

A new approach to poverty in Brazil:

abidimensional measurement of well-being

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Abstract

This article analyzes poverty in Brazilian families using a bi-dimensional measure that considers both income and time allocation. The Vickery methodology (1977), in which poverty isoquant curves are built for each type of family structure, is used to identify the proportion of generalized poverty. The percentage of involuntarily and voluntarily poor families is also estimated. Among the results obtained, it can be seen that poverty rates increase significantly when time is considered as a resource because working parents, especially in single-parent families, very often do not have the time to perform essential household chores. A higher percentage of generalized poverty is found among single-parent families and among those with a higher number of children. The highest percentage of involuntarily poor people is found among families with a high number of children.

Resumo

O artigo analisa a pobreza das famílias brasileiras por meio de uma medida bidimensional que considera tanto a renda quanto a alocação de tempo. É utilizada a metodologia de Vickery (1977), em que curvas de isoquanta da pobreza são construídas para cada tipo de constituição familiar, a fim de identificar a proporção de pobres generalizados. As proporções de famílias pobres involuntárias e voluntárias são também estimadas. Dentre os resultados obtidos, tem-se que as taxas de pobreza aumentam significativamente quando o tempo é contabilizado como um recurso porque pais que trabalham, especialmente, de famílias monoparentais, muitas vezes não têm tempo suficiente para realizar as tarefas domésticas essenciais. Percebe-se também maior proporção de pobres generalizados entre as famílias monoparentais e entre aquelas com maior número de crianças. Adicionalmente, as maiores proporções de pobres involuntários são de famílias com elevado número de crianças.

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1 Introduction

In the seventies, Vickery (1977) concluded that the US government did not acknowledge that households had basic time needs and that this restriction should be taken into account. Despite the wide discussions on family values and the importance and necessity of parents spending more time with their children, there used to be no government efforts to incorporate these issues in the assessment of poverty. Hence, there was much criticism of the traditional methods used to define poverty and, as a consequence, statistical research and studies on conceptual issues related to this matter were developed by the United States National Congress of Research (Douthitt, 1994).

Different from one-dimensional measurements, Vickery's poverty study (1977) aimed at defining a two-dimensional well-being assessment. One of his interests was to identify people above the level of poverty income, but without enough time to take satisfactory care of their families.

In addition to acknowledging how important it is for parents to spend more time with their children, or even that individuals could spend more time with their families, time must be considered as a fundamental component of what can be called domestic production; that is, the time used to perform tasks such as obtaining food, washing clothes, doing housework, etc. Therefore, time must be considered as a highly valuable resource for families, mainly for those with severely restricted incomes. Thus, it would appear logical to include family time spent doing household chores when evaluating poverty status.

In this sense, it is assumed the time as a resource, then people who do not have time for family, or produce their own subsistence, when you can not through the

market, should be considered poor. Therefore, according to Diniz e Diniz (2009), Barros *et al* (2006), Kageyamma and Hoffman (2006) and Lopes *et al* (2006), families should be considered to be in generalized poverty if they have a less than adequate combination of time and income. Unfortunately, this association of income and time is not found in Brazilian poverty studies, so far.

In opposition to a one-dimensional view of the matter, Vickery (1977) aimed at defining a two-dimensional measurement of well-being. If poverty is defined as the insufficiency of a certain resource, people who do not have enough time for the family or produce their own goods and services, when it cannot be achieved through the market, should be considered poor. In Vickery's view, families should be regarded as poor when they possess less than a certain combined amount of time and money.

In Brazil, there are authors who consider poverty as something undoubtedly multidimensional. They usually associate time deprivation with deprivation of non-monetary resources such as sanitation, education and health.

Thus, this paper aims at analyzing the welfare of families in Brazil using a bi-dimensional poverty measurement that considers both time and income deprivation. The methodology applied is the one proposed by Vickery (1977), who used isoquant poverty curves customized for each type of family, to identify the general proportion of time-poor individuals. Families with combined time and income levels below the curve are considered time-poor. By using the critical salary solution, families in the involuntary poverty state were also identified.

As expected, the results obtained in the present study show that poverty rates increase significantly when time is

counted as a resource because working parents, especially in single parent families, do not have enough time for essential household tasks. The paper points out that 93.1% of single parent families with four or five children and 79.3% of those with two adults and the same number of children are below the isoquant poverty curve. A larger proportion of time-poor people were found among single parent families or families with more children.

Regarding involuntary poverty, 19.8% of single parent families with one child have an income below the critical salary, therefore shaping up as involuntary poor. Are fathers or mothers to work on average 39 hours per week, and spend about an hour and a half a day to get from home to work and from work to home. In 2009, they earned less than R\$1.61/hour or R\$264.00/month (equivalent to $\frac{1}{2}$ the 2009 minimum salary).

In addition to this introduction, this paper contains four more sections. The second section presents a review of Time Allocation Determiners and describes how time is allocated to household chores and tasks. The third section introduces Vickery's theoretical model. The fourth section presents a detailed analysis of results. The fifth and last section contains the final conclusions of the study and the resulting political implications.

