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Family Farming in Brazil: Evolution between the 1996 and 2006

Agricultural Censuses

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2006 Agricultural Censuses**

ABSTRACT

This article compares the main findings of Brazilian Agricultural Census data of 1996 with the same of 2006 by applying the methodology known as 'FAO/INCRA', which allows characterizing family farm by in relation to the total universe of farms. In this comparison several variables are shown, like the participation of family farming in the total value of production, in the total number of farms, utilization of modern technology and partial factor productivity. Census Data shows that family farming have changed from 37.91% of total production value up to 36.11% during the a decade of strong expansion of agriculture as a whole, demonstrating the economic relevance of this segment, which besides producing food, is integrated in the most important productive agricultural chains of the Brazilian agribusiness. Family farming is a heterogeneous segment, with different sub segments. During the period of ten years the most rich of these sub segments (A) has increased their participation in total production, while the poorer sub segments (C and D) have only grown in absolute terms without a corresponding increase in production.

Keywords: family farming, agricultural productivity, technical innovation, Brazil, rural development.

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Introduction

The debate about family farming has many facets to which a short paper cannot do full justice. One is the question, ‘Who are family farmers?’ Anyone familiar with rural life would have no difficulty separating family farmers from non-family farmers in the countryside. However, this is no trivial task when it is a matter of defining objective criteria with which to identify family farmers for public policy purposes. The real identity of family farmers is multifaceted, with traits that vary according to culture, tradition, level of development, market insertion, survival strategies, and many other economic, social, anthropological and political factors. Translating this complexity into objective criteria based on the incomplete information available inevitably entails simplifications, which like any simplification are open to questioning, disagreement, controversy and even distortions. In this context, it is important to use a simple criterion that takes into account the essential features of family farming and assures the inclusion of a majority in the segment while reducing as much as possible the leakages and distortions that could result from ill-defined criteria.

Despite certain specificities that differentiate it significantly from other segments of the agricultural sector, at least part of the family farming segment in Brazil can survive and grow only if it can operate according to this same systemic logic of market integration and sustainability. Some segments of family farming are part – a fragile part, no doubt – of Brazilian agribusiness. This paper presents evidence that the most dynamic and prosperous family farmers are precisely those who have successfully integrated with some regional and national production chains.¹ At present these more dynamic family farmers represent less than 10% of all family farmers, but others could also benefit from further integration into business circuits and agro value chains, provided they are able to overcome bottlenecks that hinder integration.² In some cases the integration of family farmers could dynamize existing agroindustrial subsystems or drive the creation of new subsystems, such as market niches or alternative marketing and distribution channels. Another possibility, which is not mutually exclusive, is the exploration of local market potential in terms of organic or artisanal products. Both integration with industry and the exploration of market alternatives require efforts to overcome major obstacles in the public and private spheres. One of the most daunting of

¹ Although in the 1970s some authors argued that agroindustrial integration transformed small producers into semi-proletarians, later experience with integration of the supply chain in pork, poultry, tobacco, grapes and other products showed that the earnings of integrated farmers were more stable and higher than those of non-integrated producers. See among others Batalha & Silva (1999); Santini *et al.* (2005, 2006); Souza Filho *et al.* (1998, 2004, 2005).

² The integration is a very selective process, which is always excluding those that were integrated and can't follow the big companies' new exigencies. While the bottlenecks may be very pervasive and difficult to overcome for the majority of very small family farmers, a large number have the basic conditions to integrate. The main obstacle can be considered a lack of marginal inputs, which could be addressed by public policy.

these obstacles is the difficulty of developing and transferring technology appropriate to family farming.

Ten years on from the launch of PRONAF (National Program of credit to strengthen family farms), it is worth asking how family farming is progressing and whether it conserves the dynamism it displayed in 1996.

One of the key points argued in this paper concerns the differences among different segments of Brazilian agriculture. It shows that part of the family farming segment stands out for the production of several important agricultural goods. Another argument refers to the emergence of an important sub-segment that can be termed the rural middle class, which uses modern technology and plays a significant role in production by family farming.

The 2006 Agricultural Census carried out by IBGE provides answers to some of these concerns, as shown in sections “Modernization of Family Farming” and “Typology of Family Farmers by Income” below where a comparative analysis is presented of the development of family farming between the 1996 and 2006 censuses, as well as an analysis of the process of modernization of family farming through the evolution of selected variables. First, however, it is necessary to define family farming more clearly. Section “Family Farming in Brazil 1996-2006” discusses the concept in legal and sociological terms. Finally, “Conclusions” section summarizes the factors that contributed to the performance of family farming in various respects.

Relevance of the Category

The above review suggests a clear preference for defining family farmers as those producers directly responsible for management of their farms without the intervention of foremen or administrators, with holdings whose total area is subject to certain limitations to avoid the inclusion of excessively large latifundio units, and operated mostly by family labor complemented by contract labor.³

The most important criterion, however, is management. In this case management is performed by the family, which to some extent ensures that the effects of agricultural development are extended throughout the regions in which family farming takes place. The contrast with non-family farming is evident inasmuch as the effects of its development extend to towns and cities where its products are consumed and from which investment derives.

Family Farming in Brazil 1996-2006

The methodology adopted for present purposes is taken from FAO/INCRA (2000) and can be summarized as follows:

³ The size restriction derives merely from a statistical problem. In Brazil, almost all very large properties (latifundios) are still left mostly unfarmed, yet many of these units are counted as family holdings because they have no employees and are run by their owners.

