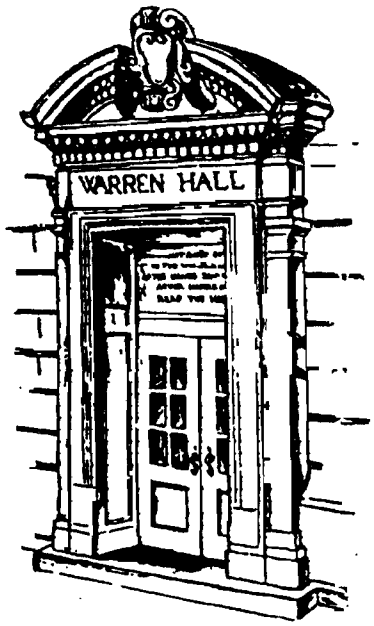

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The Urban Poor And The Payday:

The Pay Of The Day Matters But So Does The Day Of That Pay

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ABSTRACT

Although it has been shown that the poor are more responsive to food price changes than other people, they still may face higher food prices. Evidence from Zaire shows that there exists a movement within the month in food prices corresponding to changes in food supply and food demand. This movement is caused by increased income and demand at the end of the month due to a fixed pay date. This movement is especially harmful for the poor, who buy in small quantities. Using a Benthamite social welfare function, it is shown that rescheduling the payday for different sectors or splitting up payments in smaller amounts will result in higher social welfare.

I. Introduction

The prices of staple foods are of fundamental importance with respect to food consumption and nutritional status of poor people. Incomes are low only in relation to prices. Low-income consumers typically spend 60 to 80 percent of their income on food and research on food consumption has established that malnutrition is due principally to poverty rather than other factors (Sen, 1981; Pinstrup-Andersen, 1985). Because of the high budget share spent on food among the poor, both on average and at the margin, the negative impact of food price increases is much more severe among the poor than among the better-off population groups. Estimates of price elasticities for food commodities by income groups are of recent origin and only a few are available (Musgrove, 1988; Alderman, 1986). In a cross-country analysis, Alderman (1986) estimates that the price elasticity for rice of the poorest 10 percent of a population is 80 percent higher than the mean value for the whole population. Similar relationships are found for meat, milk, root crops, wheat and coarse grains. Absolute values of price elasticities above one are not uncommon among the poor and it is clear that food price changes cause larger relative quantity adjustments among the poor than indicated by parameters for society as a whole.

Although the poor seem more sensitive to price changes than the wealthier consumers, some people hypothesize that on average food prices are higher for them (Musgrove, Galindo, 1988; Kunreuther, 1972; Alcaly, Klevorick, 1972). Several explanations are given for this: a. poor people patronize small shops, whose costs are

high because of the small volume and because of the shortage of working capital; they visit these shops because they can buy on credit and because they are more accessible in poor neighborhoods, saving their buyers lengthy trips to the better-off neighborhoods where larger shops (supermarkets, central markets) tend to locate; b. they buy in fractional amounts, where the price per unit weight is higher than for larger quantities.

In this paper, a different cause for a higher food price paid by the poor is explored. They pay a higher price because they buy at a bad time. Because people tend to be paid on the same date in each month and because of imperfect credit markets, food prices can fluctuate during the month and cause poor people to pay a higher price. The structure of the paper is as follows. In a second section, stylized facts from Zaire are presented. In a third section, a model is developed that generates price fluctuations by fixing the pay date and by incorporating different endowments for different sectors. Conclusions are drawn in a fourth section.