2 Time Allocation

The first author ever to theorize about time allocation was Becker, in "The Theory of Allocation of Time". According to that author, time allocation in a paid job is determined by the salary, by some exogenous income and by home production.

According to Becker's theory (1965), home production has utility (it has value, which is the welfare measurement) and work generates income. There is a

home production function in which the time devoted to home tasks is an important variable to transform inputs into domestic products for consumption.

Therefore, goods and services produced, plus available time, are the inputs to the home production function and are processed to obtain commodities. Two families of the same size and income may not have the same level of well-being because they may have different amounts of time available to take care of their home needs. For example, consider two families with three members each (two parents and a child), having the same annual income, and both are considered poor.

In the first family, members are unemployed but have a financial resource, resulting from the informal market. On the other hand, the second family allocates most of their time during the week to working at their paid jobs and earning money.

Although both families are poor and have the same income, the first one has a higher level of well-being despite not working formally. They dispose of more free time and have more available money, since they don't spend money on daily care and commuting.

Considering time as a factor, the poverty rate increases drastically for the second family because the adult members do not have sufficient time to do their daily household tasks. In this sense, it is important to identify the time allocation determinant factors, usually considered as domestic production.

2.1 Time Allocation Determinants

Time allocated to work presents many determinants. Not only financial, but also cultural, factors help to explain how the allocation is made regarding time, gender, age, social status, location (rural or urban), ethnicity, etc. Yamada and Kang (1999) noticed that in Japan, for

example, time allocation in both formal and domestic labor is explained better by a cultural than by an economic rationale.

Outside problems, such as disease and unemployment, also hamper time allocation among family members. Ilahi (2001) conducted a study in Peru and concluded that “outside” problems harm considerably the women’s time allocation within the family. The study also revealed that, in the case of illness, women spend more time doing housework. This increase in hours of housework cause, according Ilahi (2001), a decrease of hours devoted to paid work.

On the other hand, involuntary male unemployment fosters a time reallocation between the two types of work, paid and household, contrary to the one caused by disease. Male unemployment motivates women to spend less time doing household chores and more time doing paid jobs, thus resulting in a time allocation for these women.

It is acknowledged in the economics literature that disease imposes financial costs on a family. Russell (2004), Hansen et al (1998) and Stephen (1992) point to this situation. However, indirect time costs are not considered. Ilahi (2001) also noticed that disease causes a decrease in individuals’ leisure time. Unlike a child, a sick adult will spend more time doing housework in comparison to healthy people. A child will demand adult care whether sick or not, while a sick adult loses (family yield) and spends more time doing housework.

Besides illness and unemployment, ethnic origin in Latin America can be considered an important determinant of time allocation. Native Latin American families are more likely to suffer time deprivation than non-natives in the same region. Another important finding is related to infrastructure. It seems that water

and energy availability affects family time allocation (ILAHI, 2001). The author observed a connection between income and time allocation and between a paid job and housework. The higher the income level the greater the family’s capacity to replace household chores (home production) by increasing leisure levels, creating what is called “the substitution effect”. Female labor for household chores can be bought easily in Brazil; and, the willingness of Brazilian families to pay for baby-sitting services (substitution effect) is considerably high, according to Brown and Haddad (1995).

In developed countries, the availability of housework services is scarce. As most women in these countries have higher education levels and female formal work is many times performed in the most qualified sectors of the economy, this makes domestic services more expensive (ILAHI, 2000).

On the other hand, there are regions in which it is not possible to create the substitution effect and the income improvement doesn’t bring about any housework reduction. The purchase of domestic services is not possible, for instance, in Nepal’s mountains, as there are no such services there. Countryside families can also suffer from a low substitution effect due to the scarcity of domestic services (ILAHI, 2000).

An interesting piece of information about Brazil, pointed out by Teixeira (2009), shows that government income transference programs such as the “*Bolsa Família*” affect women’s time allocation between paid jobs and domestic production. The results of that study show that an increase in income transfer of R\$1.00 *per capita* reduces, on average, the demand for a paid job by 0.06h/week. Even though this is a slight decrease in paid jobs time, it results in an increase in the household chores time.

Moreover, education incentive policies, promoting an increase in the expansion of human capital, affect time allocation between male and female jobs. Individuals with higher levels of schooling tend to work more in formal work and less in domestic production. Female education is also related to paid jobs, especially for women with higher levels of education. Formally educated women tend to work more and to have fewer children (HARIS and SPYRIDON, 2003).

Bardasi and Wodon (2009) conducted a study in Guinea-Bissau and concluded that the low efficiency in time allocation of poor people isn't only an effect of a low level of formal education, lack of skills or low income. They concluded that it is also due to an overly long workday and lack of housework technology. Yet another conclusion is that time-poor people take more time to accomplish their basic needs, because they live in places with no sanitation, no public transportation, etc. (BARDASI and WODON, 2009).