Methodology adopted to define family farms

Characterization of family farms

Managed directly by producer
and
 family labor > contract labor
and
 Total area of establishment ≤ maximum regional area

Family labor

Family members aged 14 & over
 +
 (Family members under 14) / 2

Contract labor

(Wages + value given to sharecroppers + jobbers)
 ÷
 (state daily rate x 260)

The methodology described above⁴ allows IBGE's 1996 and 2006 agricultural censuses to be compared, showing that the number of family farms rose from 4,139,000 to 4,551,855 in ten years. The latter number corresponds to 87.95% of all agricultural establishments in Brazil. The gross value of production (GVP) by family farms in 2006 was R\$59.2 billion, or 36.11% of total agricultural output. The family farms covered by the census accounted for 32% of the area of all agricultural establishments covered, occupying an aggregate area of 106.7 million hectares. They employed 13,048,252 people (including family members and employees), or 78.75% of the total agricultural workforce.

The 1996 census had already revealed the importance of family farming, which was shown by the 2006 census to have expanded and gained in

⁴ Algorithms were based on the methodology FAO/INCRA used by IBGE to characterize family farming in the 1996 census. The same methodology was applied to data from the 2006 census, with the results presented in Section 3, to assure compatibility with the information already available from the 1996 census and enable the two data sets to be compared. The last step was to develop algorithms to express the calculations performed using SAS statistical software, with which IBGE processes agricultural census data.

economic and social importance.⁵ The number of family farms, area farmed and employment increased over the intercensus period. Their share of total agricultural production fell, however, from 37.91% in 1996 to 36.11% in 2006, as can be seen in Table 1.

Table 1. *Family Farming in Brazil – Change in Key Variables between 1996 & 2006 (% Total)*

<u>Variable</u>	<u>1996</u>	<u>2006</u>
No. of farms	85.17	87.95
Area	30.48	32.00
Gross value of production (GVP)	37.91	36.11
Workforce	76.85	78.75

Source: The author, using data from IBGE, Agricultural census 1995-1996 & 2006 (special tabulations by IBGE based on microdata).

The fact that family farming's share of agricultural production stayed almost constant in a decade when the agricultural sector expanded strongly suggests FF has at least been able to follow the same path of growth achieved by large-scale agribusiness. This shows the economic importance of family farming, which no longer produces just food but has become part of the major agricultural production chains, contributing to the boom in Brazilian agribusiness between the end of the 20th century and the current decade.

If family farming were a synonym for 'subsistence farming' or 'peasant farming', as many people believe, the agribusiness boom would have relegated it to a position of insignificance, but as noted this was not what happened.

In contrast with the methods used in other countries, this study does not use size of establishment or revenue to identify family farms because these are the criteria appropriate to defining a different category, i.e. that of small producers, which may cover different social relations (small in area but corporate, or large in area but family owned and managed). What matters in our view is to identify family farmers who have few employees and live on

⁵ The statements made here refer solely to calculations based on special tabulations of the Census microdata from the 1996 and 2006 agricultural censuses. Different estimates could result from an error analysis, which IBGE has not yet performed. However, there are some methodological differences between the two censuses, which may ultimately alter these conclusions. The 1996 census collected data for the agricultural year (August 1995-July 2006), whereas the 2006 census was based on data for the calendar year (January-December 2006), which is traditional for IBGE. This change may affect the comparability of the two censuses. For example, the 1996 census is assumed to have underestimated the participation of tenants, sharecroppers and temporary laborers because they were not present at the time the interviews were conducted (September-October), which is the off-season. The 2006 census will have captured a larger number of these individuals, who are typically family farmers. If so, the growth in production and in the number of producers may be illusory. Nevertheless, recent assessments by IBGE delivered at seminars claim this is not the case. Because IBGE has not yet resolved the issue, the discussion here is necessarily confined to the available data. For more details of methodological aspects of the 1996 census, see Guanziroli (1998).

their farms, since they create more jobs, contribute to land tenure deconcentration and thus set the direction taken by rural development.

In sum, the typology used here defines family farmers as those who live and work on their property and extract income predominantly, albeit not solely, with the use of family labor.

As noted above, the methodology used here adopts a broader definition of the area occupied by a family farm than the Family Farming Law (Law 11,326/2006), which uses four tax modules, adopting instead a specification for each region corresponding to 15 times the average regional module⁶ calculated according to the schedule of municipal tax modules in force. Thus areas vary from 279.3 hectares in the South to 1,155.2 hectares in the North. In the Center-West, Brazil's export agriculture hub, the upper limit is 650.7 hectares.

Some of these farms are therefore large enough to develop modern corporate-style farming with economies of scale that enable them to appropriate the gains deriving from participation in the major agribusiness chains, such as the soy complex, fruit farming, dairy farming etc. In this sense they resemble family farms in the United States. Others confine themselves to food production, although these also contribute to the growth in GVP noted above. Evidently, there are also subsistence farmers, who resemble peasants more than corporate family farmers.

The strongest growth in family farming's share in GVP occurred in the North and Northeast, where the segment became predominant in agricultural production, probably also owing to the effect of public measures that helped structure family farming (PCPR, Cistern Program-P1MC, Electricity for All, Land Reform etc). Table 2 presents a breakdown of family farming by region.

Table 2. *Family Farming in Brazil – Share of GVP by Region (% Total), 1996 & 2006*

<u>Region</u>	<u>1996 (%)</u>	<u>2006 (%)</u>
North	58.26	60.18
Northeast	42.98	47.38
Southeast	24.43	22.28
South	57.13	54.43
Center-West	16.31	14.53

Source: The author, using data from IBGE, Agricultural census 1995-1996 & 2006 (special tabulations by IBGE based on microdata).

