Title of Paper: A new approach to poverty in Brazil: a bidimensional measurement of well-being

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Abstract:

The paper analyzes the poverty of Brazilian families through a two-dimensional measure of poverty that considers both the income and the allocation of time. In this sense, using the methodology proposed by Vickery (1977) in which *poverty isoquant curves* are constructed for each type of family constitution to identify the proportion of generalized poor. This methodology also identifies the proportion of families who are in a state of involuntary poverty (temporary). As expected, poverty rates increase significantly when the time is counted as a resource, because working parents, especially single parents often do not have enough time to perform essential housekeeping time. It is noticed that there is a higher proportion of poor widespread among lone parents and among those with more children. Another result, for example, is that around 20% of single parents with a child are characterized as involuntary poor and that the highest rates of unintended poor are from households with a higher number of children. These results verified that this article have important implications in relation to government income transfer programs. Indeed, there could be cases where a family with more children were less poor income that a family with fewer children, but in widespread poverty measure occurred otherwise. Additionally, these programs should distinguish between voluntary and involuntary poverty. After all, if this is not taken into account these programs benefiting poor households could be voluntary. Another point that deserves special attention these programs are high proportions of poor single-parent families compared to other family types, especially for those with larger numbers of children. Since the proportion of poverty for a family consisting of a single parent with no child is 77.1%, while for a family with four to five children this proportion is 93.1 %. After all, you can create a "vicious circle" of poverty, because the growth trend of these types of families in Brazil can generate poorest families in the future.

Keywords: poverty, well-being, time allocation.

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1. INTRODUCTION

In the seventies, Vickery (1977) concluded that the U.S. government did not acknowledge that households had basic time needs and that this restriction should be considered. In spite of championing family values, like the importance and the necessity of parents to spend more time with their children, there used to be no government efforts into the measurement of the poverty guideline. Hence, many criticisms were made to the traditional methods used in order to define poverty, so that a research about the statistics and the conceptual issues related to this matter was sought by the United States National Congress of Research (Douthitt, 1994).

Unlike a one-dimensional measure, Vickery's (1977) aimed to define in his poverty study a 2-dimensional well-being measure. One of his interests was to identify people above the income poverty line, people without enough time to take satisfactory care of their families.

Besides acknowledging how important is parents spending more time with their children, or even the individuals spending more time with their families, time must be considered as a fundamental component of what can be called domestic production, which is, the time used to do tasks such as food obtainment, clothes washing, housework, etc. Therefore, time must be valued as a resource valued by families, mainly by those ones with severe income restrictions. Hence, it would appear logical to discuss time spent in housework by families in order to determine their poverty status.

On this sense, considering time as a resource, people which do not have time for their families, or to obtain their own subsistence, if the free market does not allow so, must be considered poor. So, families will be considered generalized poor without less than a certain combination between time and income. For instance, look at Diniz (2009), Barros *et al* (2006), Kageyamma and Hoffman (2006), Lopes *et al* (2006). However, income and time association doesn't appear, so far, as a research subject in the Brazilian poverty studies.

Denying a one dimensional view of the matter, Vickery (1977) aimed to define a two dimensional measurement of well-being. If poverty is the same as the insufficiency of a certain resource, people who do not dispose of time for family, or to earn their own

livelihood 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 something undoubtedly multidimensional. They usually associate time deprivation with no-monetary resources deprivation, like sanitation, education and health.

Thus, this paper aims to analyze the welfare of families in Brazil, through a two-dimensional poverty measure which considers time and income deprivation. The methodology behind it was the one proposed by Vickery (1977) who used isoquant poverty curves customized for each type of family in order to identify the general proportion of time-poor individuals. Families with time and income levels set below the curve will be considered time poor. By using the critical salary solution, families in the involuntary poverty state were also identified.

The results obtained through the study show, as expected, that poverty rates increase significantly when time is accounted as a resource because working parents, especially from parent families, do not have enough time for essential tasks. The thesis points out that 93.1% of parent families with four or five children and 79.3% from the ones with two adults and the same number of children are under the isoquant poverty curve. A larger proportion of time poor were found among parent families or families with more children. A larger proportion of time poor was found among parent families and bigger number of children.