Kalenkoski (2008) did an empirical study in the United States and concluded that individuals with higher incomes have resources to "buy time". In other words, they can buy fast food, hire a babysitter to take care of their children, hire a housekeeper, etc. Consequently, they are able to allocate time to productive activities, thereby increasing their income and having more free time for leisure, as well as improving their human capital through education.

The use of time by families is a matter of gender. Ilahi (2000) analyzed the differences between men and women in developing countries. He observed that women spend about 20% more time than men in all types of jobs. Brown and Haddad (1995) had obtained the same results in 15 out of 17 studies carried out in Africa.

Shelton (1992) adds that, in the USA, being married means more housework for women and less for men. Women's time, widely allocated to domestic

production, forces the female population into low leisure consumption and into high poverty levels. For Vickery (1977), low salaries in formal jobs and high time demand for domestic production result in families headed exclusively by women being poorer, when considering the two dimensions of income and time.'

Aguiar and Hurst (2006) show some interesting features about time allocation between work and leisure for the American economy. The authors state that there was a general increase in leisure time in recent years. On average, increases of 7.9h/week for men and 6.0h/week for women were devoted to leisure time, between 1965 and 2003. This change happened for many different reasons, such as high substitution elasticity in the 'taking care of children' activity; that is, the availability of domestic services (au pairs) resulted in an increase in parental leisure hours.

Amazingly, according to the same authors, women simultaneously increased their levels of leisure and their participation in the labor market, decreasing the time spent in domestic production to 5.9 hours/week. Furthermore, the study suggests that individuals with higher levels of education reached a growth of 4.0h/week in their leisure time.

2.2 Time Allocation in Domestic Production

While income is an essential resource in market production, time is a fundamental resource in domestic production. Ilahi (2000) studied the use of intra-family time in developing countries and he states that, in domestic production, poor families find mitigation for the instabilities of the credit market. Therefore, within these families, time is a fundamental resource for the survival of their members.

The production of goods and services by family members for their own consumption, using their

own capital and their own unpaid labor, is defined as domestic production. These goods and services produced by a family unit might include housing, meals, washing clothes and child care. The process of family production involves the transformation of purchases and intermediate goods, like supermarket products and electricity, into services or final consumption products (Ironmonger, 2001).

Contrary to what is widely believed, domestic production has been studied since the XIX century. The main study was conducted by Gilman (1898), who discussed the displacement from domestic production into domestic economy development and taught these subjects at some North American universities.

Ironmonger (2001) highlights that even in developed countries, where a great part of domestic production is transferred to the market, a considerable amount of home production is still necessary. In many cases, market production and home production are in competition. For example, eating meals in restaurants versus home-made food; staying in hotels versus staying at home; hiring child care services versus taking care of your own children or taking taxis versus driving your own car. Traditional microeconomic handbooks define family units only as consumer agents, restricted to a certain amount of income and prices of goods; they assign the production of goods and services to companies. Few authors consider families as anything more than consumer agents or as production units that devote time to domestic production (Ironmonger, 2001).

The total economic value generated by families and obtained in family production is called "Gross Household Product" (GHP). The first estimates of this production in the United States were established by Mitchell in 1919 and later by Kuznets in 1929, as well as in Sweden by

Lindahl, Dahlgren and Krob in the same period, as Ironmonger (2001) reports.

The GHP of the USA represented 37.5% of its GDP (Gross Domestic Product) in 1981. The hourly cost of housework results in a loss of opportunities in paid jobs.

Hence, the substitution effect must consider that, in many cases, market production is more efficient than domestic production (Ironmonger, 2001). Douthitt (1994) admits that family units have a subsistence domestic production. These activities are related to the family composition, more specifically to the number of children in a house. Children demand less money resources, but require more available time from parents.

Mendola (2007), after analyzing empirical evidence of domestic theory in several countries, states that it is important to be familiar with different means of production in each country, as well with poverty reduction strategies. This is especially true in developing countries, such as those in Asia, where there are constant market imperfections. Very often, the reality is that market inefficiencies impact on domestic production options, resulting in a substitution of market production by domestic production.

Neoclassical theory has evolved to include the time spent in leisure activities as part of the set of products consumed by a family, as well as the time allocated to labor. Time allocation plays an important role in most applications of the production function model. Decisions on housework time allocation reflect not only considerations of production, but also preferences of how to use time. It is assumed that a family can "sell time" or sell work in the market (POLLAK and WACHTER, 1975).

The income received by an individual in a paid job consists of selling time and effort in the job market. For Huffman (2010), econometric studies ignore the

value of adult time in a family unit, and this leads to a specification bias due to the omission of this variable in the model. According to Becker, each product requires a unit of time from one or more members of the family unit. A family has a restricted amount of time. If the family income decreases, the amount of time dedicated to the production of domestic goods grows. This is a conclusion reached by Huffman (2010) for the United States. For this author, domestic production results in good health for a family. Naturally, homemade food is healthier than fast food, so domestic production contributes to the reduction of obesity problems. Moreover, family member satisfaction must also be considered, once they are having meals together, which enhances the well-being of the individuals involved.