Family farming grew little in some regions (North and Northeast), while in others (South, Center-West and Southeast) it contracted in relative terms, but this does not mean it stagnated. On the contrary, the agribusiness boom was strongest precisely in the South and Center-West, meaning that family farming

⁶ This is an approximation to the units specified in the legislation, where the maximum area for medium-size properties corresponds to 15 tax modules.

expanded at almost the same pace as non-family or corporate farming, benefiting from the same boom.

Not all the numbers are positive, however. IBGE's special tabulations on land tenure show a certain degree of concentration in the family-farming segment as well (Table 3). A small group of family farmers, corresponding to about 17% of the total, own between 50 and 100 hectares or more, accounting for 63% of the land belonging to family farmers and, at least in some regions, for most of the segment's production. These are producers of soybeans and wheat in Rio Grande do Sul and Paraná, milk producers in Minas Gerais, corn growers and poultry farmers in Santa Catarina, fruit growers in the Northeast etc. This group, comprising some 600,000 producers, most closely resembles US family farmers, French *paysans* or *landwirtschaftlicher Familienbetriebe* in Germany. They are large enough to develop modern corporate-style farming with economies of scale that enable them to appropriate the gains deriving from participation in the major agribusiness chains.

Table 3. Family Farming in Brazil – Distribution of Farm Size, 2006

Area range	% establishments	% total area
Under 5 hectares	39	3
5- 20 hectares	28	13
20-50 hectares	16	21
50- 100 hectares	7	20
Over 100 hectares	10	43

Source: The author, using data from IBGE, CensoAgropecuário 2006 (special tabulations by IBGE based on microdata).

A numerous group of holdings under 5 hectares corresponds to 39% of all farms but to only 3% of the total area. Thus their contribution to total output is relatively insignificant. Most of these very small properties are technically minifundios, which do not provide the conditions for sustaining the family above the poverty line. In a recent study on the 'new face' of rural poverty, Buainain, Dedecca & Neder (2012) show that almost every facet of poverty can be found in these minifundios: apart from their small area, their owners' access to technology is very limited, they lack formal education and are mostly illiterate, and they have little or no access to financial resources and services. While land availability has not impaired the positive evolution of family farming in much of the South and Southeast, the large number of very small holdings mostly located in fragile environments indicates that Brazil still has a severe deficit in land tenure to address. Acreages need to be increased, as well as other factors such as water, education etc., as a basic precondition for eliminating poverty.⁷

⁷ This analysis demonstrates that acreage is important to an understanding of the situation of the poorest family farmers in Brazil. In other parts of the article (table 17, page 19) we show that, in spite of the influence of acreage for the poorest farmers, the size of a property alone does not explain all the differences in income between groups of family farmers.

Although family farming accounts for about 40% of total production, as noted above, its shares by crop or livestock vary considerably. Table 4 below shows a breakdown of these shares in 1996 and 2006.

Table 4. *Family Farming in Brazil – Share of Production by Type of Product*

Type of product	1996 (%)	2006 (%)
Beef cattle	23.64	16.65
Dairy cattle	52.05	60.53
Pigs	58.46	52.45
Poultry	39.86	30.34
Bananas	57.58	62.40
Coffee	25.47	26.97
Oranges	26.96	25.25
Grapes	47.02	53.63
Rice	30.87	39.19
Sugarcane	9.55	10.24
Onions	72.37	69.59
Dry beans	67.23	76.57
Tobacco	97.18	95.67
Cassava	83.88	93.17
Corn	48.57	51.90
Soybeans	31.62	23.60
Wheat	46.04	36.38

Source: The author, using data from IBGE, Agricultural census 1995-1996 & 2006 (special tabulations by IBGE based on microdata).

The fall in beef cattle as a share of total production is consistent with the fact that family farmers own small areas compared with non-family farmers, especially because almost all cattle farming is extensive in Brazil. However, the fall in the shares of pig and poultry farming is more surprising, given that these have long been traditional activities for family farmers.

The increase in dairy cattle as a share of total production is striking, as it suggests family farmers have adapted to new sanitary requirements for milk in Brazil,⁸ especially mandatory cooling of raw milk on the farmer's premises. Compliance with these rules entails more sophisticated organization of production, including the use of cooling equipment that is both expensive and incompatible with the scale of production on most family farms, and many dairy producers, especially the smallest, have since abandoned production or joined large co-ops.⁹

On the other hand, family farmers' share of production rose in permanent crops, at least those shown in the table, between 1996 and 2006. This rise may reflect higher productivity and crop yields as well as growth in crop acreage. If so, it may also reflect a tendency to replace animal production with crop growing, which is better suited to the relative scarcity of land and abundance of labor in family farming.

⁸ Ministry of Agriculture (MAPA), Normative Instruction 51 (IN 51), September 2002.

⁹ Some authors blame the trend on migration to the cities by young family members, others to the attractiveness of commodity crop production over dairy because of the sharp rise in commodity prices during the decade concerned.

In the case of bananas, growth was conspicuous and appears to reflect the advance of production in irrigated areas of several Northeast states that prioritized this crop as well as family farming during the ten-year period. Permanent crops expanded most in the Northeast, driven by government and private efforts to expand the use of irrigation by family farms growing bananas, oranges, grapes and coconuts. For example, wineries in Petrolina, Santa Maria de Boa Vista and Juazeiro (Pernambuco) worked hard to integrate family producers into their viticulture projects.

