Comprehensive Homeowner's Microinsurance in Brazil: Estimation of Pricing and Market Potential

Luís Eduardo Afonso

Department of Accountancy and Actuarial Sciences

University of São Paulo

(lafonso@usp.br)

Maria Pilar Varela Sepúlveda

TempoPar

(pilarsp@yahoo.com)

Abstract

This study examines the question of comprehensive microinsurance for Brazilian homeowners. In particular, the study: (i) calculates pricing for selected types of microinsurance homeowner's coverages and insured amounts; and (ii) the estimated market potential of this product. The Brazilian agency charged with responsibility for regulation of private insurance, SUSEP, has determined that microinsurance should be aimed at families with a monthly per capita income of up to two minimum wages. According to this criterion, the study finds that there are more than 42 million households in Brazil that are eligible for microinsurance. The study also finds that premiums for microinsurance for these households would be very low (US$ 1.03 to 2.16 per month) — less than 1% of average household income. The calculated market size for this type of insurance would certainly be viable, approximately US$830 million per year. These figures show that there is a significant potential for the expansion of the microinsurance market in Brazil.

Keywords: insurance, microinsurance, microfinance, property insurance, Brazil.

1. Introduction

Recognition that a lack of access to credit represents a severe restriction on efforts to improve the living conditions of impoverished people in underdeveloped countries gave rise to the creation of the first so-called 'micro-credit' bank, the Grameen Bank, in 1998 (Yunus, 2006). The success of this bank was the catalyst for the development of other micro-financial institutions (MFIs). Over time, as this burgeoning micro-credit movement gained maturity, MFIs felt the need to protect themselves from their clients' risk of death, unemployment, physical disability, and invalidity—which had emerged as the main causes of debtor default. The need for coverage against these risks gave rise to the concept of 'microinsurance'. This form of insurance, which aims to provide sufficient protection to low-income families who do not have access to traditional financial markets, is characterised by: (i) distribution to a large mass of clients; (ii) low insured amounts; and (iii) low premiums.

Microinsurance thus originated as an aspect of the developing movement for micro-credit offered by MFIs. It therefore has some of the characteristics of social-protection programs for low-income groups in society. Nevertheless, as an insurance product, it must also satisfy the requirements of supply and demand like any other product in the insurance market; that is, it should be priced at a level that attracts consumers and it should be profitable for the private insurance companies that offer it.

In Brazil, interest in microinsurance is a relatively recent phenomenon. Brazil began to participate in the international microinsurance movement in 2006 when the Brazilian agency charged with responsibility for superintendence of private insurance, SUSEP, became a collaborating member of the joint working group on microinsurance established by the International Association of Insurance Supervisors (IAIS) (which elaborates principles and standards for insurance regulation and supervision) and the Consultative Group to Assist the Poor (CGAP) (which is a working group on microinsurance consisting of donor organisations, international agencies, specialists in financial system development, private insurance brokers, and other stakeholders). In June 2008, SUSEP set up its own Microinsurance Work Group.

Against this background, the present study has two objectives. The first is to establish a price for premiums of comprehensive homeowner's microinsurance in Brazil for certain types of coverages and insured amounts. The second goal is to estimate the market potential of this product. In pursuit of both objectives, the study utilises the accepted pricing principles and techniques that are routinely applied in the traditional private insurance market.

Following this introduction, the paper contains four other sections. The second section presents a theoretical background to the study, including: (i) a description of the concept of microinsurance; (ii) examples of microinsurance around the world; (iii) a description of comprehensive homeowner's microinsurance; and (iv) a brief overview of microinsurance in Brazil. In the third section, the methodology and data of the study are described, including: a description of the risk profile of Brazilian homes eligible for comprehensive homeowner's microinsurance; and the proposed insured amounts of the types of coverages. The fourth section presents the results of the study with regard to the insured amounts; the prices for the proposed microinsurance products for different income ranges and real estate values and the potential for this type of microinsurance in the Brazilian market. The conclusions of the study are presented in the final section of the paper.

2. Theoretical background

2.1 Concept of microinsurance

Insurance is an appropriate risk-management technique when the probability of an unwanted event is low and the financial consequences of this event are severe (Vaughan and Vaughan, 2007). According to a study by the Consultative Group to Assist the Poor (CGAP, 2003), low-income people face similar risks to those to those faced by other people, but the frequency of adverse events is higher (because low-income people are more likely to live and work in higher-risk areas) and the financial impact is greater (because they do not have the resources to cope these adversities).

Stylized facts show that low-income family members work in the informal sector, have low schooling level and are concentrated, most of times, in the poorest rural areas. If these characteristics are actually verified, that evidences that these families will not be able *ex-post* to deal in an efficient way with the risks related to their properties, particularly when catastrophic events occur, in accordance with Goldberg and Varada (2008). This subject was also addressed by Townsend (1995). Thus, if risk pooling with neighbours is not efficient, other risk management techniques may show to be more adequate. These may include *microinsurance*. In view of these realities, Churchill (2002) has emphasised the need for financial institutions to offer some kinds of microinsurance products to people on lower incomes, as a complementary risk-management strategy to conventional insurance.