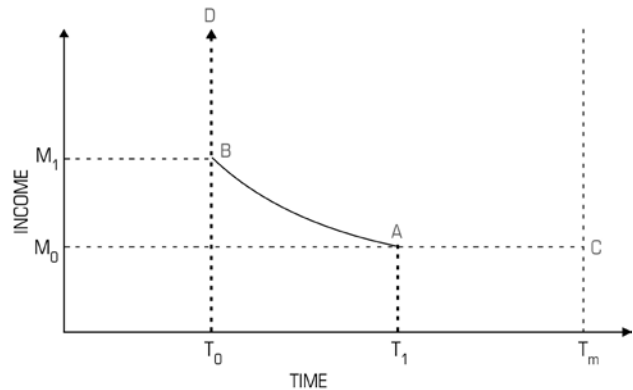
Another discovery is that housewife education can influence efficiency in family production. In this sense, the education/skills of a housewife may increase the efficiency of domestic production. However, as women with higher levels of education have been gaining more access to the labor market, preparing homemade food has become less attractive than before (Huffman, 2010).

3 Methodological Remarks

Unlike the traditional classification of poverty, a family considered poor is one which, besides earning an income below the limit of a given level of poverty, has a few extra activities apart from their paid jobs. These extra activities are called domestic production, which include the tasks of producing domestic goods and services such as cooking, cleaning, looking after children, etc. A general pattern of poverty is defined by considering the two dimensions.

A reasonable hypothesis, that a family does not reach the poverty level, is that it has a minimum amount

Figure 1: Illustration of Isoquant Curve of Poverty for a Family Aggregate.



of time independent of their income and a minimum income that is independent of their available time.

Let's take M_0 and T_0 in Figure 1 as the minimum values of income and time, respectively. If the available time and income of a family present values less than T_0 and M_0 , respectively, then it is considered time-poor.

Additionally, let us assume that these values are not enough to determine a non-poor pattern. If a family only has time T_0 (or income M_0), then it needs income M_1 (or time T_1) to reach the poverty level.

Note that, by the usual poverty measurement, the financial value of M_0 is the income poverty line, while the value of time T_1 is the required number of hours a family must devote to house chores.

In this study, Time T_0 is the number of hours a week that an adult family member must devote to family management and interacting with the family members. T_m is the maximum of available hours that an adult can work without endangering his physical and mental health.

The combinations of time and income necessary to reach the minimum poverty pattern could be represented

through the points on the DBAC curve, called the poverty isoquant. The inclination of the curve also measures the capacity of a family to substitute domestic production by goods and services purchased in the market. The isoquant measures the ability of a family to exchange their available time for consumption, which depends on their productivity in both the labor market and in domestic production.

Point A (T_1, M_0) corresponds to the minimum value of income with the necessary time value for a family not to be considered poor. In general, it is associated with families of low income, originated in the free market, which buys a few goods and services from the market; however, this does not include items that will prevent the need for doing household chores. Point B (T_0, M_1) represents the situation in which the maximum substitution of income by time spent doing household chores can take place.

Note that M_1 is equal to M_0 plus the income necessary to be able to purchase substitutes (another individual's time) in order to accomplish all domestic activities.

The relation of this measurement of generalized poverty with the traditional measurement of income poverty gives us the following terms: if M_0 is the minimum income necessary for a family to be within the poverty limit, then the traditional poverty definition corresponds to the horizontal line M_0C . In a generalized measurement, all families below the curve DBAC are only time-poor, or only income-poor, or in generalized poverty. Following this pattern, the number of families in generalized poverty is larger than when considering the traditional measurement. Families that are not considered income-poor, but must be accounted as poor by the generalized pattern, are the ones with incomes above M_0 but below M_1 ; however, with available extra time below T_1 .

Considering these parameters, three categories can be observed: i) time and income poverty; ii) no income poverty, but time poverty; iii) income poverty, but no time poverty. The total generalized poverty is the sum of the three types of poverties.

Note that for each type of family, according to the number of members, a corresponding isoquant poverty curve is estimated. The methodologies for the estimation of parameters M_0 , T_1 and T_m for each kind of family are introduced in detail in the following section.

3.1 Estimation of the isoquant curve of generalized poverty parameters

The variables used to estimate the parameters of the isoquant curves were extracted from the 2009 PNAD (National Household Sample Survey) micro-data, a survey carried out by IBGE (Brazilian Institute of Geography and Statistics).

The poverty isoquant curves were built for each of the family types: families from one to five adults without children, with one child, with two to three children, or with four to five children up to 14 years old¹. There is a total of 177,663 families, disaggregated into 20 family types².

The weekly value for T_m was estimated as 91 hours. This value was obtained by considering 56 hours a week for sleeping³, 7 hours for eating, 7 hours for getting dressed and 7 hours for personal grooming and care.