Related to involuntary poverty, 19.8% of single parent families with one child have income below the critical salary, shaping up, therefore, as time poor. On average, the parents work about 39 hours/week and spend one hour and a half on their way to work, they used to earn in 2009 less than R$1.61/hour or R$264.00/month (equivalent to ½ minimum salary in 2009).

Besides this introduction, this paper comprises four paper. The second section brings a review of Time Allocation Determiners and how time is allocated to household chores and tasks. The third section presents Vickery´s theoretical model. Then, the fourth section which brings detailed analysis of the results. The fifth and last section contains the final conclusion of the study and the result political implications.

2. TIME ALLOCATION

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

According to Becker´s conception (1965) home production engenders utility (thus, has a value which is the welfare measurement) and work generates income. There is a home production function in which time for home tasks consists of an important variable to transform of the inputs into domestic products for consumption.

Therefore, goods and services produced, plus available time are inputs in 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 possibly have different amounts of time available to take care of their home needs. For example, two families with three members, may be considered poor (parents and a child), despite having the same annual income.

The first family members are unemployed and have a financial asset. On the other hand, the second family income allocates most of the time of their week to work on their paid jobs and earn money.

Although both families are poor with the same income, the first one reaches a better well-being level but do not work formally and disposes of more free time and more available money, once they don't spend money on day-care and commutes.

Considering time as a factor, rates of poverty drastically increase because adult members do not have available time to do their daily routine tasks. On this sense, it is important to spot the time allocation determinant factors, otherwise named as domestic production.

2.1   Time Allocation Determinants.

Time allocation for work presents many determinants. Not only economic but cultural factors help explain how the distribution 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 either in formal or domestic work is explained more by culture than by economic rationality.

Outside problems, such as diseases and unemployment also hamper time allocation among family members. Ilahi (2001) made a study in Peru and concluded "outside" problems considerably harm women´s time allocation in a family. The study also revealed that in case of illness there was an increase of spent time for women in housework. This increase caused a decrease in activities on their paid jobs.

On the other hand, the involuntary male unemployment caused a time reallocation between the two types of work, contrary to the one caused by diseases. The unemployment of men caused to women a decrease in house-task time and an increase in female participation in paid jobs.

It is acknowledged in economics´ literature that diseases cause economic costs to a family, works such as Russell (2004), Hansen et al (1998) and Stephen (1992) go in this direction. However, indirect time costs are not considered. Ilahi (2001) also noticed that a disease causes a decrease in individual leisure time. Unlike a child, a sick adult will spend hours in additional time in comparison to healthy people. A child will demand adult care whether sick or not, while an adult loses (family yield) and spend more time in housework.

Besides illness and unemployment, ethnic origins in Latin America can be considered an important determinant of time allocation. Latin American families are more likely to suffer time deprivation than the non-natives in the same region. Another important conclusion is the one about infrastructure. It seems that water and energy supplying affect families´ time allocation (Ilahi, 2001). The author observed a connection between income and time allocation and between a paid job and housework. The bigger the income level, the bigger is a family´s capacity to replace house tasks (home production) by crescent leisure levels, creating what is called "the substitution effect". Female labor for house tasks, can be easily bought in Brazil. 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 offer of house-task services is short. As most women in these countries have higher education levels, female formal work is many times done by

the most qualified sections of the economy, which makes domestic services more expensive (ILAHI, 2000). There are regions in which it is not possible to create the substitution effect and the income improvement doesn't bring about any reduction in housework. The domestic services purchase 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 owing to the shortage of domestic services provision (ILAHI, 2000).

An interesting evidence for Brazil, pointed by Teixeira (2009) shows that income transference programs of the government like *"Bolsa Família"* improve women´s time allocation between a paid job 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 in 0,06h/week. Even though this is a slight decrease in paid jobs' time, it causes an increase in home-task time.

Moreover, education incentive policies, responsible for an increase of human capital expansion, affect time allocation between men´s and women´s jobs. Individuals of higher schooling tend to work more in formal work and less in domestic production. Women´s education is also related to paid jobs, mainly the ones of higher education level. Formally educated women tend to work more and to have less children (HARIS and SPYRIDON, 2003).

