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► **To cite this version:**

Sytske Floortje Groenewald, Marrit van den Berg. Smallholder Livelihood Adaptation in the Context of Neoliberal Policy Reforms: A Case of Maize Farmers in Southern Veracruz, Mexico. *The Journal of Development Studies*, 2012, 48 (03), pp.429-444. 10.1080/00220388.2011.615923 . hal-00807101

HAL Id: hal-00807101

<https://hal.science/hal-00807101>

Submitted on 3 Apr 2013

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Smallholder Livelihood Adaptation in the Context of Neoliberal Policy Reforms: A Case of Maize Farmers in Southern Veracruz, Mexico

Journal:	<i>Journal of Development Studies</i>
Manuscript ID:	FJDS-2010-Sep-0074.R2
Manuscript Type:	Original Manuscripts
Keywords:	Livelihoods < Economics, Economic development < Economics, Latin America < Geographical Area, Policy reform < Government, State Policy, & Ideologies, Well-being < Health, Agriculture < Environmental issues

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Manuscripts

1. INTRODUCTION

Since the 1980s, the Mexican government has embraced market liberalisation to create substantial gains in efficiency, stimulate economic growth, and reduce rural poverty. In 1986, Mexico joined the General Agreement on Tariffs and Trade (GATT, now the World Trade Organisation) (Bahmani-Oskooee and Hegerty, 2009), and subsequently signed more trade agreements than any other country in the world, the most important being the North American Free Trade Agreement (NAFTA) in 1994 (Henriques and Patel, 2004). Accordingly, Mexico has substantially reformed agricultural policies, and traditional maize farmers have faced difficult economic conditions. Smallholders are forced to adapt to economic pressure from rising imports, low prices for maize and other traditional crops, weak local and regional demands, and large reductions in public sector support for agriculture with far-going consequences for their livelihoods (Wise, 2007).

Seventeen years after the implementation of the NAFTA, the link between liberalised agricultural trade and poverty remains unclear. Although in rural areas, income poverty levels have decreased with about 9 percentage points since 1992, the proportion of the rural population living in poverty remains substantial: 60.8 per cent in 2008 (CONEVAL, 2005). Critics argue that in the short run trade liberalisation puts great stress on certain actors in the economy and that even in the longer run successful open regimes may leave some behind in poverty (Manders *et al.*, 2001; Winters *et al.*, 2002; Anderson, 2005; Eriksen and Silva, 2008). This paper argues that more micro-level knowledge is needed about the adaptation process of different actor groups to get a better understanding why some fare less well during the adjustment process.

During the 1990s, the conviction that openness is good for economic growth was fostered by several cross-country regressions of income per person on international trade (for example, Dollar, 1992; Sachs *et al.*, 1995; Edwards, 1997; Frankel and Romer, 1999). Critical research conducted by Rodríguez and Rodrik (1999) challenges this causation and argues that the conclusions of earlier cross-country studies rest on indicators of openness that are 'poor indicators' of trade barriers or are highly correlated with other sources of bad economic performance. They conclude that there is no clear-cut relationship between integration into the world economy and