The weekly value of T_0 for each family was fixed at 14 hours, equivalent to 2 hours a day. This is the minimum amount of time necessary for family management and household chores. Although this parameter was fixed arbitrarily, its value is not very relevant as the labor market is restricted to a maximum of 40 hours a week.

To try to estimate T_1 , the time families must spend in domestic production, an average of weekly hours spent on household chores by each family type was considered⁴. T_1 values for each family type were calculated using 2009 PNAD data. These data are shown in Table 1.

M_0 values vary for each family type. Therefore, for families with no children, the M_0 value is equal to the number of adult persons in the family, multiplied by the poverty line fixed by the IPEA (Institute of Applied Economic Research) of $\frac{1}{2}$ minimum monthly salary (R\$ 232.50), taken from the data of the 2009 survey. In weekly terms, that amount should be divided by 4 (four).

Since economies of scale exist in the expenses of families with children, decreasing fractions of the minimum salary are added to M_0 for each child in the family. For example, the value of M_0 for a family composed of one adult and a child is equal to $\frac{1}{2}$ of the minimum monthly salary plus $\frac{1}{2}$ of that amount. The value of M_0 for a family with one adult and two or three children is $\frac{1}{2}$ of the minimum salary plus $(\frac{1}{2} + \frac{1}{4})$ of that amount. For the case of four to five children, add marginally to the previous value plus $\frac{1}{8}$ of the case and so forth. The same applies to a family composed of a couple but considering M_0 as equal to one minimum salary (two adults times $\frac{1}{2}$ the minimum salary). In formal terms, M_0 weekly values for each family type are calculated as follows:

$$M_0 = \begin{cases} \frac{N \times (S_m / 2)}{4}, & \text{for families no children} \\ \frac{N \times (S_m / 2)}{4} + \frac{1}{4} \sum_{i=1}^c \left(\frac{S_m}{2^i} \right), & \begin{array}{l} c=1 \text{ (family with one child),} \\ 2 \text{ (family with 2 to 3 children),} \\ 3 \text{ (family with 4 to 5 children)} \end{array} \end{cases}$$

where S_m , represents the minimum salary as R\$ 465.00 in 2009 and N represents the number of adults per family. M_0 values are calculated using this equation, included in Table 1.

According to Fernandes *et al* (2002), despite the fact that the concept of familiar income *per capita* is used in most studies on poverty, this concept does not allow us to consider family members differently. Hence, in this work, we opted to use the monthly income of all labors⁵ (main job, secondary and other types of jobs).

M_1 was calculated considering the cost of hiring a housekeeper, showing the substitution effect (buying someone else's time). This cost was obtained using the workers' weekly income of R\$98.50, divided by the number of hours usually worked in a week (about 36 hours) according to PNAD/2009. Therefore, the cost of substitution (reposition) is calculated in the present study as R\$ 2.74 per hour in Brazil.

4_Observations in Brazil

The values of the poverty levels for income M_0 and the amounts estimated for parameters T_1 and M_1 are shown in Table 1. Broadly speaking, the values of this table show that time is money and that both are interchangeable up to a certain point; also, that the trade-off between income and time is important and might result in a higher level of well-being for the families. It also show that, in order not to be considered poor according to the generalized poverty definition, a family formed by an adult with three children should have either a weekly income of R\$101.27 (M_0) and 27 hours of domestic production (T_1), or the equivalent of a weekly income of R\$277.00 and 14 hours of domestic production (T_0). Likewise, a family formed by two adults and a child with a monthly income of R\$ 145.00 (M_0) would not be in a poverty

situation if the adults were dedicating 33.5 hours (T_1) of their week to taking care of the home and the child, or if they had the equivalent of R\$ 397.00 of income (M_1) and were dedicating 14 hours of their week to domestic production (T_0). Notice that there is always a combination of income and time allocation along the isoquant poverty curve. For the other family types, the analysis is similar.

The hours allocated to domestic production are related to family composition, because the larger the number of children, the larger the demand for this resource. Douthitt (1994) reached the same conclusion in a study carried out in the USA. In fact, children demand

less financial resources than they demand of parents' available time. The same results were obtained in Brazil.

4.1 Recounting the Poor

The values in Table 2 show the proportion of poor individuals in Brazil considering the assessment of generalized poverty for each family type. Including time as a measurement of well-being clearly generates a larger proportion of poor people compared to the traditional assessment of poverty. This is the case in Brazil and the same conclusion had been reached by Vickery (1977) and Douthitt (1994) in the USA by applying the same definition of generalized poverty.

For Fernandes *et al* (2002), according to the traditional poverty pattern, only 36.3% of families were in a poverty situation in 1999. Applying the generalized definition of poverty, 57.9% of families were in that category.