In the case of temporary crops, the data in the table reflects crop substitution by family farmers, with the strongest growth in rice (almost 10 percentage points), dry beans and corn. Tobacco and cassava had no scope for growth as these crops were almost entirely produced by family farmers to begin with.

The overall picture is therefore one of a fairly significant shift by family farmers toward food crops, or domestic production as it is known, i.e. rice, corn, dry beans and cassava, concurrently with a sharp fall in animal production. This does not mean the products characteristic of agribusiness have been abandoned by family farmers. Despite the decrease, their shares remain relatively high in soybeans (24%), wheat (36%), beef (17%) and pork (52%). In other words, some of the more capitalized segments of family farming are linked to agribusiness, producing soybeans, wheat, cattle and even sugarcane, while a large mass of family farmers basically produce food.

The fact that these farmers produce food, such as rice, beans and cassava, does not necessarily mean they are subsistence farmers. Today family farms produce rice and beans with high technology and entirely for the market. Thus these farmers are as commercial as those who produce soybeans, because their basic goal is not to grow their own food but to sell their products in the market, and in this way they also contribute to food security in Brazil.

It can therefore be said that family farming participated in Brazil's agribusiness boom of the 2000s while also continuing to perform its role as a commercial producer of food products.

Other segments of family farming produce basically for their own consumption, such as the *caboclos* of the Northeastern backlands who lack the conditions to integrate positively with the market. This should by no means be considered belittling as far as their social status is concerned, since instead of migrating southward and helping to fill the city slums they struggle to survive with as much dignity as possible in the neglected areas where they were born.¹⁰

The fact that family farming's share of total soybean production fell, to take just one example from the agribusiness sector, shows on the other hand

¹⁰ Migration is still a common survival strategy for poor family farmers. Helfand & Pereira (2012) provide evidence of the importance of migration as a way out of rural poverty, particularly in the Northeast, where members of poor rural households continue to migrate to local towns or cities in other regions. Traditional seasonal migration to take part in the sugarcane, coffee, cotton or orange harvest has decreased considerably and migration patterns have changed significantly in the last two decades.

that production by non-family farms grew even more; indeed, production by non-family farms doubled between 1996 and 2006.

Only cotton appears to have diminished in terms of both production and market share, and as noted above this crop was practically abandoned by family farmers in all regions of Brazil.

Modernization of Family Farming

As discussed below, the process of technological modernization in agriculture has extended over time to include substantial numbers of family farmers, especially in terms of mechanization but also in such basic areas as access to electricity, which more than doubled in the period analyzed. This change is summarized in Table 5.

Table 5. *Family Farming in Brazil – Modernization: Proportion Using Modern Technological Components*

Selected variable	1996	2006
TARE	16.67	19.23
Electricity	36.63	68.26
Animal traction	22.67	38.75
Mechanical traction	27.5	30.21
Manual traction	49.83	31.04
Irrigation	4.92	5.74
Fertilizer & soil correctives	36.73	37.79

Source: The author, using data from IBGE, Agricultural census 1995-1996 & 2006 (special tabulations by IBGE based on microdata). TARE = technical assistance and rural extension.

Table 5 shows this progress was not significantly influenced by technical assistance, whose use increased only moderately between 1996 and 2006. According to the 2006 census, only 19% of family farmers used technical assistance, up from 17% in 1996. This may be one reason for the lack of growth in fertilizer and soil corrective use, one of the objectives of technical assistance and rural extension (TARE).

The strongest growth was in the use of electricity, which has been boosted since the 1990s by a series of government programs, especially in the Northeast and mostly in the context of social welfare policies unlinked to production strategies. The use of mechanical traction increased and the proportion relying entirely on manual traction decreased, although it remained high (31%). Mechanization was encouraged both by loans from BNDES, the national development bank, under the MODERFROTA Program, which finances purchases of tractors, combines and farm machinery, and by PRONAF.

A regional breakdown of these growth rates shows that although technical assistance did not advance much in aggregate terms (rising from 17% to 19% nationwide), significant efforts were made in some regions to increase the

influence of TARE among family farmers. In the North and Northeast, especially, where only 3% and 6% had access to TARE respectively in 1996, the proportions rose 177% in the North and 192% in the Northeast. Based on these growth rates, in 2006 roughly 9% must have had access to TARE in the North and 18% in the Northeast (Table 6).

Table 6. *Family Farming in Brazil – Growth in Modernization by Region, (%) 1996/2006 Referência*

Region	TARE	Electricity	Mechanical traction	Irrigation	Fertilizer
North	177	409	134	391	30
Northeast	192	270	24	43	26
Southeast	19	63	-10	17	-5
South	0	13	10	-3	-4
Center-West	35	129	-1	60	17
Brazil	27	105	11	28	4

Source: The author, using data from IBGE, Agricultural census 1995-1996 & 2006 (special tabulations by IBGE based on microdata).

The Northeast also made strides in irrigation, thanks mainly to public and private programs (in Petrolina, Juazeiro etc.), while the use of electricity expanded strongly in the North and Northeast.

Differences in Productivity

FAO/INCRA (2000) noted a significant difference between family and non-family farms in terms of land productivity. This difference, which is amply discussed in the international literature,¹¹ reappeared in the analysis of the 2006 census reported here.

Table 7. *Productivity per Hectare – Comparison of Family and Non-family Farms*

	1996 R\$*	2006 R\$
GVP/area – family	435.12	554.57
GVP/area – non-family	312.45	461.74

Source: The author, using data from IBGE, Agricultural census 1995-1996 & 2006 (special tabulations by IBGE based on microdata).