II. Stylized Facts

Evidence from different surveys document the monthly movement in prices, demand and supply of food products in Kinshasa, Zaire (Goossens, Minten, Tollens, 1994): Price analysis of wholesale markets in Kinshasa shows that there is an amplitude of 11 percent in monthly cassava prices during the period 1987 - 1989, i.e. the price at the end of the month is 11 percent higher than prices in the middle of the month;

Analysis of the wholesale market of Mangobo in the zone of Ndjili, one of the biggest wholesale markets in Kinshasa, and located in one of the poorest areas of the city, shows that the number of trucks arriving at the beginning and the end of the month is 30 percent higher than the number of trucks arriving between the 6th and the 20th of the month during the period 1987 - 1989; A survey of 1000 food retailers in Kinshasa in November 1990 indicates that 60 percent of them think that customers "have more money" at the end and the beginning of the month while only 5 percent think this is the case from the 6th to the 20th of the month (35 percent did not express their opinion); a survey with 1400 itinerant traders in the same period indicates that 70 percent of them thinks that food prices are higher at the end and the beginning of the month and lower in the middle of the month; most of them (71 percent) say they take this into consideration when they supply agricultural products.

In conclusion, most traders are aware of the monthly movement and adjust to it. This means that the movement in demand is even larger than in supply[1]. This movement is caused by the fact that most consumers get their salary at a fixed date: government officials get it on the 20th of the month; workers in the private sector often receive an advance on the 15th of the month and the rest at the end; most

[1] The repercussions of this price fluctuation in Kinshasa are felt throughout the marketing system as illustrated in this quote: "Manioc traders try to arrive in Kinshasa at the beginning or the end of the month, thus their purchase and assembly activities are concentrated over a limited time during the month. In consequence, the demand for transport is also concentrated within a limited period. This puts added strain on an already insufficient transport capability and contributes to the high level of spoilage as traders are frequently unable to secure space on trucks to market their produce in a timely fashion" (Louis Berger Inc., 1988, p. 36).

workers in the informal sector are paid at the end of the month. This monthly movement is especially harmful for the poor because they purchase small quantities of food in small time intervals[2].

When poor people receive their paycheck, they tend to buy their food immediately because of liquidity constraints, an inflationary environment and incomplete credit markets. Because of the large percentage of poor people in certain urban centers, this increases the demand for food at that time. Capacity constraints (limited number of trucks that transport food, storage capacity, production constraints,) limit supply increase. Hence, the price of food will increase at the end of the month. Non-poor people will buy their food when prices are lower, i.e. in the middle of the month. Because poor people can buy less with their money, a "same" payday at the end of the month for everybody increases inequality. Policies to avoid monthly fluctuations in prices are discussed in the next section. Although it may involve more administration costs, different paydays with smaller amounts of money or rescheduling of paydays could possibly reduce inequality.

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[2] A monthly movement in demand is also found in poor areas in the U.S.. First, Thomson et al. (1988) mention that in New York State, experience shows that only those who cannot get food some other way go to eat a free meal at a soup kitchen. They are considered as a last resort for those who would not need them if the welfare system were working properly. Attendance rises during the month and then falls precitipitously at the beginning of the next month when food stamps and other form of public assistance are distributed. Second, the Economist (1992) observes that in Newark (where one third of the city's people are on welfare), at the beginning of the each month when the welfare cheques are send out, food prices are "put up another notch".

III. Model

Suppose a two-sector model (sector 1 = public sector; sector 2 = private sector) each characterized by a number of "poor" (NP) and "rich" (NR) people (NP_1 and NR_1 in sector 1 and NP_2 and NR_2 in sector 2) and three periods within the month. Initially, poor people have an income vector [Y,0,Y] (i.e. they are paid at the end of the month but they don't have any income left by the middle of the following month) while rich people have an income vector [Y,Y,Y] (policy 1). Alternative payment policies for the poor are: a) equal amounts in the three periods with an income vector [2Y/3,2Y/3,2Y/3] as result (policy 2) and b) a different pay date for the different sectors, i.e. [Y,0,Y] for the public sector and [0,Y,Y] for the private sector (policy 3).

It is assumed that supply during the three periods is fixed at a constant Q and no intertemporal storage or savings are allowed[3]. Utility functions (u_i) are identical over time and over individuals and are strictly increasing in quantities consumed but at a decreasing rate (more formally $\partial u/\partial q > 0$ and $\partial^2 u/\partial q^2 < 0$). A Benthamite social welfare function[4] (SWF) is defined where

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[3] These are critical assumptions and not completely true. In reality, supply responds but less than change in demand. Savings occur but less than would be expected with perfect credit markets. Incorporating this in the model would complicate the calculations unnecessarily without changing the results. The assumptions are justified by the fact that transport and storage capacity and imperfect credit markets are effective constraints.