The values in Table 2 show that 93.1% of single parent families with four or five children and 79.3% of those with two adults and the same number of children are below the *poverty isoquant curve*. In other words, they are families with a scarcity of income, time or of both resources. It is perceived that there is a higher proportion of generalized poverty among single parent families, which aligns with the results obtained by Sorj

Table 1_Poverty Isoquant Curve per Family Type in Brazil - 2009

M ₀ (weekly values in R\$)					
Families with	1 adult	2 adults	3 adults	4 adults	5 adults or more
0 child	58	116	174	232	290
1 child	87	145	203	261	319
2-3 children	101	160	217	275	340
4-5 children	108	167	224	282	340
T1 (weekly hours)					
0 child	18.5	28.0	33.5	37.5	43.5
1 child	24.0	33.5	35.5	40.4	47.5
2-3 children	27.5	36.5	39.5	43.5	48.5
4-5 children	33.5	40.5	40.5	45.5	52.0
M1 (weekly values in R\$)					
0 child	158.9	317.8	476.8	635.7	794.6
1 child	238.4	397.3	556.2	715.1	874.1
2-3 children	276.7	438.4	594.6	753.5	931.6
4-5 children	295.9	457.6	613.8	772.7	931.6

Source: provided by the authors based on PNAD/2009 data.

Table 2_Proportion of Generalized Poverty Families in Brazil

Families With	2 adults	3 adults	4 adults	5 adults or more
0 child	53.3	43.9	39.0	41.2
1 child	51.1	46.8	46.9	52.5
2-3 children	57.9	55.5	61.1	66.9
4-5 children	79.3	74.6	78.2	80.8

Source: provided by the authors based on PNAD/2009 data.

et al (2007). For the other family types, the poorest ones, in general terms, are those with the highest number of children. These results differ from those obtained by Fernandes *et al* (2002).

Sorj *et al* (2007) identify the single parent family type as the one with the highest percentage of poor people, mainly in the case of families led by women. Nearly 35.4% of this family type is poor, considering the traditional poverty measurement. On the other hand, the results obtained by Fernandes *et al* (2002) diverge from the results presented in this article regarding the number of children. In his study, in which only income was considered, he concluded that 70% of the poor live in families either with no children or with up to 2 children.

Vickery (1977) also concluded that family cooperation allows single parent families to experience an improvement in their level of well-being. Because of this cooperation, there are economies of scale in domestic production, since there are a larger number of people at home to perform home tasks. Therefore, market risks are reduced and families experience a higher level of well-being, which is also corroborated by a decrease in poverty statistics. According to Teixeira (2009), this type of household is becoming more and more frequent in Brazil.

5_Voluntary and Involuntary Poverty

The income transfer programs aim at transferring funds to families with a *per capita* income below the traditional poverty level. However, due to issues of equality, people responsible for managing these programs are supposed to distinguish families in temporary poverty (involuntary poverty) from those which tend to stay in the same situation (voluntary poverty).

A family can be in temporary poverty due to some “conflicts” that may make family members unemployed or because of unexpected demands. According to this, Figure 2 shows that a family without assets or without an outside income must have a salary that should be at least equal to W_c , called a critical salary, in order to reach the non-poverty limit. At point E, the family presents net income M_c , extra market labor time T_c and time $(T_m - T_c)$ dedicated to the free market. Note that the critical salary W_c , which is the angle of line $T_m E$, is calculated as:

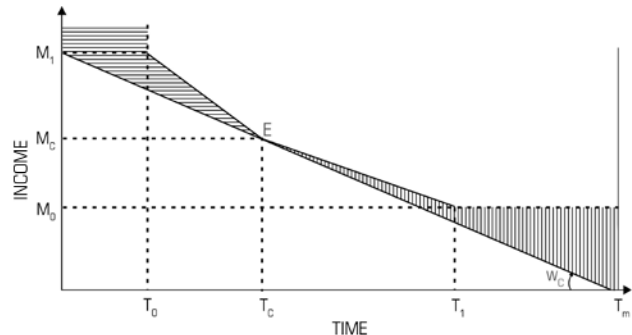
$$W_c = (M_0 + \sum_i p_i h_i) / [(T_m - T_1) + \sum_i h_i] \quad (1)$$

where p_i is the reposition cost (substitution) by hour and h_i is the number of hours spent in the i^{th} home task. In this study, the reposition cost of various tasks was calculated based on domestic employee income, taken from PNAD.

If the potential maximum salary of a family lies below the critical salary W_c , the family can be defined as involuntarily poor. It is therefore assumed that the W_c value expresses an involuntary poverty line.

A family remains in poverty, for instance, until a variation in the family composition occurs (when a

Figure 2_Illustration of a Critical Salary Solution [transcription from Vickery (1977)]



divorce occurs or a child leaves the family) or when there is an increase in the family income because of some professional specialization. The real family salary can be lower than their own potential salary for a short period as a result of a dismissal or a transition in the labor market.