* Constant prices deflated by IGP-DI up to 2006. GVP = gross value of production.

Table 7 shows that the productivity of family farming based on the gross value of production (GVP) in a given area was R\$554.57 per hectare in 2006, or 17% higher than the productivity of non-family farming (mainly capitalist

¹¹ See for example Griffin (2002), Lund & Hill (1979), Binswanger (1994), and Stanton (1978).

enterprises with hired management in Brazil), which was R\$461.74. The difference was even greater in the 1996 census (39%).

As widely found in the international literature, family farmers make more intensive use of the land, which is the scarcest factor for them, so that they are obliged to exploit the small amount of land they own as much as possible. The scarcest factor for non-family farms is labor, and for this reason they use it most intensively, as shown in the next table.

Table 8. *Labor Productivity – Comparison of Family and Non-family Farms*

	R\$ 1996*	R\$ 2006
GVP/workforce– family	3,402.86	4,538.71
GVP/workforce – non-family	18,506.46	29,762.92

Source: The author, using data from IBGE, Agricultural census 1995-1996 & 2006 (special tabulations by IBGE based on microdata).

* Constant prices deflated by IGP-DI up to 2006. GVP = gross value of production.

The census data shows that labor productivity in terms of the gross value of production divided by the number of people in the workforce was higher by many multiples for non-family farms than family farms. Family farmers use labor extensively, so that labor productivity is low, because their priority is to keep all family members in work, albeit with low rates of pay. Non-family farms do not have access to an abundant supply of labor and also have to work large areas, so they are obliged to hire employees and for this reason must be more efficient in their use of labor.

With regard to the third factor, which is capital, family farms also make better use of this factor than non-family farms according to the census data, no doubt because capital is also scarcer for them.

Table 9. *Financing Received as Proportion of Total – Comparison of Family and Non-family Farms*

	1996 %	2006 %
Family	25.3	28.9
Non-family	74.7	71.1

Source: The author, using data from IBGE, Agricultural Census, 1995-1996 & 2006 (special tabulations by IBGE based on microdata).

Table 9 shows the increase in credit received by family farmers between 1996 and 2006, with their share of total farm loans extended by official and private-sector banks rising from 25% to 29%, probably reflecting the support given to family farming by PRONAF in the same period.

As in the above analysis of labor and land productivity, here too it is evident that family farmers are more productive: with less financing in proportion to the total (29%), they produce 36.11% of total GVP, which means

more production with less credit, or in other words better use of credit and higher production per unit of capital invested.¹²

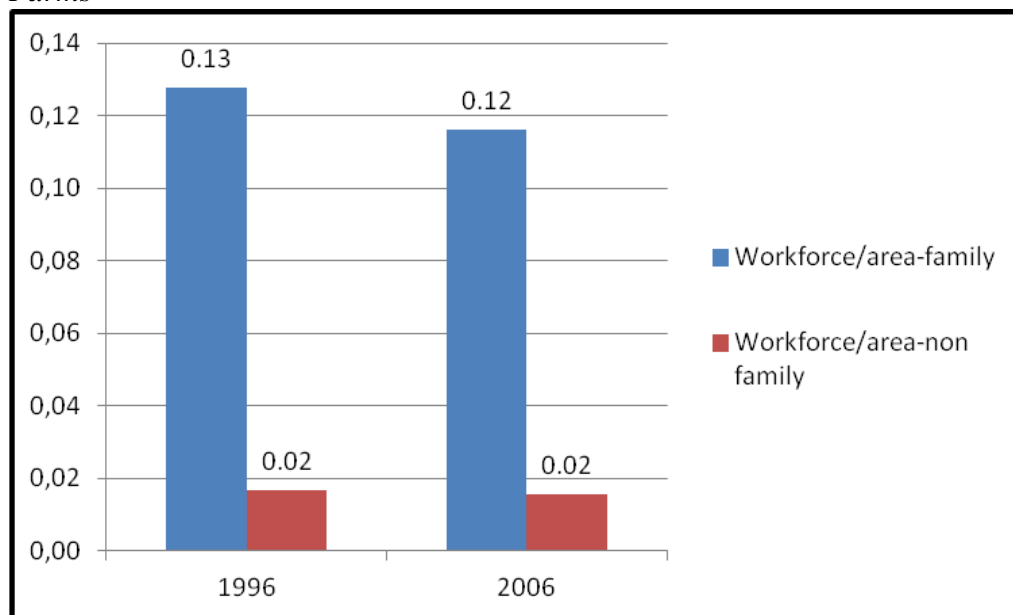
Higher productivity per total area, however, does not mean technical efficiency is greater in family farming for specific crops or in limited areas within the space available. If a given crop's yields are compared for limited areas, non-family farms will certainly display higher technical results (soybeans per hectare, for example). When all products are taken in aggregate and measured by value, family farms are more productive because they cannot afford to leave areas unused. Indeed, they use all the available land in a diversified manner and for a range of different products, whereas large-scale producers sometimes select the best land for growing crops and leave the rest fallow or farm livestock extensively, with the result that the average economic productivity of the total area is low.

Many non-family farms evidently do not waste any arable areas. This applies especially to soybean growers in the Center-West. On the contrary, many farming enterprises make excellent use of the available land with high technology and efficiency. Nationwide and regionally, however, a comparison between non-family and family farming shows the latter to be much more productive, as evidenced by the regionalized tables below.

Labor productivity is lower for family farms, which prefer to employ their own family members at low cost and with low productivity rather than see their children leave to find a job in the city. As can be seen from the chart below, family farms employ 0.12 workers per hectare (including family members and hired workers), whereas non-family farms employ less than 0.02, or only a sixth.