[4] In 1789 Bentham proposed maximizing the sum of satisfactions of individuals as a social objective (Bentham, 1907). In this function, any increase in the aggregate sum of utility improves social welfare by the same amount no matter who receives it.

$$SWF = \sum_{i=1}^{NR_1+NR_2+NP_1+NP_2} u_i$$

The prices for this model and for the different policies are shown in Table 1. They are computed by dividing total income of all sectors by the fixed supply Q. The results show that payments of the kind of policy 1 and 3 generate price movements in food prices. The amplitude in price movements are highest for the policy 1 while prices are equal within the month for policy 2.

Table 1: Computed prices for the different policies and different periods

	Policy 1	Policy 2	Policy 3
Period 1	$(NP_1+NP_2+NR^5)Y/Q$	$(2/3(NP_1+NP_2)+NR)Y/Q$	$(NP_1+NR)Y/Q$
Period 2	$(NR)Y/Q$	$(2/3(NP_1+NP_2)+NR)Y/Q$	$(NP_2+NR)Y/Q$
Period 3	$(NP_1+NP_2+NR)Y/Q$	$(2/3(NP_1+NP_2)+NR)Y/Q$	$(NP_1+NP_2+NR)Y/Q$

This results in the following social welfare values (for each policy):

$$SWF_1 = (2NP_1+2NP_2+2NR)u(\frac{Q}{NP_1+NP_2+NR}) + (NR)u(\frac{Q}{NR}) + (NP_1+NP_2)u(0)$$

$$SWF_2 = 3(NP_1+NP_2)u(\frac{Q}{NP_1+NP_2+3/2NR}) + 3(NR)u(\frac{Q}{2/3(NP_1+NP_2)+NR})$$

$$SWF_3 = (NP_1+NR)u(\frac{Q}{NP_1+NR}) + (NP_2+NR)u(\frac{Q}{NP_2+NR}) +$$

$$(NP_1+NP_2+NR)u(\frac{Q}{NP_1+NP_2+NR}) + (NP_1+NP_2)u(0)$$

[5] NR = NR_1 + NR_2 = the total number of rich

Findings:

Result 1: Social welfare is lowest under policy 1.

Proof: a. 1. Subtract the aggregate utility for the poor under policy 1 from their utility under policy 3:

$$(NP_1)u(\frac{Q}{NP_1+NR}) + (NP_2)u(\frac{Q}{NP_2+NR}) - (NP_1+NP_2)u(\frac{Q}{NP_1+NP_2+NR}) > 0$$

The first term is strictly greater than the third (if $NP_2 > 0$) and the second is strictly greater than the fourth (if $NP_1 > 0$) because u is strictly increasing in quantities. So, the poor are better off under policy 3 than under policy 1.

a. 2. Compare welfare of the poor under policy 2 with policy 1 (same procedure as in a.1.)

$$3u(\frac{Q}{(NP_1+NP_2)+3/2NR}) - 2u(\frac{Q}{NP_1+NP_2+NR}) - u(0) >$$

$$3u(\frac{Q}{(Np_1+NP_2)+3/2NR}) - 2u(\frac{Q}{NP_1+NP_2+NR}-0) >$$

$$2u(\frac{Q}{2/3(NP_1+NP_2)+NR}) - 2u(\frac{Q}{NP_1+NP_2+NR}) > 0$$

The first inequality holds because of concavity of u in the second term and because $2u(0) > u(0)$, the second inequality because of concavity in the first term and the third inequality holds because $2/3(NP_1+NP_2)+NR < NP_1+NP_2+NR$ and u is strictly increasing in quantities consumed. So, for the poor policy 2 is better than policy 1.

b. The poor still have less or equal income in all three time periods and still consume less or equal amounts than the rich.

c. The total amount consumed by rich and poor together stays the same in the three time periods (Q in each period).

d. Because of a, b and c and because of the concavity of u, total social welfare is higher under policy 2 and 3 compared to policy 1.

