.4	8.8
L, S	2.3	3.8	1.1
E, S	2.3	3.3	1.4
L, S, E	1.3	2.3	0.5

Source: Sfb 3-Secondary Occupation Survey 1984, N = 7098, own computations.

Note: Base of these computations: all persons with complete information (hours, income) for each activity (N = 7098, N_{men} = 3206, N_{women} = 3892) representatively weighted.
[1]Legal work: primary occupation and/or legal secondary occupation.
[2]As a percentage of all persons/all men/all women (14 years and older respectively).
[3]Two combined activities: persons with at least two of the activities.

For both men and women participation in near-market household production is approximately equal, illicit work shows a clearly lower female than male participation similar to the situation in legal occupation. Thus the relatively lower official female economic activity pattern continues in the field of illicit work. Considering multiple job holding in legal and illicit work as well as in household production, lower female labor force participation is even more flagrant which is to be accounted in particular to the relatively low official labor force participation.

We now consider the importance of average weekly working hours and monthly net income from informal strategies in illicit work and household production (Table 2). In the average, six hours per week are used for illicit work and five for near-market household production of goods and services. As further

[13]All figures in the descriptive tables are based on representatively weighted information.

[14]A figure which corresponds to the one presented by Schwarze and Helberger (1987), who, however, only investigate the fourth sub-sample of the Sfb 3-Secondary Occupation Survey with respect to offences against the federal law against illicit work.

results show there are only a few very active persons with high working hours; the majority spends less time in informal activities than the average. In both informal activities—in contrast to legal occupation—women have a higher time input on average than men. The time allocation of the multiple job holders, both men and women, shows an increase in the average working time of five hours for legal occupation and illicit work and three hours for legal occupation and household production respectively.

TABLE 2

INCOME ACHIEVING STRATEGIES IN THE FORMAL AND INFORMAL ECONOMY: AVERAGE WEEKLY WORKING HOURS AND AVERAGE MONTHLY NET INCOME (DM) IN LEGAL WORK, ILLICIT WORK, HOUSEHOLD PRODUCTION AND COMBINATIONS OF THESE ACTIVITIES FOR ALL, MEN AND WOMEN IN THE FRG

Activity	∅ weekly working hours hours			∅ monthly net income DM		
	All	Men	Women	All	Men	Women
Legal work (L)[1]	37.2[2]	40.4	31.5	1,647.4	1,941.1	1,122.5
Illicit work (S)	6.1	4.5	8.3	421.5	293.9	600.8
Household production (E)	4.9	3.6	6.0	154.9	225.2	98.2
Combinations[3]						
L, E	40.2	43.5	34.6	1,848.3	2,219.1	1,212.9
L, S	42.9	45.0	36.6	1,999.7	2,117.4	1,649.7
E, S	8.2	6.6	11.1	689.3	499.3	1,050.7
L, S, E	46.3	47.6	41.1	2,205.2	2,359.0	1,589.8

Source: Sfb 3-Secondary Occupation Survey 1984, N = 7098, own computations.

Note: Base of these computations: all persons with complete information (hours, income) for each activity (N = 7098, N_{men} = 3206, N_{women} = 3892).

[1]Legal work: primary occupation and/or legal secondary occupation.

[2]As a percentage of all persons/all men/all women (14 years and older respectively).

[3]Two combined activities: persons with at least two of the activities.

It can be maintained and summarized that in both parts of the informal sector, women on average have higher working hours than men. It may be supposed that women compensate for a missing legal occupation or a legal occupation with low working hours by investing more time in informal activities. In total when multiple job holding with legal and informal activities is considered, female total working hours are still lower than male working hours.

Based on higher working hours of women in the informal sector, monthly net income figures (Table 2) demonstrate that only when considering illicit work and combining illicit work with household production, their average informal income resulting thereof is above that of men. In all other sectors and their combinations, women earn between 2/3 and 3/4 of the average net income of men. Gender specific differences become most apparent when taking a look at the estimated value of household production: women estimate their monthly "savings" by DIY to nearly 100 DM. This compares to about 40 percent to the stated value of men. Converted into an estimated value per hour worked, women evaluate their DIY activities much lower stating about 16 DM/hour in comparison with 62 DM/hour for men.