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3 economic growth; rather they argue that this relationship depends on a number of
4 external and country-specific factors.
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8 Studies arguing in favour of the beneficial effects of trade on economic growth
9 often fail to modify the effects for income distribution (Barraud and Calfat, 2008). A
10 noteworthy contribution in this respect is the study of Dollar and Kraay (2001). They
11 conclude that greater openness results in poverty reduction since there is no clear
12 evidence of a correlation between changes in trade and changes in various measures
13 of inequality, such as the Gini coefficient or the Lorenz curve (Dollar and Kraay,
14 2001). They also found that average income of the poorest quintile moved almost one-
15 for-one with overall average incomes. This means that there is no intrinsic trade-off
16 between long-run aggregate economic growth and overall equality. This result is
17 consistent with the findings of, amongst others, Chen and Ravallion (1997), Bruno *et*
18 *al.* (1996), Easterly (1999), and Lundberg and Squire (2000).
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28 However, Ravallion (2001) demonstrates that finding zero average impact on
29 inequality of growth-oriented policy reforms does not mean that the benefits of
30 reforms are generally distributed neutrally. Under the surface of the aggregated
31 outcomes are often losers, even when poverty falls on average. In other words,
32 economic growth measured in national accounts is not always reflected in average
33 household living standards. It is important that the diversities of impacts underlying
34 the averages are not neglected so that governments know what else they have to do to
35 reduce poverty on top of promoting economic growth (Ravallion, 2001:1812).
36 Unfortunately, little is known regarding why some groups of actors are able to take up
37 the opportunities generated by an expanding economy and others are not. Bussolo and
38 Lecomte (1999) argue that a better understanding is necessary on the way specific
39 trade policy changes affect farmers, including whether they have the 'assets' (skills,
40 capital, land, etc) that are likely to allow gains from trade liberalisation, the extent to
41 which they interact with markets, and how vulnerable to change they are.
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54 Going beyond the aggregate level, this paper aims at contributing to a better
55 understanding of the linkages between macro-level trade policies and the social and
56 economic consequences at household or micro-level. We argue that in examining the
57 capacity to respond to economic changes, there is much to learn from the livelihood
58 literature concerning adaptation and coping. In a development context, several studies
59 have demonstrated that rural populations have traditionally coped with crop failure
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3 and climate conditions by engaging in a multitude of alternative income and food
4 sources, depending for the most part on local natural resources, social networks, and
5 local skills and institutions (Swift, 1989; Davies, 1993; Devereux, 1993; De Bruijn *et*
6 *al.*, 2005). Rather than analysing aggregated welfare indicators, we focus on strategic
7 choices fundamental to resource allocation and farmer practices. We argue that both
8 economic rationality and cultural traditions anchored in daily routines are significant
9 for the implementation of certain livelihood activities and strategies. The conclusions
10 are based on a case study on smallholder maize producers in Sierra de Santa Marta,
11 Veracruz, Mexico.
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20 The paper is structured as follows: Section 2 provides theoretical background on
21 the livelihoods framework. Section 3 examines Mexico's efforts to liberalise its
22 agricultural sector, and in particular its domestic production of maize. Section 4
23 presents the methodology and data used for assessing the adaptation process of the
24 smallholders. Section 5 presents the empirical part of the paper. It describes the rural
25 livelihood strategies of the local smallholders and their consequences for household
26 wealth. Section 6 discusses the determinants of the livelihood strategy choice and its
27 dynamics. Finally, Section 7 concludes.
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37 2. CONCEPTUAL FRAMEWORK

38 We use the livelihood framework (Chambers, 1989; Chambers and Conway, 1991;
39 Ellis, 2000) to analyse how neoliberal reforms alter the opportunities and constraints
40 of smallholder livelihoods in terms of household adaptation capacity. The concept of
41 livelihood refers to what people do for a living, how they do it, and what they gain by
42 doing it. A commonly used definition is the one provided by Ellis (2000:10), who
43 argues that a livelihood comprises 'the assets (natural, physical, human, financial and
44 social capital), the activities, and the access to these (mediated by institutions and
45 social relations) that together determine the living gained by an individual or
46 household'. The household asset base is shaped by the so-called 'mediating processes'
47 that determine the availability and accessibility of assets and resources in an area.
48 Within the livelihood framework these processes are categorised in, on the one hand,
49 exogenous conditions and trends (or 'vulnerability context'), and on the other hand,
50 policies, institutions, and processes that can be seen as endogenous to social norms
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3 and structures of which households are permeated (Hoon *et al.*, 1997; Scoones, 1998;
4 Carney, 1999; Ellis, 2000). Following this line of thought, changes in the economic
5 environment are mediating processes that affect the context under which farmers
6 participate in the agricultural sector. Economic changes expose farmers to new
7 conditions to which they will have to adapt. Some farmers may be in the position to
8 take advantage of these changes, while others face increased vulnerability (Eriksen
9 and Silva, 2008). The role of macro-economic policies and institutions as a structural
10 property of local systems is, however, neglected in the majority of livelihood studies,
11 as they most often focus on micro-level complexities in a local context (De Haan,
12 2000b; Kanji and Barrientos, 2002). Therefore, the significance of an economic shock
13 for rural livelihoods is an underdeveloped topic within the livelihood literature (Ellis,
14 2000; Dorward *et al.*, 2003). In this paper, we aim to bridge the gap between macro-
15 level policy changes and micro-level livelihood outcomes.
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27 We use the concept of livelihood strategies for analysing household decision-
28 making processes underlying their adaptation to changes related to market
29 liberalisation. A livelihood strategy can be defined as the way households handle
30 opportunities and limitations by adapting the allocation of their resources (Zoomers,
31 1999:18). The nature, scope, and effectiveness of livelihood strategies depend on a
32 variety of factors including exogenous risks and uncertainties that people have to deal
33 with, the availability of resources at household level, the type and status of these
34 resources, household characteristics, people's capability to create or access them, and
35 the set of goals and priorities defined by the household (Sen, 1984; Moser, 1998;
36 Bebbington, 1999; Zoomers, 1999). Changes related to processes of market
37 liberalisation, by altering these factors, shape the structural contexts, and this may
38 have consequences for people's responses and their ability to reduce the risk in the
39 longer-term and the capability to generate household well-being (Leichenko and
40 O'Brien, 2002).
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56 3. RECENT MEXICAN AGRICULTURAL REFORMS