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

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

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

Shelton (1992) adds that being married in the U.S.A. means more housework for women and less for men. Women's time, widely allocated into domestic production, forces female population into low leisure consumption and into high poverty level. For Vickery (1977), low salary at formal work and high time demand for domestic production turn families exclusively headed by women to be poorer, considering the two dimensions (income and time).

The Aguiar and Hurst (2006) article shows some interesting issues about time allocation between time and leisure for the American economy. The authors show there was a general increase of leisure in the latest years. On average7,9h/week for men and 6,0h/week for women between 1965 and 2003. This was due to many reasons such as the 'taking care of children' activity which presented a high elasticity of substitution, that is, the facility in buying domestic services (au pairs) provoked an increase of hours designated for parents leisure.

Amazingly, according to the same authors, women grew simultaneously their levels of leisure and participation in the work market, decreasing the time spent in domestic production down to 5,9 hours/week. Furthermore, the study pointed that individuals with higher education levels reached a growth in their leisure time of 4,0 hours a week.

2.2   Time Allocation in Domestic Production

While income is an essential resource for the market production, in domestic production the fundamental resource is time. Ilahi (2000), as he studies the use of intrafamily time in developing countries, mentions that poor families have in the domestic production, the mitigation for instabilities in the bond market. Thereby, the time spent means to these families, a fundamental resource for the survival of their members.

It is defined as domestic production, the production of goods and services by family members for their own consumption, using their own capital[1] and the very own unpaid [2]

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[1] Kitchen equipment, tables, chairs, kitchen and dining room.
[2] Hours spent in shopping, cooking, laundry etc.

labor. These goods and services produced by a family unit might include housing, meals, washing clothes and children care. The process of family production involves transformation of purchases and intermediate goods, like supermarket products and electricity, transformed into services or final[3] consumption products (Ironmonger, 2001).

Unlike it is widely conceived, domestic production has been studied since the XIX century. The main study was by Gilman (1898) who discusses the displacement from domestic production into the domestic economy development, teaching these subjects in some North American universities.

Ironmonger (2001) highlights that even in developed countries, where 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 relation to competition. For example, meals in restaurants versus home-made food, stay in a hotel versus stay at home, hiring of children care services versus taking care of your own children, taking a taxi versus driving your own car[4].

The microeconomic traditional guides define family units only as consumer agents, restricted to one certain amount of income and prices of goods, assigning companies with the production of goods and services production. Few authors consider families as more than consumer agents, and also as production units which provide time for domestic production (Ironmonger, 2001).

The total economic value added by families and obtained in familiar production is called "Gross Household Product" (GHP). The first estimates of this production were done in the United States by Mitchell in 1919 and, after him, by Kuznets in 1929, and also in Sweden by scholars Lindahl, Dahlgren and Krob in the same period, as the Ironmonger (2001) reports.

The GHP of the U.S.A. in 1981 represented 37.5% of its GDP (growth of domestic production) the same year. The hour cost of housework results in loss of opportunities at paid jobs.

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[3] Meals and cleaning clothes.
[4] However, there are considerable evidences that unpaid domestic works are not perfect substitutes for services offered by the market (HUFFMAN, 2010).

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, on the other hand, 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 evidences of domestic theory in several countries, states that it is important to know the ways of production in each country as well as the strategy for reduction poverty, most important in developing countries, like in Asian countries, where there are constant market imperfections. Most of the times, reality has shown that market inefficiencies impact on the options of domestic production, implying a substitution of market production by domestic production.

The neoclassical theory has been making some improvements in order to include the time spent in leisure as part of the set of products consumed by a family, as well as the time allocated for labor. Time allocation has been playing an important role in most of the applications of the production function model. Decisions about time allocation in housework reflect not only considerations on production, but also preferences on 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 his time and effort dedicated to the free market. For Huffman (2010), econometric studies ignore adult time price in a family unit, and this leads to a specification due to the omission of this variable in the model. According to Becker[5], each product requires a unit of time from one or more members of the family unit. A family has one allocation of time which is taken from it. If the Family income decreases, grows the amount of time dedicated to the production of domestic goods. This is a conclusion by Huffman (2010) for the United States. For this author, domestic production ends up in good health for a family. As usual, homemade food is healthier than fast food, domestic production contributes to the reduction of obesity problems. Moreover, family member satisfaction must be considered, once they are having meals together, thus increasing well-being for the individuals involved.

