

AN APPLICATION OF THE LOGIT MODEL TO THE ANALYSIS OF
INFORMAL SECTOR ACTIVITIES: THE CASE OF STREET
SELLERS IN SHIRAZ, IRAN

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ABSTRACT

This paper reports on the results of a research carried out during 1993-94 aiming at studying street sellers as an informal sector activity and a source of socio-economic problems in Shiraz, Iran. This study makes use of two Logit models in order to present a unified framework depicting the factors that seem to affect the development of informal sector activities. The first model looks at those factors affecting one's choice of hawking as a job, and the second looks at those factors responsible for the sustenance of hawking in Shiraz. The results of the study show that: 1) unavailability of proper jobs in the formal sector, 2) lack of proper skills required to be employed in the formal sector, 3) inadequate income earned in the formal sector; and finally, 4) the indecisiveness of the local authorities towards the street sellers have led to the sustenance of hawking in Shiraz.

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1. INTRODUCTION

Informal sector activities in urban and rural areas have been the subject of much interest in developing countries. During the last two decades, in particular, intensive research has been carried out by individuals and international organizations such as ILO in order to study the main causes of formation and expansion of such activities.

Although the concept of "informal sector" has been a matter of controversy (Peattie 1987, Khundker 1988), a great number of researchers have studied the topic from diverse viewpoints. Mazumdar (1976), for instance, looks at the structure of labor force in Tanzania's informal sector. Scott (1985) investigates the development of informal sector activities in Zambia. Hofmann (1986) looks at the market differences among selected branches of the informal sector in Fayoun City in Egypt. Natras (1987) considers the relationship between the formal-informal sector and the government in Transkei, South Africa. Nurul Amin (1987) studies the informal sector as a useful source of labor for the process of industrialization in Bangladesh. Hemmer and Mannel (1989) consider the formation of the informal sector as a result of industrialization policies in developing countries. Chaudhuri (1989) investigates the relationship between the formal and the informal sectors in a general equilibrium framework. Livingstone (1991) considers the concept of small scale enterprise as a better representation of informal sector activities. And finally, Kelly (1994) considers the informal sector in a macro context.

This list, though not exhaustive, is representative of the research carried out on the informal sector activities. Nonetheless, none of these studies provides a formal model to help the reader capture the contribution of factors affecting the development of informal sector activities.

The present study attempts to fulfill the gap by applying the Logit model in a study of street sellers as an informal sector activity in Shiraz, Iran. In so doing, we will first introduce the background and the source of the data. This will be followed by the presentation of the models. The findings of the study will be discussed in the light of the proposed models. Finally, concluding remarks and policy recommendations will be offered.

2. BACKGROUND

The informal sector in Iran has attracted both the unemployed and the employed people. For the latter, the informal sector is a means of supplementing their low income obtained from the formal sector. According to the present Iranian laws, street sellers' activities and informal taxi services are illegal, but there is no law against private tutoring. However, the exiting laws have only been partially enforced against the street sellers.

Informal sector activities in this country are mainly concentrated in trade and services. Street sellers are engaged in trade activities which include a wide variety of commodities such as clothing, footwear, food and beverages, household utensils, and tools. Informal sector activities in services mainly include private car owners transporting inner-city passengers and teachers tutoring privately. The size of such activities was negligible before the Islamic Revolution but has been an expanding business in recent years.

Although hawking, in the strict sense of the term, existed before the Islamic Revolution, the structure of hawking has changed in recent years. Not only do street sellers now engage in trading a wide variety of commodities, but have they occupied a certain space on the street pavements in a disproportionate scale and their activities have resulted in certain problems for the formal business sector, shoppers, and the local officials in Shiraz. The formal sector as tax payers demands the removal of hawkers from the street pavements. Shopping has also become uncomfortable because of the presence of hawkers in the congested downtown business districts. Nonetheless, despite the growing socio-economic problems that hawking has created, some low income groups have welcomed the presence of hawkers on the streets. Of course, hawking has not received an overall social acceptability and is regarded as a sign of disability of the formal sector to absorb a young growing urban indigenous and migrating unemployed labor force.

3. SOURCE OF DATA

The data for this research were collected through a questionnaire completed by the street sellers in Shiraz. The questionnaire included questions related to formal-informal sector relations, hawkers personal characteristics and their reasons for operating in the informal sector, and the hawker's viewpoints on official's actions and policies towards the informal sector activities. The questions were so designed to fit the application of the Logit model.

4. LOGIT MODELS OF INFORMAL SECTOR ACTIVITIES

Two models are presented here for illustrative purposes.

4.1 Informal Sector Employment Model (ISEM)

This model studies the factors that lead a person to consider hawking as a job. The respondents to the questionnaire were divided into two groups for this purpose: those already employed in the formal sector and those who chose hawking as a second job in order to supplement their low income earned in the formal sector.