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Altogether, the self-reported monthly value from household production is 155 DM. This accounts for nearly 10 percent of the West German average legal monthly net income of 1647 DM, whereas illicit workers, earning about 422 DM/month, account for 25 percent of the average net income.

Various income levels from the formal economy necessitate different informal participation patterns (Gershuny, 1983; Pahl, 1984). In the social and economic policy discussion it is asked whether additional income achieving activities are necessary, in particular where a relatively low income is concerned, or whether informal participation is, rather, connected to a higher income. Table 3 includes participation rates broken down in the first part for different monthly net household incomes (from formal occupation = from legal activities) and additional income from informal participation.

With respect to legal work, illicit work and household production, Table 3 points out similar patterns although they differ in level: a participation in the informal economy (illicit work and household production) increases along with an increase of net household income from the formal economy. In comparison to the participation of the total population, the group with the lowest net household incomes (without the informal components) shows much lower participation rates. Whereas, persons in households with a higher income are informally active above the average participation of the population as a whole. On a different level this holds for both men and women. However, gender specific differences are noticeable. In particular, women's share of household production with a higher household income (from formal activity) is, at 33 percent, clearly above that of men (27 percent).

In total, these results indicate that a better financial situation of the households (from the formal economy) also causes a higher participation rate in the informal economy. Improved possibilities of access and a different activity pattern may well be the underlying causes. However, an analysis of a net household income of this kind does not allow us to draw a conclusion on the personal composition of the household; namely, its breadwinning and its specific income need. Further income distributional analyses including equivalence scale based well-being measures are necessary and will be postponed to a further study.

From the viewpoint of family policy, it is interesting to find out whether households' different specific income needs as well as their different opportunities to earn money regarding their life-cycle could be the cause of various informal income achieving strategies. A first step in a respective analysis is to subdivide the interviewed persons according to the achieved phases of their life-cycle (Emge, 1981). A rough subdivision takes account of composition and size features of three types of households: single person households, couples without children, households with children. The life-cycle criterion for further differentiation of these three groups is age. If we then distinguish the gender of the household member being interviewed, we obtain a gender specific feature of the head of the household (more than 66 percent of the interviewed have described themselves as heads of household). In summary, this leads to eight groups of achieved life-cycle phases (see Table 3).

The second part of Table 3 shows the participation in the formal economy (legal work) and in the informal economy divided by illicit work and household

TABLE 3

INCOME ACHIEVING STRATEGIES IN THE FORMAL AND INFORMAL ECONOMY: PARTICIPATION IN LEGAL WORK, ILLICIT WORK AND HOUSEHOLD PRODUCTION FOR ALL, MEN AND WOMEN ACCORDING TO MONTHLY HOUSEHOLD NET INCOME (FROM LEGAL ACTIVITIES), AND TO DIFFERENT LIFE CYCLE PHASES OF THE HOUSEHOLD

	Legal Work			Illicit Work			Household Production		
	All	Men	Women	All	Men	Women	All	Men	Women
Total population	42.1	59.8	27.5	4.4	5.7	3.3	25.2	24.9	25.5
Household net income from legal activities (monthly)									
Low (<1500 DM)	13.7	15.0	13.1	3.2	4.4	2.6	17.5	19.4	16.6
Medium (<2500 DM)	36.4	56.2	19.2	4.1	5.0	3.2	23.0	23.7	22.4
High (≥2500 DM)	59.2	75.0	43.8	5.1	5.5	4.6	30.5	27.6	33.5
Single person households									
Young (≤29 years)[2]	66.6	61.3	71.5	5.4	5.9	4.8	28.4	28.7	28.4
Medium (30–59 years)	70.0	72.9	67.3	3.5	5.6	1.7	20.8	20.2	21.4
Elderly (≥60 years)	2.7	5.8	2.1	1.3	2.5	1.1	15.2	25.8	13.3
Households without children									
Young/medium (≤59 years)	60.2	82.4	39.2	5.7	6.6	4.8	29.0	27.7	30.2
Elderly (≥60 years)	5.8	7.9	3.0	2.0	2.3	1.5	18.0	15.6	21.2
Households with children by age of youngest child									
≤5 years	50.2	86.4	25.1	5.2	6.9	4.0	31.2	33.9	29.4
6–13 years	53.9	84.1	28.1	4.0	4.6	3.6	30.6	29.4	31.6
14–20 years	49.0	61.7	37.0	6.1	7.9	4.3	26.5	25.1	27.9