Although there is no consensus on a single definition of such 'microinsurance', most definitions emphasise its applicability to the poor and the fact that it is based on the principles

of conventional forms of insurance. For example, according to the CGAP of the International Association of Insurance Supervisors (IAIS), 'microinsurance' is "… insurance that is accessed by low-income population, provided by a variety of different entities, but run in accordance with generally accepted insurance practices" (IAIS-CGAP, 2007, p. 9). In a similar vein, Matos (2007–2008, p. 1) defined microinsurance as a "microfinance tool developed to relieve poor families and low-income people from specific danger … [having] all the principles [that] a general insurance should have, but with products, premiums and services designed with such people in mind … a way of extending social protection to needy people or as a new segment in the insurance market". Similar definitions have been suggested by Roth et al. (2007) and Churchill (2006).

The insurance market has traditionally targeted the more affluent socio-demographic groups. According to Simões (2008), there are five reasons for the relative exclusion of the less-affluent socio-demographic groups from the traditional insurance market: (i) lack of information on the potential of the low-income market; (ii) lack of efficient distribution channels for selling the insurance, which, in the case of microinsurance, need to be quite close to the consumer public (such as retail banks, funding agencies, and community associations); (iii) prejudice against low-income segments (which are perceived to be an unacceptably high risk); (iv) limited understanding of insurance and its benefits among people with lower incomes; and (v) an inadequate regulatory environment for microinsurance (see also Weaver, 2009).

Against this background, Estienne (2008) has contended that the distinction between traditional insurance and microinsurance is that the latter is targeted at the lowest social class—that is, those who earn less than the minimum wage. For this class, mass distribution of products is necessary. Such 'mass insurance' is already offered in Brazil as a form of traditional insurance sold to large numbers of people in a standard way through such intermediaries as retailers, electricity and water providers, and community associations. Estienne (2008) could thus be interpreted as seeing 'microinsurance' as a specific form of such established 'mass insurance' in Brazil.

2.2 Microinsurance around the world

There has been a rapid expansion in microinsurance in recent years, and various forms of microinsurance are now offered around the world — with life insurance being predominant (IMF, 2005). In India, there are 83 microinsurance products—including life insurance, physical

disability, accidental death, health, damage to goods, and financial protection—and it is estimated that five million people below the poverty line are protected by some microinsurance policy (Garand, 2005). However, despite this growth, according to Roth et al. (2007) only two of the hundred poorest countries (India and Mali) have more than 21 microinsurance providers and most poor countries have fewer than 10 providers. According to the same authors, in Asia, more than 67 million lives are covered by microinsurance, of whom about 58 million people live on less than US$2 per day; nevertheless, more than 97% of the Asian low-income population has no microinsurance coverage.

In South America, 7.8 million people, representing 10% of the entire population, are insured by microinsurance (Roth et al., 2007). The majority of these, representing 86% of insured clients, come from Colombia and Peru. In Peru, most microinsurance policies are associated with various forms of financial protection insurance offered by credit institutions. In Colombia, a large proportion of microinsurance is offered by La Equidad Seguros, a Colombian insurance company that was established 35 years ago in association with cooperatives. By 2004, this company had 1.5 million clients. At first, it worked exclusively with financial protection in case of death and disability using the cooperatives' loans to members. Over the years, the company's product portfolio has expanded to offer (for a monthly premium of only US$ 1) such benefits as joint family protection against death by any cause, death grants, food aid, medical expenses, and severe diseases (Almeyda and Jaramillo, 2005).

In Brazil, the only product that could possibly be classified as microinsurance is the 'Immediate Social Support Plan' offered by *Clube Pasi* (www.pasi.com.br). This product, which has been offered since 1989, is a group life insurance policy for workers on permanent or temporary labour contracts (including outsourced workers). The plan basically offers coverage in case of the client's death due to natural causes or accidents. Additional coverage can include disability and the partner's death. There are more than 1.7 million insured clients.

Despite the range and growing importance of these microinsurance programs around the world, references in the literature on this subject remain relatively scarce. One of the first papers to address the theme was that of Siegel et al. (2001), who analysed the potential and limitations of microinsurance as a mechanism for managing social risks in accordance with the conceptual framework of social risk management as proposed by Holzmann and Jorgensen (1999) and the World Bank (2001). One of the most important contributions in this field has

been the large compendium of studies organised by Churchill (2006); some of the more important studies in this compendium (Radermacher and Dror, 2006; Radermacher et al., 2006; Fonteneau and Galland, 2006) focused on the issue of health insurance for the poorest groups. A later contribution in the field of microinsurance was that of Manuamorn (2007), who analysed the case for 'climate insurance' for small proprietors in India. Another list of microinsurance programs in Latin America has been provided by Goldberg and Ramanathan (2008). A recent and important contribution is given by Cai et al. (2009) who analyze the importance of rural microinsurance for farmers in China.

It is apparent from this brief review of microinsurance around the world that the main stimulus for the appearance of such insurance was the need for micro-financial institutions (MFIs) to mitigate their risks against defaulting clients. As a consequence, the main distribution channel for microinsurance was (and remains) the MFIs, followed by cooperatives and non-governmental organisations (NGOs). The most commonly offered products provide financial protection (unemployment and physical disability), life insurance, and health insurance. However, regulation by national governments remains limited, which contributes to informality in the distribution and charging of microinsurance premiums, whose mean monthly value ranges between one and two (US) dollars.

The review also reveals that successful examples of microinsurance share certain common factors. These include: (i) being easy to understand; (ii) having dissemination material that uses appropriate language for the low-income population; (iii) having well-trained distribution agents; (iv) being associated with effective public programs of risk prevention and awareness; and (v) having adequate channels for distribution and premium charging.