Families with salaries (income) and time inside the crosshatched area of Figure 2 are considered to be in voluntary poverty. In this case, the individuals involved have control on their own time allocation. This is the case when a family is found under the isoquant poverty curve, even though it has the resources to be above the curve. At least two situations of poverty occur:

- a) Time-poor: families spend a lot of time laboring and little time on domestic activities. Figure 2 includes the region limited by $W \geq W_c$, $T < T_c$ and $M > M_c$. They could reduce their work hours to wages they currently gain or they could work the demanded number of hours at any salary $W \geq W_c$.
- b) Time-rich: these families spend little time in the labor market and more time on domestic activities. This is the case represented by the region $W \geq W_c$, $T < T_c$ and $M > M_c$. They could improve their working hours to wages they currently gain or they could work a required number of hours $W \geq W_c$.

In many cases a family might need to buy time from other family individuals (buy substitutes) in the labor market. Naming this time as T_s , the calculation is made in the following way:

$$T_s = [(T_m - T_w) - T_1] \quad (2)$$

where T_w is the average weekly hours worked in the labor market plus the number of commuting hours spent. Therefore, T_s is the net time available and T_w is the number of hours worked in the market plus the commuting time spent per week. So, T_s is the net time of an adult family member minus T_w and T_1 . If this time is negative (time deficit) the family needs to buy someone else's time (buy substitutes) in the free market.

5.1 Counting the Involuntarily Poor

Table 3 shows the critical salary values W_c for each kind of family calculated using expression (1) and the values of T_s obtained using (2). Based on the substitution cost (reposition) of R\$ 2.74 an hour, a Brazilian family formed by two adults with four or five children must have a critical salary of R\$3.19 an hour in order not to be considered involuntarily poor. Similarly, a family with a father or a mother with a child should make a critical income of R \$ 1.61 an hour to avoid being in poverty.

The system used to categorize the other types of families as being in involuntary poverty follows the same logic.

It seems that the critical salary (W_c) grows as the number of family members increase. That is because the bigger a family is, the greater is the amount time spent on domestic production and money required. Therefore, the critical salary of that given family will have to be higher. Douthitt (1994) and Vickery (1977) reached the same conclusions in their USA studies.

Adults who do not live with children dedicate more of their time to the free market. Table 3, for example, shows a family formed by a couple and no children. These adults devote 114.4 hours (T_w) every week to the labor market, which means that each one spends 57.20 hours in the market. As each individual spends

Table 3: Estimates of Average Hours Worked in the Labor Market, Net Time and Critical Salary per Brazilian Family Type

Families with	1 adult			2 adults			3 adults		
	Tw	Ts	Wc	Tw	Ts	Wc	Tw	Ts	Wc
0 child	56.1	16.4	1.03	114.4	39.6	2.03	165.3	74.2	3.16
1 child	54.1	12.9	1.61	113.2	35.3	2.56	165.3	72.2	3.68.
2-3 children	51.7	11.8	1.95	111.6	33.9	2.87	4.00	213.2	107.3
4-5 children	49.3	8.2	2.19	104.6	36.9	3.19	152.4	80.1	4.41
	4 adults			5 adults or more					
	Tw	Ts	Wc	Tw	Ts	Wc			
0 child	22.0	106.5	4,22	274.5	137.0	5.28			
1 child	218.8	104.8	4,77	270.5	137.0	5.90			
2-3 children	213.2	107.3	5.16	262.0	144.5	6.49			
4-5 children	200.8	117.7	5.62	260.0	143.0	6.54			

Note: The time values Tw and Ts are weekly values, while Wc is an hourly value.

Source: provided by the authors based on PNAD/2009.

an average of 15 hours commuting, only 42.20 hours are paid. On the other hand, a single adult living with 4 or 5 children devotes 49.30 weekly hours to his job. Discounting the round trip commuting time of 15 hours, this individual only receives payment for 34.30 hours.

Table 4 highlights the percentage of involuntary poverty in Brazil. One of the findings is that 19.8% of single parents with one child earn a salary below the critical salary. Therefore, they are involuntarily poor.

Table 4: Proportion of Involuntarily Poor Families in Brazil⁶

Families With	1 adult	2 adults	3 adults	4 adults	5 adults or more
0 child	11.4	13.1	16.8	13.8	16.6
1 child	19.8	10.6	17.4	20.8	27.3
2-3 children	33.0	21.0	25.5	34.5	43.0
4-5 children	46.9	41.2	49.3	60.2	65.2

Source: provided by the authors based on PNAD/2009 data.

They are fathers or mothers who work 39 hours a week, spend one and a half hours per day to work and back home and earn less than R\$1.61 an hour or R\$264.00 a month. Table 4 shows that the involuntary poverty proportion is smaller than the generalized poverty.

Douthitt (1994), using Robinson's (1993) data, found that 10% and 26% of single parent families in the American economy with one child or two or more children, respectively, earned salaries below the critical salary. These values were significantly lower than those found in Brazil for the same family type.

In general, results show a convergence of involuntary poverty in any family category. Nevertheless, as usually happens in generalized poverty and as Table 4 shows, the proportion of involuntarily poor families grows proportionally to the number of children, regardless of the family type.