Source: Sbf 3-Secondary Occupation Survey 1984, N = 7098, own computations.

Note: Base of these computations: all persons with complete information (hours, income) for each activity (N = 7098, N_{men} = 3206, N_{women} = 3892).

[1] As a percentage of all persons/all men/all women (14 years and older respectively).

[2] Age of the interviewed person.

production and takes into account these eight different groups of achieved phases of life-cycle. Almost all participation rates of young and middle-aged single person households are substantially higher than those of the all over participation of the total population. These rates differ only slightly in household production and illicit work. Legal male labor force participation is, as expected, above the average of the total male population; that of female young and middle-aged single person households is more than twice that of the overall legal labor force participation of women. Altogether, two out of three single person households under sixty years pursue a legal occupation as the main income achieving strategy in this group of persons. Elder single person households withdraw from work in general, except for men who increasingly participate in household production.

There are relatively less active elder couples without children in household production and illicit work than respective younger/medium households. Only 18 percent of the men and women are active in household production. However, the general withdrawal from work of elder couples without children is considerably stronger with respect to paid legal or illicit work than with regards to unpaid, non-market oriented household production.

Younger/middle-age couples without children show a legal labor force participation of about 60 percent. The figures for men (82 percent) and for women (39 percent) are significantly higher compared to the overall figured (men 60 percent, women 27 percent). Regarding both sexes under 60 years in this household type, we can record a participation rate above average in the informal economy. In household production as well as in illicit work. With a relatively high legal participation we could suppose here that the available leisure time (no children) is split up in additional work for the achievement of an even higher level of consumption and in the necessary consumption time.

The last household type regarded is a household with children divided by the age of the youngest child. Men and women in the three household types show substantial differences in participation in formal and informal activities. The economic need to earn more money in this first family phase is satisfied, compared with the overall population, through a relatively strong extension of informal activities in household production and illicit work, carried out by men and women. Men's relatively high household production participation is to be noted. As expected, women mostly spend their time for child care within this family phase, whereas men, in comparison to all other phases of life, achieve a relatively high legal labor force (86.4 percent), household production (33.9 percent) and illicit work participation rate (6.9 percent). Women with children of all age groups are relatively more active in the informal economy than the overall average; they definitely contribute their share to the additional income achievement.

A similar picture is true for the groups of households where the youngest child attends primary school. But female legal and DIY-household production participation has risen, whereas participation in illicit work slightly dropped. Women in these types of households have a bigger chance of becoming active in the legal sector since the children, due to school, require a smaller share of a mother's time budget. We note that men in this group in comparison to men in couples with younger children reduce their participation in illicit work and

household production; we suppose that pushing the career in a legal primary occupation requires a higher number of hours. An accomplished increase in disposable legal income reduces the necessity of an informal additional labor force participation.

The last group to be considered are those households with exclusively elder children; the male legal labor force participation is at 60 percent, clearly lower than in other types of households with children. The legal participation of women with elder children (37 percent) nearly attains the same level as that of women in couples having no children. This higher female participation combined with possibly insufficient legal job opportunities, also causes a higher femal participation in illicit work as the second paid work alternative than in the two other types of households with younger children. The considerably lower male labor force participation seems to have an effect on male illicit work participation as well, which, with 7.9 percent of men in this type of household, is higher than all other types of households.