2.3 Homeowners' insurance

The focus of the present study is homeowners' insurance, which provides coverage against the effects of such adverse events as fire, landslides, floods, and so on. According to studies by IAIS-CGAP (2007) and Munich Re NatCatService (2005), approximately one-third of catastrophic losses due to such natural disasters is insured in affluent countries; in contrast, insurance against catastrophes hardly exists in poorer countries, where people are forced to rely on the support of families and the government. Moreover, natural disasters have more severe impacts on the poor because they are more likely to live in badly planned constructions in high-risk areas. For example, in China between 1980 and 2006, Reinhard (2008) has reported that only 1.44% of all property damage due to natural disaster was covered by property insurances, and although property losses were estimated at US$188 billion, this

resulted in indemnities of only US$2.7 billion. According to this author, microinsurance represents an important tool to complement microfinance in reducing the vulnerability of poorer people in high-risk situations.

The greatest challenge faced by insurance companies in providing such microinsurance in poorer countries is to organise mass distribution and availability of such coverages to low-income populations living in high-risk rural regions that typically have difficult access and deficient infrastructure. The situation is aggravated by the inadequate construction of houses using cheap materials, which are less resistant to fire, rain, and wind (Giesbert, 2008; McCord and Matul, 2007).

It is thus not surprising that a large-scale survey by Dercon and Kirchberger (2008) has shown that property microinsurance lags well behind health and life microinsurance around the world. In a hundred countries examined by these authors, only 0.7% of the low-income population had any form of property insurance, and very few countries had any homeowners' microinsurance coverages (with 77% of all microinsurance policies being in China). According to Roth et al. (2007), the feasibility of property microinsurance is compromised by narrow margins, the greater risk of fraud, and perceived moral hazard. Additional reasons for low penetration of this form of insurance include relatively high transaction costs (as a consequence of most of these policies not being sold through mass sales) and high administrative and claim expenses.

2.4 Microinsurance in Brazil

Although the review of microinsurance around the world (see above) suggested that homeowners' microinsurance virtually does not exist in Brazil, there is a range of popular insurance programs (such as the above-mentioned 'Immediate Social Support Plan' offered by *Clube Pasi*) that could fit into the general category of microinsurance. These insurances, which are widely offered in electricity concessionaires, retail networks, and popular banks, cost approximately 3 to 8 Brazilian reais (BRL) per month (equivalent to US$1.6 to US$4.3 per month). They offer coverages against fire, lightning and explosion, public liability (civic family responsibility), and loss of rent. These forms of homeowners' insurance coverages are frequently combined with coverage against death, personal accident, physical disability, and unemployment.

Nevertheless, given the general lack of homeowners' microinsurance in Brazil and the absence of precise information and standards for all forms of microinsurance in the country,

SUSEP set up the Microinsurance Consultation Commission in 2008 to present studies on the technical, legal, and operating aspects of the microinsurance market in Brazil. The need for comprehensive microinsurance for homeowners was underlined by a study by the Brazilian National Civil Defense Secretary (Sedec), which found: (i) that six million people were affected by one or other natural disaster between January and September 2007; (ii) that 146,000 persons were displaced by these events; and (iii) that 40,000 people were rendered homeless. In the same period, 730 natural disasters were detected in the country—including gales, landslides, floods, droughts, plagues, and fires. It was thus apparent that property microinsurance required careful consideration as a form of protection against catastrophic risks for a considerable proportion of the Brazilian population.

The primary determination of the new Microinsurance Consultation Commission was to define the concept of microinsurance as it was to apply in Brazil. According to SUSEP (2008): "the initial microinsurance market exceeds 70 million [people], considering potential consumers as people gaining a monthly per capita income of up to 2 minimum wages, corresponding to more than 40% of the Brazilian population". The present study adopts the SUSEP definition for microinsurance in Brazil. In other words, all calculations and conclusions regarding the pricing and delimitation of the potential homeowners' microinsurance market in Brazil in this study are based on the population with a per capita income of up to two minimum wages (MW).

3. Methodology and data

3.1 Risk profile of homes

The first objective of the present study was to establish the risk profile of homes according to the definition of microinsurance provided by SUSEP—that is, a per capita income of less than 2 MW. For this purpose, data from the most recent Brazilian National Household Sample Survey, collected in 2007 - PNAD (2007) were utilised. This survey, which is conducted every year by the Brazilian Institute of Geography and Statistics (IBGE), with the exception of Census years, consists of two parts: (i) questions regarding the characteristics of homes (such as construction materials, access to water, sewerage, electricity, etc.); and (ii) questions regarding people (education, fecundity, employment, income, etc.). At the time the data was gathered (last week of September 2007), the minimum wage was R$ 380.00 (*Real* is the Brazilian currency) and the average exchange rate was R$1.85 per US dollar. From this point

on, all monetary values are converted into dollars (US$) in order to facilitate comparisons with other countries.

For the purposes of this study, the risk profile of homes was assessed on the basis of the materials used to construct the building. This proxy measure is in accordance with the risk-acceptance standards of private insurance companies, which tend to accept insurance coverage for real estate with less risk exposure in terms of the materials used to construct walls and roofs.

Table 1 presents the data derived from PNAD (2007) regarding the number of homes per: (i) type of external wall; and (ii) domestic income range per capita. The table excludes homes for which there was no available information on domestic income ranges per capita and/or the construction material of the walls.