Result 2: Confronted with a payment schedule [Y,0,Y] for sector 1, the optimal payment for sector 2 is such that quantities consumed are equal over the three periods. This is achieved by paying equal amounts in the first and third periods and $Y[2NR/(2NP_2+3NR)]$ in the second period.

Proof: The maximization problem for the n ($=NP_2 + NR_2$) people in sector 2 is:

$$\begin{aligned} Max. \sum_0^n u(q_1) + \sum_0^n u(q_2) + \sum_0^n u(q_3) \\ (1)\ Y_1 + Y_2 + Y_3 \leq 2Y \\ (2)\ NP_1Y_1 + NP_2Y + NRY \leq Qp_1 \\ s.t. \\ (3)\ NP_1Y_2 + NRY \leq Qp_2 \\ (4)\ NP_1Y_3 + NRY + NP_2Y \leq Qp_3 \end{aligned}$$

where $q_{i=1,2,3}$, $Y_{i=1,2,3}$ is the quantity consumed and the income for people in sector 2 in period 1,2 and 3.

At the optimal point

$$\frac{\partial u}{\partial q_1} = \frac{\partial u}{\partial q_2} = \frac{\partial u}{\partial q_3}$$

and this is the case when $q_1^* = q_2^* = q_3^*$. Solving for prices gives

$$p_2 = p_1\left(\frac{NR}{NP_2 + NR}\right)$$
$$p_3 = p_1$$

Using the 4 equations ((1)-(4)) and 4 unknowns (p_1, Y_1, Y_2, Y_3), the final solution looks like:

$$Y_1^* = Y_3^*$$

$$Y_2^* = Y\left(\frac{2NR}{2NP_2 + 3NR}\right)$$

Checking for border conditions shows that for NP_2 going to 0, $Y_1^* = Y_2^* = Y_3^* =$ 2/3 Y and for NR going to 0, $Y_1^* = Y_3^* = Y$ and $Y_2^* = 0$ (because $p_2 = 0$). Depending on the size of the different sectors, optimal income schemes differ. Equal distribution of the payments over the three periods is optimal if $NP_2 = 0$. Payments in period 1 and 3 are only optimal if $NR = 0$.

Result 3: Social welfare is highest under policy 2.

Proof: It is clear from result 2 that under policy 2 the people in the three sectors are at the optimal point with respect to the stated maximization problem. So, social welfare is highest under policy 2.

Result 4: Although policy 2 is the best policy for aggregate social welfare, it might be possible that the poor in sector 2 are better off under policy 3.

Proof: A flat utility curve, a large sector 1 and a small sector 2 can easily generate this result (f.ex. NR = 10 %, NP_1 = 80 %, NP_2 = 10 % and a linear utility curve would prove this point).

IV. Conclusions

A regular monthly movement in food prices, food supply and food demand exists in Zaire. The timing of the payday within the month combined with imperfect credit markets generates this kind of price movement. The effect of different policies with respect to the timing of the payday and the influence on social welfare and inequality are discussed and compared. Assuming that there are no extra administrative costs, splitting up of payments in smaller amounts equally divided within the month results in higher social welfare than a payday at the end of the month for everybody. However, if the purpose is to favor one poor group with respect to an other[6] then rescheduling of their payday to the middle of the month would increase the welfare of this particular group with respect to the previous policy without extra costs for the government.

The monthly movement in food prices has only been documented in Zaire. It might be expected that similar movements exist in urban environments where poor people constitute a large percentage of the population. However, as daily

[6] The poor in the public sector are usually politically more powerful than the poor in the private sector (for a discussion, see Pinstrup-Andersen (1992)).

prices are needed for this kind of analysis and given that reliable statistics are often scarce, appropriate data might be difficult to find.

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