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[5] Mentioning Becker's model (1965).

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

3. METHODOLOGY NOTES

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

A reasonable hypothesis that a family does not reach this level of poverty is that it has a minimum time independently of their income and, a minimum income independently of the amount of available time. Let´s take T_0 and M_0 and M_0 in Picture 1 as the minimum values of income and time, respectively. If the available time and income of a family present values shorter than T_0 and M_0, respectively, it is considered time poor.

Additionally, let us assume these values as not enough to determine a non-poor pattern. If a family only has time T_0 (or income M_0) so it does need an income M_1 (or time T_1) to reach the poverty level.

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

In this study, time T_0 is fixed in 14 weekly hours, assuming that an adult member must spent at least two hours a day in family management and interacting with other family members. T_m is the maximum of available hours that an adult can work without endangering his physical and mental health.

The sufficiency combinations of time and income to reach the minimum of poverty pattern could be represented through the points on the DBAC curve, called isoquant of poverty. The inclination of the curve also measures the capacity of a family for substituting domestic production by goods and services purchased in the market. The

isoquant measures the ability of a family to exchange their available time by consumption, which depends of their productivity in both labor market and domestic production.

The point A of coordinates (T_1, M_0) corresponds to the minimum value of income with the respective necessary time level for a family not to be considered poor. In general, it is associated with families of low income, deriving from the free market, which buys a few goods and services from the market, not including savers items of house tasks. On the other hand, point B of coordinates (T_0, M_1) represents the situation when the maximum substitution of income by time in house tasks, takes place.
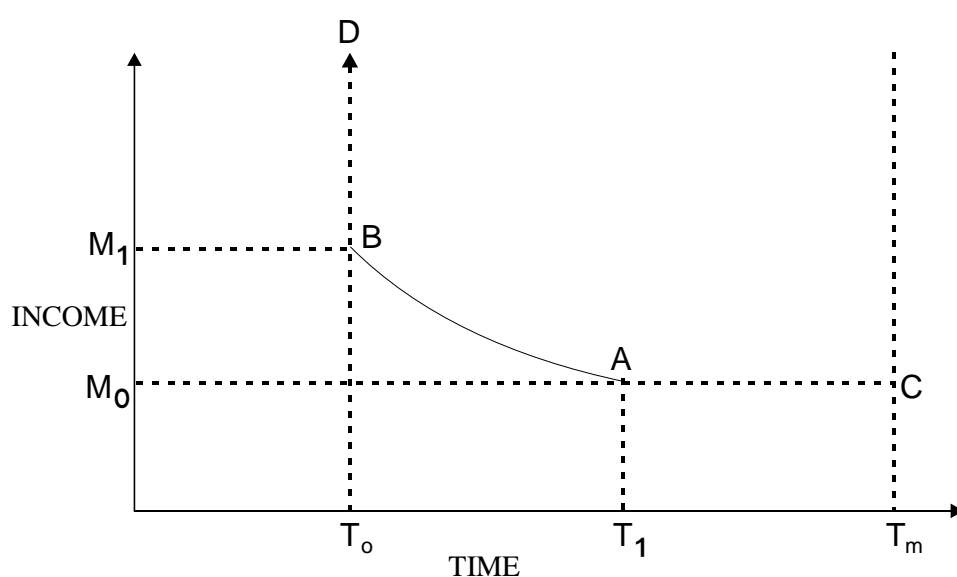
Picture 1- Illustration of Isoquant Curve of Poverty for a Family Aggregate.

Note that M_1 is equal to income M_0 plus the quantity of income necessary to purchase substitutes (other individual´s time) in order to accomplish all the domestic tasks.

The relation of this generalized poverty measure with the traditional measure of income poverty give us the following terms: if M_0 is the minimum necessary income for a family to be within the poverty limit, so the traditional poverty definition corresponds to the horizontal line M_0C. In a generalized measure, all the families set below the curve DBAC are only time poor, or only income poor or generalized poor. At this rate, the number of generalized poor families is larger than considering the traditional measure. Families which 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 lower than T_1.