Table 1: Number of Brazilian homes per type of external wall and monthly domestic per capita income range

Income range (*Y*)	Type of external wall						
	Bricks	**Planed wood**	**Uncovered bricks**	**Used wood**	**Straw**	**Other**	**Total**
No income	732,323	69,524	30,404	17,459	3,505	4,791	858,006
$0 \leq Y \leq 0.25$ MW	3,447,884	427,272	275,908	70,798	17,004	26,196	4,265,062
0.25 MW $< Y \leq$ 0.5 MW	7,595,733	910,234	181,949	82,464	13,154	23,657	8,807,191
0.5 MW $< Y \leq$ 1.0 MW	13,754,605	1,406,168	135,237	95,759	11,641	27,148	15,430,558
1.0 MW $< Y \leq$ 2.0 MW	12,775,149	1,062,705	29,843	35,730	1,976	13,749	13,919,152
2.0 MW $< Y \leq$ 3.0 MW	4,530,197	234,334	2,730	4,555	0	2,642	4,774,458
3.0 MW $< Y \leq$ 5.0 MW	3,483,193	103,438	2,469	1,118	0	2,895	3,593,113
$Y >$ 5.0 MW	3,140,383	50,739	1,379	619	0	275	3,193,395
Total	49,459,467	4,264,414	659,919	308,502	47,280	101,353	54,840,935

Source: PNAD (2007). Author's tabulations.

It is apparent that brick houses predominated (more than 90% of the almost 55 million homes in the country), followed by planed wood (less than 8% of the total). Other types of material are very infrequent. Although it is common practice in the insurance market for homeowners' insurance policies to be offered for constructions that are more resistant to fire (such as brick constructions and, to a lesser extent, planed wood constructions) the problem for microinsurance is that sales should be made by mass distribution—that is, risk acceptance should be the same for all real estate with no individual analysis. It is therefore necessary to incorporate this greater probability of claims (and higher indemnities) into any model of homeowners' microinsurance by adding a security margin. A multiplier of the risk premium is thus required. This procedure is discussed below (see Section 4.2).

3.2 Insured amount

The second objective of the study was to define the amount to be insured, or 'insured amount' (*IA*). Because this information was not available in the PNAD survey, the value of each home (and hence the *IA*) was attributed indirectly on the basis of information regarding the rent paid (in the case of rented homes). This indirect attribution proceeded as follows.

According to the survey, there are 9,367,341 rented homes in Brazil, which represented 16.6% of the more than 56 million Brazilian homes. Table 2 shows the number of rented homes and mean monthly rent in terms of income range per capita. To calculate the value of the real estate and the IA, the present study then adopted a common standard in the real estate market, whereby the mean monthly rent is taken to represent 1% of the real estate value.

Table 2: Number of homes and mean monthly rent paid according to per capita income range

Income range (*Y*)	Number of homes	Monthly rent (US$)
No income	167,290	117
$0 \leq Y \leq 0.25$ MW	431,966	76
0.25 MW < $Y \leq 0.5$ MW	1,260,694	87
0.5 MW < $Y \leq 1.0$ MW	2,465,375	116
1.0 MW < $Y \leq 2.0$ MW	2,563,148	159
2.0 MW < $Y \leq 3.0$ MW	930,911	212
3.0 MW < $Y \leq 5.0$ MW	711,570	299
$Y > 5.0$ MW	630,509	529
No declaration	205,878	431
Total	9,367,341	

Source: PNAD (2007). Author's tabulations.

To estimate whether a homeowner's budget is sufficient to pay for a given monthly microinsurance premium, calculations were made of mean monthly domestic income according to per capita income range for both: (i) all homes (Table 3); and (ii) rented homes (Table 4). It is apparent that there are no significant differences in mean income between the two groups. It can thus be inferred that information about real estate value for rented homes can reasonably be extended to include all homes in the country.

Further information on the appropriate IA for homeowner's microinsurance was obtained by noting some characteristics of heads of households earning less than 2 MW (which was the target population for microinsurance) and comparing this information with those earning more than this amount. As shown in Table 5, the differences in mean age and hours worked are quite small. In contrast, income from the main job was about 4–5 times higher for heads of households who are eligible for microinsurance. The mean formality rate of workers

eligible for microinsurance was 47.38%, whereas the rate for the remainder was 68.42%. Another clear difference was found in years of study (5.55 years compared with 10.43 years), a variable closely correlated with a dummy variable which value is 0 for non-white and non-black heads of households. Moreover, many more heads of households eligible for microinsurance work in agricultural activities (22.69%) than the other group (6.36%).

Table 3: Mean monthly domestic income according to per capita income range (all homes)

Income range (*Y*)	Number of homes	Monthly domestic income (US$)
No income	858,006	0
$0 \leq Y \leq 0.25$ MW	4,265,062	162
0.25 MW $< Y \leq 0.5$ MW	8,807,191	320
0.5 MW $< Y \leq 1.0$ MW	15,430,558	514
1.0 MW $< Y \leq 2.0$ MW	13,919,152	865
2.0 MW $< Y \leq 3.0$ MW	4,774,458	1,404
3.0 MW $< Y \leq 5.0$ MW	3,593,113	2,119
$Y >$ 5.0 MW	3,193,395	4,575
Total	54,840,935	

Source: PNAD (2007). Author's tabulations.