As a result of this descriptive analysis of various types of families, we can summarize that both, household production as well as illicit work as informal additional income achieving strategies, vary in their importance by life-cycle and gender. Besides differences in the official paid work between single person households, elder households without children and households with children, clear distinctions between interviewed men and women are obvious in the informal sector. We would like to point out again that the term "household production" here describes a type of DIY activity rather than housework which is presumably still mainly carried out by women.

4. MULTINOMIAL LOGIT ESTIMATION OF PARTICIPATION IN ALTERNATIVE INFORMAL INCOME ACHIEVING STRATEGIES

Our descriptive analysis demonstrates that participation in the informal sector is strongly influenced by gender, life-cycle pattern and different type of household composition. To elaborate and *to quantify the relative influences* of the various individual factors on a participation in the informal sector, we now follow a multivariate approach. We separately analyze male and female decisions between different informal alternatives.[15]

According to our concept of the informal economy, individuals have the following four different mutually exclusive strategies at their disposal:
   (1) no informal participation (0)
   (2) illicit work only (S),
   (3) household production only (E), and
   (4) both illicit work and household production (SE).
The four strategies concerning informal engagement consists of three single strategies [(1)–(3)] and one combined strategy (4) and give an exhaustive picture of individual behavior towards the informal economy as defined in former sections. The appropriate approach of modelling individual participation behavior therefore is multinomial and requires a discrete choice approach.

[15]The results of the model for the whole residential population with gender as a dummy are available by request from the authors.

Random Utility Maximization and the Multinomial Logit Approach

The discrete choice approach for the different independent income achieving strategies is based on random or stochastic utility maximization (see McFadden, 1985 for an overview) and serves as a model to explain individual decision making out of a finite set of mutually exclusive alternatives or strategies. The underlying basic idea of the random utility concept is that an individual i is capable to describe each strategy j $(j = 0, \ldots, J)$ by a scalar utility index U_{ij},

$$(1) \qquad U_{ij} = D_{ij} + \varepsilon_{ij} \qquad \text{where } D_{ij} = \alpha' A_{ij} + \beta_j' X_i$$

which is composed into a stochastic part ε_{ij} and a deterministic part D_{ij}. The latter is linear and additively separable in its arguments. It consists of A_{ij} as a vector of attributes of the J strategies and of X_i, the socioeconomic characteristics of the decision maker. The parameter vectors to be estimated are α and β_j. The parameter vector β_j differs in its magnitude for each strategy j, whereas α remains constant across all strategies. Given α and β_j an individual finally chooses strategy j if its utility is greater than these of all other strategies ($U_{ij} > U_{ik}$ for $j, k = 0, \ldots, J$; $j \neq k$). Since our microdata do not contain the specific attributes of each strategy,[16] we have to restrict our analysis to the socioeconomic characteristics of the individuals. The choice probability P_{ij} in our model finally is:

$$(2) \qquad P_{ij} = \left[\sum_k \exp\left((\beta_0 - \beta_j)' X_i\right) \right]^{-1} \qquad (j, k = 0, S, E, SE),$$

where X_i still denotes the vector of the individual explanatory variables and β_j the parameters to be estimated by maximum likelihood for the discrete informal income strategies $j(j = 0, \ldots, J)$.

As is shown in equation (2) only the difference of the parameter vectors $(\beta_0 - \beta_j)$ is to be estimated, which requires that the parameter vector is normalized with regard to one alternative, here "no informal participation" (0). From that, all parameters β_0 have to be referred to this inactive alternative.

Explanatory Variables Accounting for a Participation in the Informal Economy

When modelling the alternatives of different informal participations, a human capital variable like experience, approximised by age, age^2 and educational level should be used besides family status. Since individual skills out of an official occupation could be of importance for an informal additional participation, an extension of the classical human capital approach by variables like occupational statuses and wage rates in the formal economy (primary occupation) seems to be appropriate. The hours of work in primary occupation should also be included in the analysis of informal activities since they compete with the informal activities in the time budget. The additional incorporation of different non-gainful statuses (e.g. pupils/students, housewife/-man) should demonstrate how far the non-primary occupied show different activity patterns in the informal economy.