After estimating these parameters, three categories can be observed: i) time and income poor; ii) not income poor, but time poor; iii) income poor, but not time poor. The total of generalized poor is the sum of the three types of poor.

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

3.1   Estimation of parameters of the isoquant curve of generalized poverty

The variables applied to estimate the parameters of isoquant curves were extracted from the year 2009´s PNAD (National Research of Household Samples) micro data, a research held by IBGE (Brazilian Institute of Geography and Statistics).

The poverty isoquant curves were built for each one of the family types: a family formed by five adults or more with no children, with one child, with two to three children or four to five children aged up to 14- year-olds[6]. Therefore, there is a total of 177.663 families, disaggregated in 20 types of family[7].

Calculating M_0, T_1 and T_m, the week value for T_m was estimated in 91 hours. This value was obtained by taking 56 hours a week used for sleeping, 7 hours for eating, 7 hours for getting dressed and 7 hours for personal grooming and care.

Assuming that 14 hours a week, or 2 hours a day, is the minimum of hours a person must dedicate to his or her family, this was the value fixed for the parameter T_0.

As you may know, T_1 is the time families must spend in domestic production. In order to calculate T_1 we used the average of hours spent weekly by each kind of family when doing house work[8]. The values of T_1 for each type of family are discriminated in the Table 1.

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[6] From a total of 178.113 families, only 450 include 6 children or more. Considering this as an inexpressive number, only families with up to 5 children were included.

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

[8] Home tasks are the ones which are not included in the job conception, such as: a) tidying and cleaning up; b) cooking, ironing, doing the dishes by using devices or not; c) guiding domestic workers at

The value of M_0 was fixed in ½ minimum salary (R\$ 232.00), as of 2009, in case a family formed by a couple without a child. In a family formed by a couple, the M_0 value was a minimum salary. Considering the scale economy effect in the monetary cost of having children, decreasing fractions of the minimum salary are added considering the addition of each child in each group. In other words, the M_0 for a family formed by an adult with a child is equivalent to a ½ minimum salary plus ¼ of its value. The M_0 value for a family with an adult and two to three children is equal to a ½ minimum salary plus (1/4 + 1/8) of its value. In a family with 3 children, consequently, it is added 1/16 and so on. The same for a family formed by a couple, but considering M_0 as the minimum salary.

According to Fernandes *et al* (2002), despite the concept of familiar income *per capita* be used in most studies about poverty, this concept does not enable us to consider family members differently. Thence, this work chose for using the monthly income of all labors[9].

The parameter M_1 was calculated considering the cost of hiring a housekeeper, which characterizes the substitution effect (buying someone else's time). This cost was obtained through 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. So, the cost of substitution (reposition) is R\$ 2.74 per hour in Brazil.

4. OBSERVED EVIDENCES FOR BRAZIL

The Table 1 shows the considered for the income poverty line M_0, just like the estimated values of the parameters T_1 and M_1. Broadly, the values of the table also show that time is money and until certain point both are interchangeable, and the trade-off between income and time is important and might result in a higher well-being level for the families. Note that a family formed by an adult with three children should have a weekly income of R\$101.27 (M_0) and 27 hours of domestic production (T_1), or the equivalent to a weekly income of R\$277.00 and 14 hours of domestic production (T_0) not to be considered poor, according to the generalized poverty definition .On the same

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housework execution; d) taking care of children and e) cleaning the yard and area around the residence (IBGE, 2010).

[9] The using of *per capita* family income with no adjustments, in order to determine the poverty line tends to overestimate the needs befalling big families and, as a consequence, also to overestimate poverty amongst the individuals in such families.

way, 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 dedicating 33.5 hours (T_1) of its week taking care of their home and children, or the equivalent to R\$ 397.00 of income (M_1) and 14 hours a week in domestic production(T_0). Notice there is always a combination between income and time allocation along the isoquant poverty curve. For the other kinds of family, the analysis is similar.

The hours designated for domestic production are related to family composition, because the bigger the number of children, the larger the demand for this kind of request. Douthitt (1994) concluded the same for the U.S.A. In fact, children demand fewer money resources than parents' available time. The same results were obtained in Brazil.