Table 4: Mean monthly domestic income according to per capita income range (rented homes)

Income range (*Y*)	Number of homes	Monthly domestic income (US$)
No income	168,157	0
$0 \leq Y \leq 0.25$ MW	433,075	87
0.25 MW $< Y \leq 0.5$ MW	1,262,480	167
0.5 MW $< Y \leq 1.0$ MW	2,471,595	269
1.0 MW $< Y \leq 2.0$ MW	2,566,905	432
2.0 MW $< Y \leq 3.0$ MW	933,328	676
3.0 MW $< Y \leq 5.0$ MW	712,015	1,011
$Y >$ 5.0 MW	631,193	2,043
No declaration	0	0
Total	9,178,748	

Source: PNAD (2007). Author's tabulations.

Information was also gathered on the characteristics of homes. As shown in Table 6, homes eligible for microinsurance did not differ greatly from other homes in terms of proportion of brick constructions (approximately 88.5% compared with 96.5%), which is of significance for product pricing and risk aggravation. There are also few differences for such electrical appliances as stoves, radios, televisions, and refrigerators. However, differences are apparent for other appliances, such as freezers, washing machines, computers, and telephones. Nevertheless, the large proportion of quite expensive items in both groups highlights the need for some protection through some kind of insurance. On average, the poorest homes also

housed more people (3.53 compared with 2.62). This characteristic is also significant in terms of risk management. Finally, a significantly larger proportion of homes that are candidates for microinsurance are located in urban areas (18.57%) than was the case for non-eligible homes (4.78%).

Table 5: Characteristics of heads of households

Variable	Not eligible for microinsurance	Eligible for microinsurance
Mean age	49,72	46,62
Years of study	10,43	5,55
Home (%)	69,46	68,68
Formality (%)	68,42	47,38
Agricultural activity (%)	6,36	22,69
Age to start working (years)	15,06	13,22
White (%)	74,03	44,92
Hours worked per week	42,95	42,36
Monthly income from main job (US$)	1,490	321
Monthly domestic income per capita(US$)	1,012	170
Monthly domestic income (US$)	2,502	542

Source: PNAD (2007). Author's tabulations.

Table 6: Characteristics of homes

Variable	Not eligible for microinsurance	Eligible for microinsurance
Brick (%)	96.48	88.51
Number of rooms	7.05	5.36
Bathroom (%)	99.65	94.46
Stove with two or more plates (%)	99.24	97.79
Radio (%)	95.58	85.96
Color TV (%)	98.89	91.98
Black-and-white TV (%)	0.09	1.18
Refrigerator (%)	98.68	88.56
Freezer (%)	31.40	11.85
Washing machine (%)	73.79	29.43
Fixed telephone (%)	78.55	35.69
Mobile telephone (%)	87.09	62.18
Microcomputer (%)	61.13	16.83
Internet access (%)	52.37	10.95
No of people living	2.66	3.53
Urban area (%)	4.78	18.57

Source: PNAD (2007). Author's tabulations.

Data are also collected regarding geographical distribution. It is apparent from Table 7 that the Northeast region of Brazil, which is known to have the lowest per capita income, has more homes eligible for microinsurance than non-eligible. In contrast, in the Southeast, the proportions are reversed; nevertheless, more than 40% of all homes that are eligible for microinsurance are still found in that region. Taken together, the Northeast and Southeast provide more than 70% of eligible homes.

Table 7: Distribution of eligible and non-eligible homes per region (%)

Region	Not eligible for microinsurance	Eligible for microinsurance
North	4.06	7.79
Northeast	11.47	29.42
Southeast	55.59	40.77
South	20.60	14.75
Central-West	8.27	7.27
Total	100.00	100.00

Source: PNAD (2007). Author's tabulations.

4. Results

4.1 Insured amount

For insurance companies to take an interest in traditional insurance for homes against fire, lightning, and explosion, the construction quality of homes must be good—that is, made of bricks or planed wood. This raises the possibility that a substantial proportion of homes might have to be excluded from a potential microinsurance scheme. However, the data collected for the present study suggests that this is not the case in Brazil. As shown in Table 8, after excluding homes without any income (for which microinsurance is not feasible anyway), there are about 42.4 million homes in the income range up to 2 MW. Of these, about 37.6 million homes (88.57%) are made of brick, and another 3.8 million (8.97%) had external walls made of planed wood. Taken together, 97.54% of eligible homes are made of brick or planed wood. That is, less than 2.5% of all homes (about 1 million) are eligible for microinsurance but not made of brick or planed wood.

Table 8: Number of homes eligible for microinsurance in terms of type of external walls and monthly domestic per capita income range

Income range (Y)	Material						Total
	Brick	Planed wood	Uncovered bricks	Used wood	Straw	Other	
$0 \leq Y \leq 0.25$ MW	3,447,884	427,272	275,908	70,798	17,004	26,196	4,265,062
0.25 MW $< Y \leq 0.5$ MW	7,595,733	910,234	181,949	82,464	13,154	23,657	8,807,191
0.5 MW $< Y \leq 1.0$ MW	13,754,605	1,406,168	135,237	95,759	11,641	27,148	15,430,558
1.0 MW $< Y \leq 2.0$ MW	12,775,149	1,062,705	29,843	35,730	1,976	13,749	13,919,152
Total	37,573,371	3,806,379	622,937	284,751	43,775	90,750	42,421,963
% of total	88.57	8.97	1.47	0.67	0.10	0.21	100.00

Source: PNAD (2007). Author's tabulations.