¹² Helfand (2010) arrives at similar conclusions using total factor productivity (TFP), except in the case of capital, where his findings differ because he uses property or assets rather than credit, as used in this study.

Chart 1. *Use of Labor per Hectare – Comparison of Family and Non-family Farms*



Source: The author, using data from IBGE, Agricultural census 1995-1996 & 2006 (special tabulations by IBGE based on microdata).

Table 10 below compares the land productivity of family and non-family farms by region.

Table 10. *Value Produced per Hectare – Comparison of Family and Non-family Farms*

Region	Value produced per hectare R\$ 2006	
	Non-family	Family
North	111.3	241.0
Northeast	378.3	390.7
Southeast	1054.6	737.8
South	837.3	1337.6
Center-West	271.7	285.1
Brazil	461.7	554.6

Source: The author, using data from IBGE, Agricultural census 1995-1996 & 2006 (special tabulations by IBGE based on microdata).

Table 10 shows, in all regions except the Southeast land productivity is higher for family than non-family farms. The difference is greatest in the North and South. The latter region is famous for the predominance of family farmers in several production chains that add substantial value, such as poultry, pork, tobacco etc. The North has large numbers of family farmers whose roots date from resettlement projects in the 1970s and who produce most of the region's food. In the Southeast, high-tech capitalist enterprises are able to outperform family farms even though the latter are far more numerous.

Finally, it is worth highlighting the rise in land productivity among family farmers between 1996 and 2006, as shown by Table 11.

Table 11. *Family Farming in Brazil – Value Produced per Hectare, by Region, 1996 & 2006*

Region	Value produced per hectare (R\$)	
	1996	2006
North	160.1	241.0
Northeast	230.1	390.7
Southeast	557.8	737.8
South	1142.5	1337.6
Center-West	212.2	285.1
Brazil	435.1	554.6

Source: The author, using data from IBGE, Agricultural census 1995-1996 & 2006 (special tabulations by IBGE based on microdata).

Typology of Family Farmers by Income

Family farming in Brazil comprises a number of sub-segments that should be identified so that differentiated policies can be formulated for the sector.

In the original FAO/INCRA papers (Guanziroli, 1998) these sub-segments were termed ‘consolidated’, ‘transitional’ and ‘peripheral’. A more refined classification from the sociological standpoint would be as follows: corporate family farms, non-corporate family farms, and peasants.¹³ The first two can be targeted by typical agricultural policies (credit, prices etc.), whereas peasants are frequently excluded from the market and benefit more from agrarian, education and health policies than agricultural policies.

For statistical purposes, it was decided to classify sub-segments by total income (TI) according to the 1996 data.¹⁴

The universe of family farms was subdivided on the basis of the opportunity cost of labor, which in 1996 was defined as the regional daily rate plus 20%. This was called V and used to define the following groups:

Incomegroup	
A	$TI > 3V$
B	$V < TI \leq 3V$
C	$V/2 < TI \leq V$
D	$TI \leq V/2$

¹³ See Schneider (2010).

¹⁴ A better classification could be obtained by taking into consideration the assets held by establishments. However, this criterion could not be used because of IBGE’s decision to remove questions on assets from the 1996 census form.

The numbers in each group are shown in Table 12.

Table 12. *Family Farming in Brazil – Sub-segments by Total Income, 1996 & 2006*

Income group	No. of farmers 1996	No. of farmers 2006
A	406,291	452,750
B	993,751	964,140
C	823,547	574,961
D	1,915,780	2,560,274
TOTAL	4,139,369	4,551,855

Source: The author, using data from IBGE, Agricultural census 1995-1996 & 2006 (special tabulations by IBGE based on microdata).

From Table 12 it can clearly be seen that the family farming universe includes a very strong group comprising more than 400,000 producers with more than 3V per month in total income (group A). At the same time, the relative importance of other groups with less income has increased, especially D, the poorest family farmers, called peasants by some. Table 13 shows the percentage growth of group D.

Table 13. *Family Farming in Brazil - Breakdown by Income Group*

FAMILY FARMING	% total establishments	
Income group	1996	2006
A	8.4	8.7
B	20.4	18.6
C	16.9	11.1
D	39.4	49.5
TOTAL	85.1	87.9

Source: The author, using data from IBGE, Agricultural census 1995-1996 & 2006 (special tabulations by IBGE based on microdata).

In the period 1996-2006, the number and percentage share of the lowest income sub-segment, D, expanded at the cost of contractions in the intermediate and transitional sub-segments, B and C. The growth of group A and the impoverishment of the other groups originated in different forms of participation in agricultural production, as shown in Table 14.

Table 14. *Family Farming in Brazil – Share of Gross Value of Production (GVP) by Income Group*

Income group	1996	2006
	% total GVP (family farms)	% total GVP (family farms)
A	50.66	69.46
B	29.29	15.70
C	9.50	4.70
D	10.82	10.14
TOTAL	100.00	100.00

Source: The author, using data from IBGE, Agricultural census 1995-1996 & 2006 (special tabulations by IBGE based on microdata).

GVP includes all products, both marketed and consumed.

As can be seen from Table 14, sub-segment A grew strongly in the period, from 50.6% to 69.46% of the total. B and C fell in percentage terms, while D remained stable, albeit mainly as a reflection of its numerical growth in the period. The changes in GVP evidently led to changes in average income per establishment in each group, as shown in Table 15.