The model is as follows:

$$\text{Ln} \left[\frac{P(\text{FRJ} = 1)}{(1 - P(\text{FRJ} = 1))} \right]^* = \alpha_0 + \alpha_1 \text{MUR}_i + \alpha_2 \text{LIT}_i \\ + \alpha_3 \text{EMP}_i + \alpha_4 \text{EXI}_i + \alpha_5 \text{RSU}_i + \alpha_6 \text{ORH}_i + \alpha_7 \text{MIG}_i + \varepsilon_i$$

In this model, the hawker's response to the question that whether hawking is his second job or not is considered as the dependent variable. This variable takes a value of one if he does not have any other job except hawking and zero otherwise. Since the dependent variable can have either a value of zero or one, the Logit model is the appropriate one.

Independent variables:

These variables are qualitative and quantitative and are as following:

MUR: Mark-up rate on sales

SCR: Sales to working capital ratio

LIT: Literacy rate: this variable takes a value of one if the respondent has received less than five years of formal education and zero otherwise.

EMP: Sectoral employment preference: this variable takes a value of one if the respondent prefers employment in the informal sector and zero otherwise, implying that those who prefer employment in the formal sector would leave the informal sector as soon as job opportunities are available in the formal sector.

EXI: Expected income: this variable takes a value of one if the hawker expects a rising income and zero otherwise.

HAR: Hawker's reaction to social unacceptability: this variable takes a value of one for a passive reaction and zero otherwise.

ORH: Official reaction against hawking: this variable takes a value of one for benign neglect and zero otherwise.

MIG: Migration status: this variable takes a value of zero if the individual is from Shiraz and one otherwise.

ε : Error term.

Results:

The parameter estimates of the Logit equation incorporating the above variables are reported in Table 1. The dependent variable is the log of the odds ratio⁽¹⁾ or the Logit of the event for which FRJ=1. On a priori basis, it is expected that all coefficients take a positive sign. The estimated results indicate that all parameters except for EMP and EXI have the expected sign. Obviously, few points of explanation about these two are in order. Although the respondents' preference for employment in the informal

* Independent variable is the log of odds ratio. See note no. 1.

Table 1. Statistical Results of the Informal Sector Employment Model

LOGIT // Dependent Variable is FRJ

SMPL range: 1 - 589

Number of observations: 589

Convergence achieved after 4 iterations

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	2.2649815	0.3807615	5.9485575	0.0000 *
LIT	1.0232489	0.4200342	2.4361084	0.0151 *
MUR	0.6288284	0.4081029	1.5408574	0.1239 ***
FMP	-2.5384207	0.2734999	-9.2812487	0.0000 *
EXI	-0.5999818	0.2582412	-2.3233389	0.0205 *
HAR	0.6409320	0.2630116	2.4368965	0.0151 *
ORH	0.7518631	0.3441502	2.1846948	0.0293 *
SCR	-0.1610323	0.0927081	-1.7369814	0.0829 **
MIG	0.0443390	0.2752511	0.1610855	0.8721 ****
Log likelihood	-206.99247			
Cases with FRJ=1	484			
Cases with FRJ=0	105			

* significant at less than 5% level

** significant at less than 10% level

*** significant at less than 15% level

**** Not significant

sector would increase the probability of the person to be employed in that sector, the negative sign is an indication that the individuals under study are in the hawking business despite their preference for employment in the formal sector. This negative sign is in harmony with the sign for EXI. That is, the hawker would prefer to leave his job for employment in the formal sector despite a rising income in his present activity.

To determine the probability that an individual would choose hawking as a job, we first utilize the sample mean for MUR but a value of one for other explanatory variables to obtain the value of the log of the odds ratio. We then substitute this value into the cumulative logistic density function⁽²⁾ in order to obtain the probability that an individual would become a hawker. The obtained value is 0.849. This means that there is nearly an 85 percent probability that an individual who satisfies the characteristics which are specified by the model will become a hawker.

It is interesting to note that a 10 or a 20 percent increase in the mark-up rate, as an example, would just increase the net probability by 0.4 or 0.6 percent, respectively. This finding implies that factors other than financial prospects have an important role in attracting the respondent to become a hawker. Also, since the coefficient for MIG is not significant or different from zero, one cannot accept that having a migrant status would increase the probability of the respondent to become a hawker.

4.2. Informal Sector Permanent Employment Model (ISPEM)

The second model tries to explain the factors that lead a person to consider hawking as a permanent job. The model is as follows:

$$\begin{aligned} \text{Ln} \left[\frac{P(\text{FES} = 1)}{(1 - P(\text{FES} = 1))} \right] = & \beta_0 + \beta_1 \text{LIT}_i + \beta_2 \text{MUR}_i \\ & + \beta_3 \text{ORH}_i + \beta_4 \text{LOC}_i + \beta_5 \text{HRS}_i + \beta_6 \text{POD}_i + \beta_7 \text{RSU}_i + \varepsilon_i \end{aligned}$$

The respondent's outlook with regard to alternative future employment schemes is considered as the dependent variable in this model. The variable takes a value of one if the respondent intends to keep his position in the present activity and zero otherwise.

The independent variables include LIT, MUR, ORH, RSU, ε and MIG as defined earlier in section 4.1. Other independent variables are as follows: LOC: Locational Security: this variable takes a value of one if the hawker can secure himself a place on the pavement without being bothered by other street sellers or by the police and zero otherwise.