Two comments can be made about these findings with regard to a proposed microinsurance scheme. First, the homes not made of bricks or planed wood are not necessarily excluded as unacceptable risks. Given that microinsurance needs to be marketed in

a mass-distribution format without an individual risk analysis, it is reasonable to contend that the small proportion of these homes could be absorbed in the security margin of any statistically derived premium. Secondly, there is a geographical heterogeneity in terms of construction material, which could justify differential pricing in certain areas. For example, planed wood was more frequent as external material in the North (35.90%) and South (26.64%), and the North also included 3.88% of homes made of other materials (with 1.74% using wood). However, it should be noted that a majority of constructions are made of bricks in all regions, with the smallest proportion being 60.22% in the North and the largest proportion being 98.93% in the Southeast. Although this issue is not explored in any detail in the present study, it is nonetheless possible that regional variations could reasonably be taken into account in assessing premiums.

As noted above, IA was calculated on the basis that the monthly rent corresponds to 1% of real estate value. Because the probability of a *total* loss in a fire is quite low, it was assumed for the purposes of the calculations that there is no need to contract the insurance at the total risk value (despite this being common practice in the ordinary insurance market). The *IA* for each income range was therefore set at 80% of the real estate's mean value, which is considered sufficient to cover the vast majority of adverse events.

Table 9 shows the calculated coverages against lightning, fire, explosion, and loss of rent. In case of a fire, it is assumed that the family will receive three months of rent paid if the family has to leave the home for reconstruction.

Table 9: IA per domestic per capita income range

Income range (*Y*)	Mean monthly income	Mean value of real estate	IA (80% of real estate value) (Fire, lightning and explosion)	IA (Loss of rent)
$0 \leq Y \leq 0.25$ MW	76	7,622	6,097	3 x 76 = 229
0.25 MW < $Y \leq 0.5$ MW	87	8,703	6,962	3 x 87 = 261
0.5 MW < $Y \leq 1.0$ MW	116	11,622	9,297	3 x 116 = 348
1.0 MW < $Y \leq 2.0$ MW	159	15,892	12,714	3 x 159 = 477

Source: Authors' calculations.

4.2 Pricing

4.2.1 Premium equations

The premium that clients will actually pay for a given *IA* includes the insurer's claim costs and other overhead costs, plus an allowance for the insurer's profit margin. This can be expressed as:

$$CP = PP + CE + AE + IP \quad (1)$$

in which:

CP = commercial premium;

PP = pure premium;

CE = commercial expenses;

AE = administrative expenses; and

IP = the insurer's profit.

The definition of the pure premium (PP) is based on the statistical premium (SP), which is calculated as follows:

$$SP = \frac{NC}{NER}\frac{AC}{NC} = \frac{AC}{NER} \quad (2)$$

in which:

SP = statistical premium;

NC = number of claims;

NER = number of units exposed to risk; and

AC = amount of claims (total amount of indemnities).

In other words, *SP* is calculated by multiplying the frequency of claims (*NC* divided by *NER*) by their severity (*AC* divided by *NC*). In effect, *SP* is thus calculated by dividing the amount of claims (*AC*) by the number of units exposed to risk (*NER*).

Having obtained the statistical premium (*SP*), the pure premium (*PP*) is obtained by multiplying *SP* by ($1 + \delta$), where δ represents the security margin required to cover unexpected variations in the covered risks. This calculation is necessary to allow for the possibility of an insufficient *SP* to cover occasional claims. Equation 3 presents the formula for *PP*.

$$PP = SP\ (1 + \delta) \quad (3)$$

The final step in establishing the price is to incorporate the insurer's costs (direct, administrative and commercial), taxes, and profit margin. Commercial expenses (*CE* in eq. 1) include commissions (to brokers, agents, and partners) and communication costs (such as IT costs and information at the sales point); in the case of microinsurance, communication costs can be quite high, and commissions might need to be distributed among retail networks, electricity concessionaires, and finance companies. Administrative expenses (*AE* in eq. 1)

include all expenses (direct and indirect, fixed and variable) that are not directly related to the trading of the insurance product.

The insurer's profit (*IP* in eq. 1) is calculated by eq. 4, using the variable σ:

$$CP = \frac{PP}{1-\sigma} \quad (4)$$

4.2.2 Premium calculations

The first step was to calculate the statistical premium (*SP*). For this purpose, data disseminated by SUSEP on premiums issued, insured amounts, and total indemnities in 2005 (the last ones available) were used. All amounts were corrected by the IGP-M (Brazil's general price index) for September 2007, the date of the PNAD. The results are presented in Table 10. The dependent variables of frequency and severity were then calculated (as shown in Table 11).

Table 10: Comprehensive homeowner's insurance: general data

Coverages	Number of policies	Premiums issued (US$)	Total IA (US$)	Nº of claims	Amount of claims (US$)
Fire/Lightning/Explosion	3,561,013	149,874,116	216,104,932,888	11,751	23,096,240
Loss of Rent	1,499,158	6,644,415	7,092,161,301	125	187,606

Source: SUSEP (2005). Nominal values for December 2005 corrected to September 2007 using IGP-M.

Table 11: Frequency and mean severity calculations

Coverages	NER	IAT	NC	AC	NC/NER	AC/NC	IAT/NER
	Nº of policies	Total insured amount (US$)	Nº of claims	Total indemnities (US$)	Frequency	Mean severity (US$)	Mean IA (US$)
Fire/Lightning/Explosion	3.561.013	216,104,932,888	11.751	23,085,429	0,0032999	1,965	60,686
Loss of Rent	1.499.158	3,833,600,703	125	187,606	0,0032999	1,501	2,557

Source: SUSEP (2005). Nominal values for December 2005 corrected to September 2007 using IGP-M.