Table 15. *Annual Net Monetary Income per Income Group or Type of Farm*

Income group	Annual net monetary income (R\$)	
	1996	2006
A	30,333	53,236
B	5,537	3,725
C	1,820	1,499
D	265	255
Corporate		70,903

Source: The author, using data from IBGE, Agricultural census 1995-1996 & 2006 (special tabulations by IBGE based on microdata).

GVP includes all products, both marketed and consumed. Monetary income was calculated solely for marketed produce. ‘Net’ means discounting production costs deflated by the IGP-DI index (but not depreciation, which was not measured by the censuses).

As can be seen from Table 15, the income gradient across these groups is steep and became more so between 1996 and 2006. Group A, which comprises some 400,000 producers, earns high average income equivalent to almost R\$4,500 per month in monetary terms. Taking into account the fact that rural producers have access to non-agricultural sources of income, as well as quasi-income (such as self-consumption), and that they do not pay rent, their level of income corresponds to an urban middle-class living standard. This rural middle class is the closest parallel to US family farming to be found in Brazilian agriculture.

It should be noted, however, that the gap between group A and the rest varies between 200 times (the difference between A and D) and 14 times (A/B), and that this gap widened in the period 1996-2006. Four possible factors may explain this phenomenon: average area, land tenure, specialization, and

access to credit under the Program to Strengthen Family Farming (PRONAF). Table 16 presents data on the first of these variables, which is farm size.

Table 16. Family Farming in Brazil – Size of Establishment by Income Group

Income group	Average area (hectares)	
	1996	2006
A	59	48
B	34	26
C	22	21
D	16	19
TOTAL	26	23

Source: The author, using data from IBGE, Agricultural census 1995-1996 & 2006 (special tabulations by IBGE based on microdata).

The first point to note is that average areas are small in general, close to those typically classed as smallholdings. Group A has the largest average area, and because it is an average it may include farmers with relatively large areas (500 hectares), even though they mainly use family labor. The gradient across income groups is not very steep, nevertheless. It is less than two times between A and D, despite the income gap of more than 200 times. It can be concluded that the amount of land owned does not decisively influence income.¹⁵

The second possible explanation for the income gradient is land tenure, to which the next table refers.

Table 17. Family Farming in Brazil – Land Tenure by Income Group

Income group	Owners	Non-owners
Average for family farms	%	%
1996	75	25
2006	75	25
Group A		
1996	89	11
2006	83	17
Other groups		
1996	75	25
2006	74	26

Source: The author, using data from IBGE, Agricultural census 1995-1996 & 2006 (special tabulations by IBGE based on microdata).

The data in the table clearly shows that land tenure also does not explain the income gradient, given that 83% of family establishments in group A owned their land in 2006, compared with an average of 75% for the other groups. Thus, there is no evident correlation between the income differences,

¹⁵ Land quality and location may possibly influence this difference more, but the census does not provide the information required (on climate, soil, topography etc.) to calculate this correlation.

which reach as much as 200 times, and differences in access to land or land tenure, which are negligible.

Turning to the third variable that may explain income differences, an index of productive specialization was calculated as follows:

Degree of specialization = % value of production of main product / GVP

A Superspecialized 100%
 B Specialized 65% ≤ 100%

Specialized = sum of A and B

C Diversified 35% ≤ 65%
 D Highly diversified < 35%

Diversified = sum of C and D

The index shows the percentage participation of establishments in each category. Application of these parameters to the census data gives the results shown in Table 18.

Table 18. *Family Farming in Brazil – Degree of Specialization or Diversification*

	Specialized	Diversified
Average family farms	%	%
1996	41	59
2006	56	44
Group A		
1996	51	49
2006	72	28

Source: The author, using data from IBGE, Agricultural census 1995-1996 & 2006 (special tabulations by IBGE based on microdata).

Specialization clearly increased among family farmers between the two censuses, with a corresponding decrease in the diversity of their output. The specialization index rose from 41% in 1996 to 56% in 2006, while diversification fell from 59% to 44%. This means the main product tended to account for a growing proportion of family farmers' output, which is hardly surprising given the boom in soybeans and other commodities during the period.

Specialization increased especially fast in group A, rising from 51% to 72%, which is in the range considered 'superspecialized'. An analysis of supplementary census data shows that this increase in specialization was strongly influenced by group A's larger share in the production of permanent crops, especially coffee, bananas and grapes. Although this variable appears to be the key determinant of the widening income gap between groups, it remains to analyze the fourth variable mentioned above, which is the role of the Program to Strengthen Family Farming (PRONAF) in the process of income

generation and concentration. The next table summarizes the data for farm loans under the program.

Table 19. PRONAF Loans by Credit Category (%), 1999-2007

PRONAF category	1999	2004	2007
A	21	8	4
B	1	7	6
C	22	25	15
D	48	37	40
E		12	20
Other		11	15

Source: Mattei (2006), Aquino (2009).

Group A comprises beneficiaries of land reform; the others are in ascending order of income (B poorest, E wealthiest).

Table 19 shows that in 2007 the proportion of funds allocated to the most capitalized producers (D + E = 60%) corresponded to ten times the credit extended to the poorest (B = 6%), although the latter's share of total credit was larger than in 1999.