[16]Only information on the attributes of the actually chosen alternative are available for each individual.

Since pursuing informal activities also strongly depends on contacts not only made at work, but in social surroundings and in unpaid activities (Merz, 1989*a* or Wolff, 1990), we use activities in social networks as an additional explanatory factor. The variables, children and number of earners in the household, are indicators for individual additional time consuming activities of men and women and—in the case of chldren—a possible increased financial demand which could be covered by informal participation. The last block of regional variables, community size and regional long-term unemployment quota,[17] is used to examine the hypothesis of whether an informal participation is subject to a regional differentiation with reference to the local living area and to the regional economic structure concerning the various possibilities of obtaining a formal job.

The corresponding results of the multinomial logit approach for the three informal alternatives "illicit work only," household production" as well as "both illicit work and household production" estimated for both sexes separately are shown in Table 4a and 4b. The coefficients[18] quantify the respective influence on the index function of the multinomial approach and hence on the probability of a respective participation.

Results of the Gender Specific Multinomial Logit Approach for Various Strategies of Participation in the Informal Economy

The multinomial logic estimates of informal income achieving strategies for men and women in Table 4a and 4b contain many interesting results. In order to focus on the main results, we do not want to present all the results for both sexes separately. Instead we first point out *common factors for male and female decisions* towards informal income achieving strategies. In a second step we then discuss the *main gender specific differences.*

Common Factors for Male and Female Informal Income Achieving Strategies

An engagement in unpaid social networks, regional long-term unemployment figures as well as age, are of general significant influence for all kinds of informal participation for both sexes.

Though being active in unpaid social networks might theoretically reduce the individually available time budget for informal activities, the reverse is true for the probability of an informal engagement. Social contacts of unpaid mutual help and support sharply increase both sexes' probabilities to become active in the informal economy. It seems that social networks serve as an information market for numerous ideas, suggestions and possibilities, and, on the one hand, give rise to one's own DIY-household production. On the other hand, this kind of unpaid activity serves as a market for the exchange of supply and demand for paid illicit work.

Regional economic and official labor demand factors, portrayed by regional long-term unemployment figures, show that the probability of an informal engagement in general is inversely related to the possibilities of getting an official job.

[17]The regional long-term unemployment quota is used as an indicator for serious structural problems in the region of living.
[18]The estimations were carried out with the PC program package LIMDEP (Greene 1988).

INCOME ACHIEVING STRATEGIES IN THE INFORMAL ECONOMY: RESULTS OF A
MULTINOMIAL LOGIT APPROACH FOR PARTICIPATION PROBABILITIES FOR *WOMEN* IN
ILLICIT WORK AND HOUSEHOLD PRODUCTION