Table 1 - *Isoquant Poverty Curves* of family Composition for Brazil - 2009

Families with	M_0 (weekly values)				
	1 Adult	2 Adults	3 Adults	4 adults	5 adults ou 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
	T_1 (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
	M_1 (weekly values)				
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: by the author based on PNAD/2009 data.

4.1 Recounting the Poor

The values in Table 2 show the proportion of poor individuals in Brazil considering the measure of generalized poverty for each familiar composition. Incorporating time as a well-being measure, it clearly generates a bigger proportion of poor in relation to the

traditional measure of poverty. That is Brazil´s case and the same conclusion had been reached in Vickery's (1977) and Douthitt's (1994) for the U.S.A., by using the same definition of generalized poverty.

By Fernandes *et al* (2002), according to the traditional poverty pattern, only 36.3% of families were in poverty situation in 1999. By the generalized definition of poverty a percentage of 57.9% were found for the same family category.

Table 2 – Proportion of Generalized Poor Families in Brazil

Families With	1 Adult	2 Adults	3 adults	4 Adults	5 adults ou more
0 child	77,1	53,3	43,9	39,0	41,2
1 child	75,5	51,1	46,8	46,9	52,5
2-3 children	83,5	57,9	55,5	61,1	66,9
4-5 children	93,1	79,3	74,6	78,2	80,8

Souce: by the author based on PNAD/2009 data.

The values in Table 2 also show that 93.1% of parent families with 4 or 5 children and 79.3% of the ones with two adults (and the same number of children), are under the isoquant curve of poverty, hence, they are families with income or time shortage (or both of them).

There is a larger proportion of generalized poor among parent families, results that converge with research Sorj *et al* (2007), and families with more children, the results differ Fernandes *et al* (2002).

In search Sorj et al (2007) , we found that family composition that adds the highest percentage of poor are single parents , especially those headed by women with child. According to this survey, about 35.4 % of this type of family is poor considering the traditional measure of poverty. Moreover, the results of Fernandes et al (2002) are shown with our results differ with respect to the number of children. Through his study, in which only income was considered, he concluded that 70% of the poor live in families without children or up to 2 children.

Vickery (1977) also concluded that family cooperation allows parent families to experiment an improvement in their well-being. Because of this cooperation, there are

economy scales[10] in domestic production, once there is a larger number of people at home to execute home tasks[11]. Therewith, market risks are reduced and families experience a higher level of well-being, which also corroborates with a decrease in poverty statistics. According to Teixeira (2009), this type of home is becoming more and more frequent in Brazil.

5. VOLUNTARY AND INVOLUNTARY POVERTY

The income transfer programs aim to transfer income to families with *per capita* income below the traditional poverty line. However, due to equality matters, people responsible for these programs were supposed to distinguish families in temporary poverty (involuntary poverty) from the ones which tend to stay in the same situation (voluntary poverty).

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

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

Where p_i is the reposition cost (substitution) by hour and h_i is the number of s hours spent in the *ith* home task. In this study, the reposition cost of various tasks was calculated based on domestic employee performance, taken from PNAD.

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[10] Soares (2009) states that people living together generate scale-economy gains, since preparing food by the batch is more cost-efficient than preparing food for one single person.

[11] Although the distribution of inner housework tasks is not evenly made, due to the fact that culturally, people play typical roles according to the position each one has in the family hierarchy.
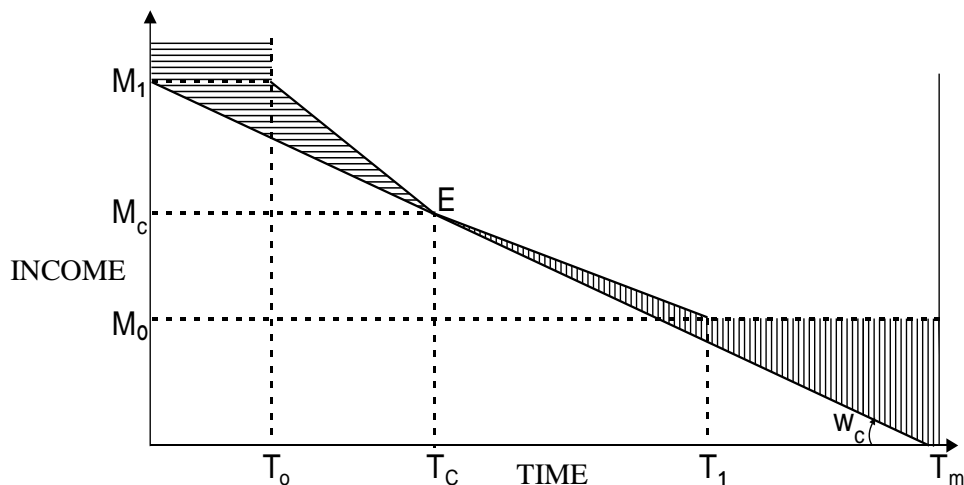
Picture 2 – Illustration of a Critical Salary Solution [transcription from Vickery (1977)]