57 Initial attempts to liberalise the Mexican economy, and in particular, the agricultural
58 sector, started already at the end of the 1980s, but accelerated and became more
59 comprehensive during the 1990s. These changes coincided with negotiations for
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3 NAFTA, beginning in 1991, and continued well beyond NAFTA's adoption in 1994
4 (Yúnez-Naude and Taylor, 2006). The reforms of the 1990s intended to stimulate
5 sustainable growth through structural adjustments and economic liberalisation (Nadal,
6 2000; Wiggins *et al.*, 2002). This 'modernisation' included a mix of monetary,
7 financial, and domestic policies, geared towards market competition through removal
8 of price controls and encouraging more private investments to stimulate production
9 according to the country's 'comparative advantage' (Nadal, 2000).

16 Financial analysts from international institutions such as the World Bank and
17 OECD predicted that the reforms would create substantial gains in efficiency and
18 would trigger a move away from farming. Yet they also recognised that there would
19 be a distorted distributional impact of agricultural liberalisation and that interventions
20 were needed to protect those who would lose out in the adjustment process (Levy and
21 Van Wijnbergen, 1992, 1994; De Janvry *et al.*, 1995). In particular, negative effects
22 were expected for the rain-fed maize sector (such as lower value of rain-fed land,
23 reduced rents from this asset, and lower demand for rural labour in the maize sector),
24 while sectors such as fruit and vegetable cultivation and the manufacturing industry
25 would flourish (King, 2006:8).

34 Reforms in the agricultural sector affected both input and product markets. In
35 1992, a major legal change towards privatisation of the land market was enacted. The
36 main feature of the reform included the amendment of Article 27 of the Mexican
37 Constitution that opened the possibility of defining individual property rights on land.
38 Land that was previously owned under a collective land tenure system – the *ejido*
39 system - was distributed among the *ejidatarios* (holders of *ejido* right), who received
40 official ownership certificates and ever since, can sell the land if they get permission
41 of the *ejido* assembly (OECD, 2006; Barnes, 2009; Bouquet, 2009). In that same year,
42 the fertiliser industry was liberalised with the privatisation of the fertiliser company
43 FERTIMEX (Nadal, 2000). No longer, the government held domestic fertiliser prices
44 below international prices through budget transfers to FERTIMEX. Additionally,
45 throughout the 1990s, the Mexican government reduced its participation in agriculture
46 by eliminating guaranteed prices to producers of key staples (such as maize and
47 wheat), limiting subsidies to agricultural inputs and the provision of credit and
48 insurance, and reducing participation in the processing of grains, oils, and powdered
49 milk via the National Company for Popular Subsistence, CONASUPO (*Compañía*
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Nacional de Subsistencias Populares) (Appendini, 2001; Yúnez-Naude and Barceinas Paredes, 2002; Yúnez-Naude, 2003). In 1999, CONASUPO was completely dismantled and the government no longer bought commodities at prices above world prices that they then subsidised and sold to consumers in order to insulate Mexico from international competition (Appendini, 2001; Yúnez-Naude and Barceinas Paredes, 2002; Yúnez-Naude, 2003). Furthermore, the government removed or reduced credit subsidies of the National Rural Credit Bank, BANRURAL (Naylor *et al.*, 2001:5; Rosenzweig, 2003:11). The role of BANRURAL declined and commercial banks were assumed to fill the gap in rural credit provision (King, 2006). Finally, in June 2003, BANRURAL was liquidated due to severe problems in credit recovery and operational efficiency (Rosenzweig, 2003).