	Illicit work		Household Production		Illicit Work and Household Production	
	Coeff.	T-value[1]	Coeff.	T-value	Coeff.	T-value
PERSONAL CHARACTERISTICS						
Family status						
Married	−0.582	1.56	−0.010	0.08	−0.460	0.11
Age	0.023	0.42	0.024	1.46	0.172	2.19*
Age^2* 10^{-2}	−0.063	1.09	−0.041	2.41**	−0.238	2.52**
Educational level						
No certificate at all	−0.289	0.87	−0.280	2.80**	−0.399	1.00
With Apprenticeship (+)[2]	—	—	—	—	—	—
Upper Secondary	0.425	0.91	0.298	1.71*	0.644	1.33
University degree	0.950	1.98*	0.089	0.41	0.312	0.48
Occupational and social status						
Blue-collar worker (+)	—	—	—	—	—	—
White-collar worker	−0.914	1.44	−0.199	1.02	−0.018	0.03
Civil servant	0.176	0.18	0.116	0.31	−16.138	0.01
Self-employed	0.505	0.54	−0.613	1.52	−0.474	0.38
Unemployed	−1.186	1.08	−0.156	0.37	0.112	0.09
Pensioner	−1.043	1.04	−0.364	1.02	−0.789	0.57
Housewife/-man	−1.070	1.21	−0.486	1.47	−1.099	0.99
Student	−1.559	1.44	−0.674	1.67*	−0.283	0.22
Occupational Trainee	−17.661	0.01	−0.201	0.50	−16.589	0.01
Primary occupation						
Hourly net wage	0.020	1.12	0.001	0.04	−0.036	0.48
Weekly working hours	−0.049	2.06*	−0.010	1.33	−0.018	0.77
Activities in unpaid social						
networks	0.900	3.51**	1.239	15.28**	1.903	6.45**
HOUSEHOLD CHARACTERISTICS						
Monthly household net income						
Low (<1500 DM)	0.020	0.06	−0.142	1.17	0.002	0.01
Medium						
(1500-<2500 DM) (+)	—	—	—	—	—	—
High (≥2500 DM)	−0.270	0.80	0.184	1.74*	−0.171	0.48
Number of earners in the						
household	0.697	4.25**	0.135	1.84*	0.528	2.54**
Children						
<3 years	−1.705	1.63	−0.037	0.21	−0.295	0.51
3–5 years	0.052	0.10	0.057	0.35	1.012	2.45**
REGIONAL AND LABOR DEMAND INFORMATION						
Community size						
Rural structure						
(<5000 inh.)	−0.607	1.13	0.074	0.56	0.203	0.46
Long term unemployment						
quota	−0.017	1.83*	−0.008	2.72**	−0.027	2.50**
Constant	−2.368	1.49	−1.155	2.16*	−6.363	3.20**
Pseudo R^2	0.55					

Source: Sfb 3-Secondary Occupation Survey 1984, N = 7826, own computations.
[1]Significance level of the t-values: *(95%), **(99%).
[2](+)-indicates the reference group.

INCOME ACHIEVING STRATEGIES IN THE INFORMAL ECONOMY: RESULTS OF A
MULTINOMIAL LOGIT APPROACH FOR PARTICIPATION PROBABILITIES FOR *MEN* IN
BLACK WORK AND HOUSEHOLD PRODUCTION

	Illicit work		Household Production		Illicit Work and House-hold Production	
	Coeff.	T-value[1]	Coeff.	T-value	Coeff.	T-value
PERSONAL CHARACTERISTICS						
Family status						
Married	−0.581	0.18	0.384	2.85**	−0.702	2.40**
Age	0.068	1.29	0.083	3.70**	0.119	2.24*
Age^2* 10^{-2}	−0.084	1.38	−0.102	4.13**	−0.152	2.40**
Educational level						
No certificate at all	−0.134	0.37	−0.162	1.01	0.382	1.28
With Apprenticeship (+)[2]	—	—	—	—	—	—
Upper Secondary	−0.180	0.33	−0.134	0.61	0.220	0.46
University degree	0.503	1.12	0.121	0.62	0.125	0.27
Occupational and social status						
Blue-collar worker (+)	—	—	—	—	—	—
White-collar worker	−0.897	2.11*	−0.157	1.07	−0.631	1.80*
Civil servant	−0.476	0.90	−0.011	0.06	−0.327	0.72
Self-employed	−0.973	1.25	−0.573	2.13*	−0.926	1.54
Unemployed	−1.278	1.23	−0.266	0.50	1.652	1.53
Pensioner	−1.836	1.66*	0.065	0.12	1.259	1.08
Housewife/-man	−16.972	0.01	−0.085	0.10	−14.308	0.01
Student	−1.443	1.41	0.157	0.30	0.894	0.80
Occupational Trainee	−0.092	0.12	0.200	0.50	0.719	1.11
Primary occupation						
Hourly net wage	−0.044	0.87	0.012	0.76	0.060	2.35**
Weekly working hours	−0.026	1.33	0.003	0.03	0.019	0.89
Activities in unpaid social						
networks	0.694	3.00**	1.410	14.61**	1.374	6.19**
HOUSEHOLD CHARACTERISTICS						
Monthly household net income						
Low (<1500 DM)	−0.169	0.42	0.122	0.75	−0.109	0.30
Medium						
(1500-<2500 DM(+)	—	—	—	—	—	—
High (≥2500 DM)	−0.214	0.72	−0.086	0.68	−0.435	1.54
Number of earners in the						
household	0.271	1.52	0.120	1.42	0.396	2.45**
Cyildren						
<3 years	−0.529	0.83	−0.274	1.23	−0.255	0.53
3-5 years	0.569	1.30	−0.268	1.33	0.497	1.28
REGIONAL AND LABOR DEMAND INFORMATION						
Community size						
Rural structure						
(<5000 inh.)	0.165	0.46	0.048	0.31	1.024	3.85**
Long term unemployment						
quota	−0.015	1.87*	−0.007	2.08*	−0.026	3.15**
Constant	−2.980	2.16*	−3.451	5.27**	−6.477	4.42**
Pseudo R^2	0.51					