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

A family remains in poverty, for instance, until a variation in family composition occurs (a divorce or a child leaves the family) or an increase in the family income because of some professional specialization. The real family salary can be below than their own potential salary for a short period as a result of a dismissal or transition in the labor market.

Still, families with salaries (income) and time inside the crosshatched area of Picture 2 are considered voluntary poor. In this case the individuals involved have the control over their own time allocation. It is the case when a family is found under the isoquant poverty curve although possessing resources to be above the curve.

At least two situations of poverty occur:

a) Time poor: families spend a lot of time laboring, and a little time on domestic activities. Picture 2 includes the region limited by $W \geq W_c$, $T < T_c$ e $M > M_c$. They could reduce their work hours to the current salary or could work the demanded number of hours at any salary $W \geq W_c$.

b) Time rich: these families spend a little time in the labor Market and much more time on domestic activities. That is the case represented by the region $W \geq W_c$, $T > T_c$ e $M < M_c$. They could really improve their work hours to the current salary, or could work a required

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number of hours $W \geq W_c$.

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

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

where T_w are the medium hours weekly worked plus the transportation time hours in the work market[12]. Whence, T_s is the net time and T_w are the numbers of hours worked in the market plus the round trip spent commuting weekly. So, T_s is the net time of a family adult member minus T_w e T_1. If this time is negative (time deficit) the family need to buy someone else's (buy substitutes) in the free Market.

5.1 Counting the Involuntary Poor

Table 3 shows the critical salary values W_c for each kind of family calculated according to the expression (1) and the values of T_s obtained through (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 to not be considered involuntary poor. On the same way, a parent family with a child must earn a critical income of R$1.61 an hour to avoid a poverty condition. The system to categorize the other types of family are involuntary poor, follows the same logic.

Anyway, it seems the critical salary (w_c) grows as the number of family members increase. That is because the bigger a family is, the bigger is the time spent on domestic production and required money, therefore, the bigger the family critical salary is. Douthitt (1994) and Vickery (1977) in their thesis, found the same conclusions for the U.S.

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[12] By using data from PNAD/2009, it was estimated that the time spent commuting during a given week is on average 15 hours per adult. It is worth reminding that commuting time is not paid for by the job market.

Table 3 – Average Hours Worked in the Market Estimated, of the Net Time and the Critical Salary per Type of Brazilian Family.

Famílias com	1 adulto			2 adultos			3 adultos		
	Tw	Ts	Wc	Tw	Ts	Wc	Tw	Ts	Wc
0 criança	56,1	16,4	1,03	114,4	39,6	2,03	165,3	74,2	3,16
1 criança	54,1	12,9	1,61	113,2	35,3	2,56	165,3	72,2	3,68
2-3 criança	51,7	11,8	1,95	111,6	33,9	2,87	4,00	213,2	107,3
4-5 crianças	49,3	8,2	2,19	104,6	36,9	3,19	152,4	80,1	4,41

	4 adultos			5 adultos ou mais		
	Tw	Ts	Wc	Tw	Ts	Wc
0 criança	22,0	106,5	4,22	274,5	137,0	5,28
1 criança	218,8	104,8	4,77	270,5	137,0	5,90
2-3 criança	213,2	107,3	5,16	262,0	144,5	6,49
4-5 crianças	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 measured by the hour.
Source: by the author based on PNAD/2009.