The above analysis shows the irrelevance of two of the four possible explanations for the income gradient: area and land tenure. Specialization is relatively significant at first glance. Credit (PRONAF) correlates closely with income, although income differences reached 200 times and credit differences 'only' 10 times.¹⁶

The fact that more capitalized producers receive more credit is only to be expected, since these producers are more qualified (with higher educational levels) and have always had better access to technical assistance and the benefits of agricultural policy in general. Besides this argument, other factors may help explain the difference: (a) Banks are much more interested in extending production credit, which is easier to program and operate than investment credit; (b) Banks are not prepared and organized to manage abundant credit for small and poor farmers but prioritize the better-off family farmers, who can offer better collateral and are more capable of repaying loans; (c) Social movements tend not to accept targeted policies, which could prioritize education and investment credit for some farmers and production credit or minimum prices for others, for example.

What is surprising, nevertheless, is how sharply the difference increased in the period, especially since PRONAF could have prevented this from happening.

To assure more equitable distribution of public funds, the production credit extended by the government under PRONAF should have been accompanied by other lines of credit for investment in farm infrastructure to bolster production capacity in a real sense, as well as raising the level of technology

¹⁶ A more detailed econometric analysis with more variables might cast more light on these correlations at the regional and microregional level. Causality would need to be analyzed, since it is natural for more capitalized farmers to have access to more credit than poorer farmers.

and contributing to income growth. In addition, the intermediate income groups (B and C) should have received continuous, systematic and efficient technical assistance and training so that they could develop projects and thus access credit facilities more easily. It is regrettable that in the period analyzed PRONAF was limited to production financing. A few infrastructure loans were extended to local governments, but these did not effectively help farmers.

More recently PRONAF has opened lines of credit and support for marketing (PAA) that may have positive effects on farmers' incomes in future, but the amount of credit for investment in infrastructure still falls short of what is needed.

Lastly, it is important to note PRONAF's failure to focus on production chains. Because PRONAF offered over-the-counter credit in the sense that borrowers could use loans as they liked, it did not strengthen certain production chains that displayed deficiencies, or would certainly do so at some stage, such as dairy farming, which needed focused credit to cope with the new milk cooling requirement and invest in the necessary equipment. For lack of focused credit, this type of production chain was unable to participate fully in the integration process.

Conclusions

As reviewed above, the structure, composition, development and performance of family farming varies from country to country and from different historical perspectives. Heterogeneity is one of the common characteristics of family farming around the world.

Different processes of evolution from peasantry to family farming, different political regimes, different organizations and forces, among others, explain in part the heterogeneity found in different countries and regions within countries.

It is clear that in Brazil a conjunction of factors made it possible to launch a program for the strengthening of family farming in the 1990s. This program has evolved significantly since then and is now protected by special state legislation. However, this does not preclude the possibility and need to evaluate the performance of family farming during this period. Providentially, the last two Brazilian agricultural censuses cover exactly the ten-year period from the creation of the program to 2006, and it therefore seems highly appropriate to assess what has happened to family farming since the introduction of PRONAF. Thus the main goal of this paper is to identify and assess, in aggregate and mostly descriptive terms, the evolution of family farming in Brazil during the period 1996-2006.

The analysis of changes in family farming performance between 1996 and 2006 using agricultural census data shows first of all that the share of family farming in total agricultural output stayed almost constant throughout the ten-year period. This would not have been possible if family farmers had not participated in the agribusiness boom that occurred during the period.

The regional distribution of family farming improved, albeit not very strongly, with relative growth in the North and Northeast alongside constant shares for other regions.

Family farming continued to make more efficient use of land and capital (in the shape of credit), which is consistent with the relative scarcity of these factors and hence the need to use them more intensively. In contrast, use of labor was more efficient in corporate farming, where this is the scarcest factor.

On the other hand, technological and land tenure limitations persist among at least one group of family farmers, the poorest, who represent a significant proportion of the total but own little land, and the statistical evidence shows this to be a constraint on income expansion for the group concerned.

From the technology standpoint, there was a relative improvement in the use of animal and mechanical traction, but the proportion of those who till solely with hand hoes remains high (over 30%). The difficulties of developing and transferring technology appropriate to family farming are related to lack of technical assistance and enough credit for financing this process.

A positive point was the growing number of establishments connected to the electricity grid, certainly as a result of the federal government's rural electrification programs, Electricity for All (Luz para Todos) and its predecessor Electricity in the Countryside (Luz no Campo). To be connected to electricity grid facilitates irrigation, and therefore, contributes to bolster production.

Because of PRONAF's lack of focus on production chains and the almost total absence of technical assistance and credit for investment, income distribution deteriorated among family farmers, with the 'consolidated' or highest-income group (A) improving in terms of production and total income, while the 'transition' groups (B and C) and the 'poorest' group (D) saw their shares decrease in both cases.

This pattern cannot be explained by better access to land or better distribution of land tenure, since these variables are practically the same for all groups. Two factors were found to be the key drivers of the increase in concentration among the 400,000 wealthier producers who make up group A: a higher degree of specialization, focusing on a few commercially successful products; and better access to production financing from the PRONAF program.

In sum, what happened was exactly the opposite of what was expected when PRONAF was launched, which was that the program would lift the lowest-income group out of poverty and avert a deterioration in the condition of the 'transitional' groups (B and C). In fact, however, the transitional groups joined the ranks of the poorest group.

For this group, production financing and subsidies are not an effective means of combating poverty. What the poorest family farmers need are specific policies targeting this group and designed to improve their access to water, land and education. In other words, this group requires support via structural and social agrarian policies, instead of short-term agricultural policies.

Finally, it is worth saying that in addition to rural credit, other policies have been implemented in recent years to strengthen the relationship between family farmers and the market, notably the Food Supply Program (PAA) and the National School Meals Program (PNAE). These policies are designed to help compensate for the failures of PRONAF noted above.

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