Thus, if the income transfer programs aimed at eradicating poverty are measured by the generalized

poverty pattern, for equity reasons, resources should be directed mainly at poor families with larger numbers of children. Although there could be cases in which families with more children would be less income-poor than families with fewer children, nevertheless, in the assessment of generalized poverty, the opposite happens. Moreover, these programs should be able to distinguish involuntarily poor families from the voluntarily poor ones.

6_Final Thoughts

This paper analyzes poverty in Brazilian families using a bi-dimensional measurement, which considers financial income as well as time restriction. In this sense, isoquant poverty curves are drawn to show the proportion of poor families in Brazil, considering income and time dimensions. The purpose of using a generalized poverty pattern is to identify families that, despite having an income above a set poverty level, do not have sufficient time to do household chores and to take care of their children.

The isoquant curves show the measurement of involuntarily poor families or, in other words, the proportion of families in temporary poverty. In this sense, it is possible to distinguish these families from the ones which, although having the conditions to leave the poverty situation, still choose to remain poor (voluntary poverty).

Among the results obtained, it was found that about 93% of single parent families with four or five children and 79.3% of the ones with both parents and the same number of children are below the isoquant poverty curve. Therefore, these are families living with a shortage of income, time or both. A general result shows that the larger proportion of generalized poverty occurs among single parent families, as compared to any other family

type. Moreover, the larger the number of children in a family, the larger the proportion of poor individuals.

In summary, it was found that the proportion of generalized poverty increases considerably when time is considered as a resource because working parents, mainly in single parent families, do not have sufficient time to do the basic household chores, such as taking care of children.

These results show that income itself is not a good criterion for rating family well-being and resources. When time and income restrictions are considered, to measure a family's well-being through

h a measurement of generalized poverty considering both dimensions, the proportion of poor families becomes much larger than the proportion found when only financial resources are considered.

Regarding in voluntary poverty, 19.8% of single parents with one child have a salary below the critical salary and are, therefore, qualified as involuntarily poor. They are mothers and fathers who, after working for about 39 hours a week and spending an hour and a half commuting to work every day, earned less than R\$ 1.61 an hour, or R\$264.00 a month, in 2009. In general, the larger the number of children in a family, the higher the percentage of involuntary poverty.

This conclusion is important for analyzing the objectives of governmental income transfer programs. Indeed, there could have been cases in which a family with more children is less income-poor than another family with fewer children; but, in the generalized poverty assessment, quite the opposite occurs. Additionally, these programs should distinguish between voluntary and involuntary poverty. In the end, if this is not considered, the programs might end up helping voluntarily poor families.

Another problem that must be considered is the high proportion of single parent families found, in comparison with other family types, particularly those with the most children. The percentage of poverty for a family formed by a single father or a single mother with a child is 77.1%, while this proportion climbs to 93.1% for families with four to five children. In the end, a “vicious poverty circle” might arise and the growing tendency of this family type in Brazil is likely to generate more poor families in the future.

Notes

¹ Kitchen equipment, tables, chairs, kitchens and dining rooms.

² Hours spent doing shopping, cooking, laundry, etc.

³ Meals and clean clothes.

⁴ However, there is considerable evidence that unpaid domestic jobs are not perfect substitutes for services offered in the market (HUFFMAN, 2010).

⁵ Mentioning Becker's model (1965).

⁶ From a total of 178,113 families, only 450 included 6 children or more. Considering this as an inexpressive number, only families with up to 5 children were included.

⁷ People with family ties, domestic dependence or familiarity, living in the same family unit or someone living alone in a family unit were considered as a family. Cohabiting families were defined as those with at least 2 people living in the same home unit (IBGE, 2010).

⁸ According to the American Academy of Sleep Medicine (2007) *apud* Burchardt (2008), the minimum time required for sleeping by any individual is between 7 and 8 hours a day.

⁹ Household chores in the domicile of residence are understood to be all tasks not included in the concept of labor, such as: a) tidying or cleaning all or part of the household; b) cooking or preparing meals, ironing, or doing the dishes with or without using electronic appliances to do chores for oneself or for other dwellers; c) assisting household workers in the performance of domestic chores; d) looking after children or underage dwellers; and, e) cleaning the garden or areas surrounding the residence (IBGE, 2010).

¹⁰ The use of a *per capita* family income with no adjustments to determine the poverty level tends to overestimate the needs of large

families and, as a consequence, also to overestimate poverty among the individuals from such families.

¹¹ Soares (2009) states that people living together generate gains in the economy-of-scale, since preparing food for a large group is more cost-efficient than preparing food for a single person.

¹² Although the distribution of household chores is not evenly made due to the fact that culturally, people play typical roles according to the position each one occupies in the family hierarchy.

¹³ By using data from PNAD/2009, it was estimated that the average time spent commuting during a given week is 15 hours per adult. It is worth remembering that commuting time is not paid for by the labor market.

¹⁴ The critical salary is measured by the hour; the income data are monthly. The W_c value was multiplied by the working hours at paid jobs during the week of reference and, after that, by the average number of weeks per month (equivalent to 4.2 weeks per month, for the year 2009).

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