Source: Sfb 3-Secondary Occupation Survey 1984, N = 7826, own computations.
[1]Significance level of the t-values: *(95%), **(99%).
[2](+)-indicates the reference group.

This also means that in regions without larger structural problems, the chances for paid informal activities (illicit work) are significantly higher than in regions that are economically worse off. A further result concerning the three different male and female informal income achieving strategies: the theoretical inversely U-shaped impact of age, well-known from human capital theory, becomes apparent. However, certain restrictions pertaining to this result have to be made. Only in regard to the strategy of combining "household production and illicit work" (for men and women), as well as the male's decision towards "household production only," is this pattern of significance. For the female strategy "household production only" the negative impact of age prevails, and for both sexes, decisions to carry out "illicit work only," no significant age effect at all becomes visible.

Main Gender Specific Differences

If we analyze the most important gender specific differences affecting an informal engagement in household production and/or illicit work, there are different impacts of the marital status and the structure of the family. Whereas married men significantly are more willing to carry out "household production only," they less tend to the strategy "household production and illicit work." In contrast, married women (though insignificantly) show lower probabilities of informal engagement at all.

A reversed picture is given for the number of earners in the household. A distinct additional worker effect only becomes apparent for women, whereas for men the number of earners only increases the probability of carrying out two informal activities simultaneously. In addition to this result, higher household incomes (without informal incomes) only increase the probability of the female strategy of "household production only."

The age of the youngest child in the household partly supports the additional worker effect already stated for women. Children from 3 to 5 years of the interviewed, i.e. an age group which, compared to younger children, require lower (female) time input for care, significantly increase female decisions towards "household production and illicit work."

The structure or size of the town of residence is of much less importance than the already stated results concerning regional labor markets. Only men are positively affected by a rural structure in their decision to carry out "household production and illicit work."

Further gender specific differences arise from educational degrees, occupational and social status as well as characteristics of primary occupation. Since there is low significant influence from education and occupational and social status on male and female behavior we only want to illustrate the impacts of primary working hours and net wages. Though only significant for the female strategy "illicit work only," weekly working hours in general show that they compete with informal activities in the allocation of time. Net wage rates only increase male probability of "household production and illicit work."

As a general result of our multinomial logit estimates we maintain that the formal economy is of general importance for the decision to become informally active, either by number of earners in the household, regional labor demand

situation or personal occupational characteristics. The relative impact of these variables on informal activities follows at least partly gender specific patterns and differs between legal and illegal strategies. In addition, unpaid social network contacts are an important source of information and generally increase the probability of becoming engaged in various kinds of informal activities.

5. CONCLUDING REMARKS

Our shadow economy results showing differences in the explanatory structure of different legal and illegal informal income achieving strategies support the multinomial approach we had chosen with different independent strategies. They also underline the need to distinguish carefully between legal and illegal informal activities in the economic and social policy discussion and to discuss the activities in the shadow economy separately.

Besides gender specific differences, the overall relevance of personal characteristics, features of the region and social networks as well as family related factors, stress the particular importance of socioeconomic life-cycle situations for an engagement in the informal economy with household production and illicit work as informal family income achieving strategies.

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