HRS: Hawker's reaction to a decision by the local authorities to allocate a proper space in order to formalize hawking activities. This variable takes a value of one if the person welcomes such a decision and zero

otherwise.

PQD: Price and quality differential of commodities offered for sale in the two sectors. This variable takes a value of one if the commodity is cheaper and has a superior or the same quality in the informal sector, zero otherwise.

Results

The parameter estimates of the second model are reported in Table 2. The dependent variable is the Logit of the event for which FPS=1. On a priori basis, it is expected that all the coefficients take a positive sign.

As shown in Table 2, the sign of all the coefficient is positive. The results of ISPEM indicate that, in addition to those factors which were considered in the first model and are responsible for the formation of hawking activities and except for EXI, three other factors-i.e., LOC, PAD, and HAR- can explain why the hawkers prefer to stay in this business permanently. Similar to the results of the previous model, the coefficient for MIG is not significantly different from zero, and thus, one cannot retain the hypothesis that migration will increase the probability of employment in the local informal sector.

In order to calculate the probability that an individual considers hawking as a permanent job, we follow the same procedure as in the first model. Our calculation shows that this probability is about 0.96 percent. This means that there is a 96 percent probability that an individual who satisfies the characteristics which are specified by the model will choose hawking as a permanent occupation.

Based on the estimated coefficients literacy, mark-up rate on sales, and price quality differential have a relatively greater role in this outcome.

As long as the hawkers can occupy the street pavements with no concern for the rules and a moderate policy is pursued by the local authorities, the interplay of these and other factors reduce the distinction between the formal and informal sectors to a minimum. However, such a situation should not be interpreted as a desirable solution for the street sellers problem.

5. SUMMARY AND CONCLUDING REMARKS

This paper reports the results of a research carried out during 1993-1994 in Shiraz, Iran. The objective of the research was to analyze the behavior of the street sellers as an informal sector activity. A questionnaire was used to collect the data. Two Logit models were applied in order to study the behavior of the street sellers.

The first model, Informal Sector Employment Model, looks at those factors affecting one's choice of hawking as a job and the second one,

Table 2. Statistical Results of the Informal Sector Permanent Employment Model

LOGIT // Dependent Variable is FPS

SMPL range: 1 - 589

Number of observations: 589

Convergence achieved after 4 iterations

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	-2.7663317	0.3003009	-9.2118654	0.0000 *
LIT	1.2327882	0.2329238	5.2926686	0.0000 *
MUR	1.3546652	0.3083393	4.3934240	0.0000 *
EMP	0.3261264	0.2300153	1.4178462	0.1568 ****
EXI	0.7748070	0.1994437	3.8848402	0.0001 *
HAR	0.8097303	0.2220144	3.6471969	0.0003 *
ORH	1.6972684	0.6224443	2.7267797	0.0066 *
SCR	0.5087322	0.2824066	1.8014174	0.0722 **
MIG	0.0499803	0.2275265	0.2196679	0.82621 ****
Log likelihood	-314.87999			
Cases with FPS=1	205			
Cases with FPS=0	384			

* significant at less than 5% level

** significant at less than 10% level

*** significant at less than 15% level

**** Not significant

Informal Sector Permanent Employment Model, looks at those factors responsible for the sustenance of hawking in Shiraz.

The first model predicts that the lower the literacy rate and the higher the mark-up rate on sales and the more the leniency of the local officials towards the informal sector activity, the higher the probability of the unemployed to join the informal sector. Nonetheless, the results show that the street sellers prefer employment in the formal sector despite rising expected income in the informal sector. The results also show that there is an 85 percent probability that an individual who satisfies the characteristics and conditions which are specified by the model will become a hawker.

The second model looks at those factors that lead a person to consider hawking as a permanent job despite their preference for employment in the formal sector. The Logit model estimates reveals that in addition to those factors which are responsible for one's employment in the informal sector, three other factors have led the street sellers to consider hawking as a permanent occupation: having a secured, though illegal, location for hawking activities, absence of price and quality differentials between commodities which are offered for sale in the formal and informal sectors, and finally, the possibility that local authorities might allocate a proper space in order to formalize hawking activities. There is a 95 percent probability that an individual who satisfies these characteristics and conditions will consider hawking as a permanent job.

As this study suggests, the sustenance of hawking in Shiraz is basically the result of: 1) unavailability of proper jobs in the formal sector as indicated by the preference of the hawkers; 2) Lack of skillful manpower to be employed in the formal sector as indicated by the low level of education among the hawkers. 3) Inadequate income earned in the formal sector; and finally, 4) the indecisiveness of the local authorities towards the street sellers. To successfully solve the problem requires the implementation of policies aimed at job creation and income support programs in the formal sector as well as the establishment of more vocational schools. Of course, whatever policy is taken, the enforcement of the existing rules regarding the street sellers should not be neglected by the local authorities.

It is expected that further modification and application of the logit model will enhance our understanding of the informal sector activities in other countries.

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