For each *IA* range, a distinct mean and weighted severity range was calculated, assuming total *IA* as the severity for the 11.43% of homes made from materials other than brick. For each *IA* range, an adapted mean severity was also calculated, with the mean severity of US$ 1,965 referring to a mean *IA* of US$ 60,686 in the market. Thus, the adapted mean *IA* was calculated, resulting in the mean severity amounts.

The same procedure was adopted for coverage for loss of rent. The frequencies of loss of rent and fire were assumed to be the same, because cover for loss of rent for three months is derived from an event involving fire, lightning, or an explosion. Hence:

$$Weighted\ Mean\ Severity = MeanSev.\%Brick + IA.\%\ \text{Other materials} \quad (5)$$

A 5% security margin was added to the statistical premiums (*SPs*) and the pure premiums (*PPs*). This was in accordance with the market's practice of using a security margin of 5–10%. The results are presented in Tables 12 and 13. Direct claim expenses added to the

*PP*s allowed for regulation, telemarketing, opening the claim, receiving documents, staff costs, and so on. A 15% claim expense on the PP was assumed.

Table 12: SP and PP per mean IA coverage for fire, lightning, and explosion

IA	Mean Severity (US$)	Weighted Mean Severity (US$)	Frequency	Annual Statistical Premium (US$)	Annual Pure Premium (US$)
6.097	197	933	0,0032999	3,08	3,23
6.962	225	1.065	0,0032999	3,51	3,69
9.297	301	1.423	0,0032999	4,70	4,93

Source: Authors' calculations.

Table 13: SP and PP per mean IA coverage for loss of rent

IA	Mean Severity (US$)	Weighted Mean Severity (US$)	Frequency	Annual Statistical Premium (US$)	Annual Pure Premium (US$)
229	134	146	0,0032999	0,48	0,51
261	153	166	0,0032999	0,55	0,58
349	205	223	0,0032999	0,74	0,77

Source: Authors' calculations.

The last step in the pricing process was the calculation of the *CP*, taking into account the total costs—that is, 10% for investments, 10% for *AE*, 10% for *IP*, *PIS/COFINS* (a federal tax charged on gross receipts). According to Decree 4.524 from 2002, the rate of this tax is 4.65%, charged on the difference between net premiums minus paid claims. In Table 11, the line taxes (g) refers to *PIS/COFINS* minus the subtotal (c) of the net premium and 30% for commissions. The results are shown in Table 14 for four pairs of fire, lightning, explosion, and loss of rent coverage (referred to as Products *1*, *2*, *3*, and *4*). These products correspond to the four per capita income ranges previously chosen: (i) 0 to 0.25 MW; (ii) 0.25 to 0.5 MW; (iii) 0.5 to 1 MW; and (iv) 1 to 2 MW. The coverage for each product is shown in the last two columns of Table 9.

Line *a* in Table 14 corresponds to the sum of the *PP*s for each of the coverages presented here. Using the product for the first per capita income range (below 0.25 MW), line *a* is the sum of US$ 3.23 (Table 12) and US$ 0.51 (Table 13), corresponding to the annual *PP*s of the fire, lightning, explosion, and loss of rent coverages respectively. Line *b* refers to 15% of claim expenses, directly added to the *PP*, reaching the subtotal in line *c* (US$ 4.30). To this amount, the total cost is added (investments, taxes, AE, profits and commissions), the sum of which is shown in line *i*. The division of the subtotal in line *c* by the total costs results in the net premium. When the *IOF* (Tax on Financial Operations) is incorporated, the rate of which is 7.38%, the commercial premium (*CP*) paid by the insured person is derived. This amount is

presented annually and monthly. Thus, for a joint three-month coverage against loss of rent (US$ 229) and damage caused by fire, lightning, and explosion (US$ 6,097), the monthly premium to be paid by the client is US$ 1.58.

Table 14: Annual commercial premiums per coverage and IA range (amounts in US$)

	Product 1: 0 ≤ Y ≤ 0.25 MW			**Product 2: 0.25 MW < Y ≤ 0.5 MW**	
	Coverage	**Limit**		**Coverage**	**Limit**
	Rent	3 x 76 = 229		Rent	3 x 87 = 261
	Fire / Lightning / Explosion	6.097		Fire / Lightning / Explosion	6.962
a	Total pure premium	3.74	a	Total pure premium	4.27
b	Claim expenses	0.56	b	Claim expenses	0.64
c	Subtotal (a+b)	4.30	c	Subtotal (a+b)	4.91
d	Direct investments	10,00%	d	Direct investments	10,00%
e	AE	10,00%	e	AE	10,00%
f	Profit	10,00%	f	Profit	10,00%
g	Taxes	2,72%	g	Taxes	2,72%
h	Commissions	30,00%	h	Commissions	30,00%
i	Total expense loading (d+e+f+g+h)	62,72%	i	Total expense loading (d+e+f+g+h)	62,72%
	Net premium [(c/(1-i)]	11.54		Net premium [(c/(1-i)]	13.17
	IOF	7,38%		IOF	7,38%
	Annual Premium	**12.38**		**Annual Premium**	**14.14**
	Monthly Premium	**1.03**		**Monthly Premium**	**1.18**