Adults who do not live with children are the ones who dedicate more of their time to the free market. Check Table 3, for example, a family formed by a couple with no children. This kind of adults allocates every week 114.4 hours (T_w) in the labor market, which means that each one spends 57.20 hours in the market. As each individual spends a medium of 15 hours commuting, only 42.20 hours are paid. On the other hand, a single adult living with 4 or 5 children disposes of 49.30 weekly hours to his job. Discounting from this time the round commuting trip time (15 hours), this individual only receives the payment for 34.30 hours.

The data in Table 4 brings up the proportion for type of family which is in involuntary poverty situation in Brazil. One of its results is that 19.8% of single parents with a child earned salary below the critical salary. Therefore, they were involuntarily poor. They are fathers or mothers who are working 39 hours a week and spend one and a half hour in their round trip (way to work/way back home) used to earn less than R$1.61 an hour or R$264.00 a month. Table 4 shows that the involuntary poor proportion is shorter than

the generalized poor.

Table 4 – Proportion of Involuntary Poor Families for Brazil[13]

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: by the author based on PNAD/2009 data.

Douthitt (1994) using Robinson data (1993) found about the America economy that 10 % and 26% of parent families with a child or two and more children earned, respectively, salaries below the critical salary. Whence, the smaller values than the ones found for Brazil in the same type of family.

In general, the results show a convergence of the involuntary poor in any category family. Nevertheless, as it usually happens to generalized poverty, it is noticed from the values in the Table 4 that the proportion of involuntary poor families, no matter the family makeup, it grows along the number of children.

Thus, if the official income transfer programs aim to poverty eradication measured in the generalized pattern, by equity reasons, resources must be mostly directed to poor families with a larger number of children. After all, there could be cases in which a family with more children would be less income poor than a family with fewer children, but in the generalized measure, the opposite happened. Moreover, these programs should distinguish involuntary poor families from the voluntary poor.

6. FINAL THOUGHTS

This paper analyzes the poverty in Brazilian families through a two-dimensional measure, which considers monetary income as much as time restriction. In this sense, isoquant poverty curves are drawn to measure the proportion of poor families in Brazil, considering income and time dimensions. The interest of using a generalized poverty pattern is to identify families which, despite having an income above certain poverty

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[13]Critical salary is measured by the hour and the data about income are monthly data. The Wc value was multiplied by the working hours at paid work 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).

line, do not have sufficient time to do house tasks and take care of their children.

The isoquant curves drawing allows for the measurement of involuntary poor family. 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 conditions to leave the poverty situation, still choose to remain in such terms (voluntary poverty).

Among the obtained results it was found that about 93% of parent families with four or five children and 79.3% of the ones with two adults (the same number of children), are under the isoquant curve of poverty. So, these are families living in shortage of either income, or time, or both of them. A general result shows that the larger proportion of generalized poor occurs among parent families when compared to any other kind of family. Moreover, the bigger the number of children in a family, the bigger the proportion of poor individuals.

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

These are results which show that income itself does not work as a good index of well-being and resources of a family. After all, when time and income restriction is considered for measuring a family´s well-being, through a generalized measure of poverty with these dimensions, the proportion of poor families is much bigger than the proportion that appears when only monetary income is considered.

About involuntary poverty, 19.8% of single parents with one child had salary below the critical salary, therefore categorized as involuntary poor. They are mother and fathers who after working for about 39 hours a week and taking an hour and a half every day commuting to work, earned in 2009 less than R$ 1.61 an hour or R$264.00 a month. In general, the larger the number of children in a family, the larger the proportion of involuntary poor families.

This conclusion is important for the analyses of the objectives of governmental income transfer programs. Indeed, there could have been cases when a family with more children was less income poor than a family with fewer children, but in the generalized poverty measure, quite the opposite occurred. Additionally, these programs should have

distinguished voluntary and involuntary poverty. At last, if it is not considered, the programs might benefit voluntary poor families.

Another problem which must be considered, is the high proportion of parent families compared to the other kinds of families. Especially the ones with more children. But the proportion of poverty for a family formed by a single father or a single mother with no children is 77.1%, while in a family with four to five children this proportion is 93.1%. In the end, a "vicious poverty circle" might arise, but the tendency to growth of this kind of family in Brazil is likely to generate more poor families in the future.

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