	Product 3: 0.5 MW < Y ≤ 1.0 MW			**Product 4: 1.0 SM < Y ≤ 2.0 MW**	
	Coverage	**Limit**		**Coverage**	**Limit**
	Rent	3 x 116=348		Rent	3 x 159=477
	Fire / Lightning / Explosion	9.297		Fire / Lightning / Explosion	12.714
a	Total pure premium	5.70	a	Total pure premium	7.79
b	Claim expenses	0.85	b	Claim expenses	1.17
c	Subtotal (a+b)	6.56	c	Subtotal (a+b)	8.97
d	Direct investments	10,00%	d	Direct investments	10,00%
e	AE	10,00%	e	AE	10,00%
f	Profit	10,00%	f	Profit	10,00%
g	Taxes	2,72%	g	Taxes	2,72%
h	Commissions	30,00%	h	Commissions	30,00%
i	Total expense loading (d+e+f+g+h)	62,72%	i	Total expense loading (d+e+f+g+h)	62,72%
	Net premium [(c/(1-i)]	17.69		Net premium [(c/(1-i)]	24.18
	IOF	7,38%		IOF	7,38%
	Annual Premium	**18.99**		**Annual Premium**	**25.97**
	Monthly Premium	**1.58**		**Monthly Premium**	**2.16**

Source: Authors' calculations.

The results in Table 14 show that the premiums of the four products priced for the four income ranges are quite low. A comparison of the mean domestic income in each range (see

Table 3) with the monthly premiums calculated in Table 14 reveals that the latter do not represent a burden for the families, even in the lowest range (as shown in Table 15).

Table 15: Relationship between insurance premium and mean domestic income

Income range (*Y*)	Mean domestic income (US$)	Monthly premium (US$)	Monthly premium/mean income (%)
$0 \leq Y \leq 0.25$ MW	162	1,03	0.35
0.25 MW $< Y \leq 0.5$ MW	320	1,18	0.20
0.5 MW $< Y \leq 1.0$ MW	514	1,58	0.17
1.0 MW $< Y \leq 2.0$ MW	865	2,16	0.14

Source: Authors' calculations.

It is apparent that the prices of these products comply with demand requirements (that the product should be affordable to consumers) and with supply requirements (that the product should be profitable for vendors). For the companies, the 10% income, or a combined 90% income, represents a good result that is in accordance with expectations in the insurance market. This 10% income refers to operating income. When considering gains from financial revenues, results can be even better. Financial revenues are relevant in the insurance market because reserves for claim payment are invested in the financial markets. Insurers' operating performances are thus evaluated through a combined ratio, expressed as an index representing the sum of claim expenses and the insurer's other expenses and claims gained. The insurer gains operating income when the combined ratio is below 100%.

4.3 Market potential

To estimate the market potential of the comprehensive homeowner's microinsurance, the premium corresponding to each of the four income ranges (Table 15) is multiplied by the number of homes in the income range (Table 8). For example, for the first income range (below 0.25 MW), the annual commercial premium (US$ 12.38) is multiplied by the total number of homes (4,265,062), resulting in a market potential of more than US$ 4,40 million per month for this product, or more than US$ 52,81 million per year. Considering all houses with a domestic income of less than 2 MW, the annual potential is more than US$ 831 per year, as shown in Table 16. Although it is acknowledged that this number corresponds to the improbable scenario of all homes purchasing the microinsurance, the figures are nevertheless quite impressive.

Table 16: Market potential of comprehensive homeowner's microinsurance in Brazil

Income range (Y)	Monthly premium (US$)	Annual premium (US$)	Eligible homes	Potential market (per month) (US$)	Potential market (per year) (US$)
Y ≤ 0.25 MW	1.03	12.38	4.265.062	4.403.388	52.817.606
0.25 MW < Y≤ 0.5 MW	1.18	14.14	8.807.191	10.378.203	124.538.441
0.5 MW< Y≤ 1 MW	1.58	18.99	15.430.558	24.438.668	293.013.785
1 MW< Y≤ 2 MW	2.16	25.97	13.919.152	30.095.464	361.446.520
Total			42.421.963	69.315.723	831.816.352

Source: Authors' calculations.

5. Conclusions

The aims of this study were: (i) to price comprehensive homeowner's microinsurance in Brazil; and (ii) to estimate the market potential of this product. The results of the study permit the following conclusions to be drawn:

a) The microinsurance market in Brazil is quite considerable, with more than 42 million potentially insurable homes. Moreover, the vast majority of these have construction characteristics that represent good risk acceptance according to the parameters commonly established by private insurers.

b) The calculated monthly premiums for comprehensive microinsurance coverage for homeowners against damage caused by fire, lightning, explosion and loss of rent in four ranges of domestic income per capita are low (that is, between US$ 1,03 and US$ 2,16 per month). These amounts correspond to less than 1% of domestic income. This means that the product is accessible, even for the lowest income ranges.

c) The potential market for microinsurance is more than US$ 831 per year. This amount is sufficiently attractive for insurance companies to take an interest in offering this type of insurance.

These results suggest three possible avenues for elaboration of the findings of this study. First, pricing in the present study was done for two types of coverage. Because the calculated premiums are quite low, there seems to be room to offer other types of coverage — such as coverage against damage from flood, windstorm, landslide, and electrical damage. Secondly, it would be interesting to disaggregate the data by region (North, Northeast, Southeast, etc.) and location (urban or rural). In a country as large and heterogeneous as Brazil, this additional information could be important. Thirdly, the mass-distribution channels that need to be used to reach the target public require further analysis. This is a fundamental issue for microinsurance and should be addressed in future studies.

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