Government support that moved away from direct price supports for grains, beans, and oilseeds – administrated through CONASUPO – was redirected to income payments through the Programme for Direct Assistance in Agriculture, PROCAMPO (*Programa de Apoyo Directos al Campo*) (Yúnez-Naude and Barceinas Paredes, 2002; Taylor *et al.*, 2005; Yúnez-Naude and Taylor, 2006). The main objectives of the programme were to compensate for the anticipated negative income effects of lower crop prices after the implementation of NAFTA and to help farmers to switch to crops that are more competitive in a liberalised context (Nadal, 2000; Sadoulet *et al.*, 2001; Yúnez-Naude and Barceinas Paredes, 2002). Currently, any producer who cultivates a legal crop on eligible land¹, or uses that land for livestock, forestry production, or some ecological project, can receive PROCAMPO payments, which are made on a per hectare basis. In 2001, a special service – PROCAMPO Capitaliza – was introduced that allowed farmers to receive the remaining years of PROCAMPO, which was supposed to end in 2008 but has been extended to 2012, in one lump sum. These funds would provide farmers with greater capital to invest in agricultural improvements, such as the conversion from maize to cattle-ranching or other crops that adhere more closely to Mexico's comparative advantage (Keleman *et al.*, 2009).

The reforms contributed to a low economic growth at an annual per capital rate of 1.6 per cent between 1992 and 2007 (Zepeda *et al.*, 2009:4). This economic growth has resulted in a gain of about 1.2 million jobs, mostly in the manufacturing and service sector. However, an employment loss in agriculture has more than offset this gain. In total, the employment loss since the early 1990s was more than 2.3 million

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3 jobs in the second quarter of 2008. This job loss includes primarily permanent
4 employment. By contrast there has been a significant increase in seasonal work,
5 drawing large numbers of internal temporary migrants (Zepeda *et al.*, 2009).
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10 11 4. METHODOLOGY AND DATA 12

13 We have studied local adaptation to neoliberal reforms implemented at the beginning
14 of the 1990s through analysing contemporary livelihood strategies at household level
15 and their correlates. Adaptation is a long-term and continuous process that needs at
16 least 10 to 20 years to unfold before significant outcomes and trends are observable
17 (Blanchard, 2000). For this reason, we consider contemporary livelihoods a reliable
18 indicator to measure the outcomes of the adaptation process. In addition, we used
19 qualitative methods to compensate the lack of a quantitative baseline study. These
20 methods allowed us to analyse the livelihood strategies and activities at the time
21 preceding the implementation of most significant policy reforms. A profound
22 literature study on the study area provided additional information on trends and day-
23 to-day life in the recent past.
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34 35 36 4.1 Data collection 37

38 The data used for this study are drawn from a field study conducted by the first author
39 in Morelos, a community in the municipality Soteapan, located on the flanks of a rain-
40 forested volcano in the Sierra de Santa Marta biosphere, between March 2007 and
41 May 2010.
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45 The quantitative data on livelihood strategies was collected by means of a
46 household survey among 200 randomly selected households. The survey was
47 addressed towards household heads (representing 848 household members, about 30
48 per cent of the total population in Morelos). The qualitative data on the types of
49 livelihood strategies and activities used now and at the time preceding the neoliberal
50 policy reforms in the study area was gathered from key informants during participant
51 observation, semi-structured interviews, a focus group discussion, and life-histories
52 with representatives of various groups of community members. Key informant
53 interviews were conducted with 10 farmers aged 30 and above and with 5
54 representatives of governmental organisations and regional authorities. We organised
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3 a focus group discussion, as group members have an overlapping spread of
4 knowledge, which may cover a wider field than any single person. For this discussion,
5 we invited 8 farmers representing different key families of the village. The topics
6 addressed in the semi-structured interviews and focus group meetings were
7 predetermined, had a retrospective character, and included, amongst others, history of
8 the village, agricultural developments, changes in markets, crop choices, technical
9 changes, changes in level of wellbeing, and economic development. The life-history
10 method is an open interview technique that concerns the totality of an individual's life
11 as seen within the broader framework in which he or she lives. This research method
12 made it possible to understand the impact of the economic changes in a retrospective
13 way. Life-histories were used to gain insights into socio-economic changes during the
14 last 30 years, which made it possible to relate market liberalisation processes to other
15 changes at both community and household level. In total 4 men and 4 women of 30
16 years and older were interviewed and asked to tell their life-histories.
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31 *4.2 Defining livelihood strategies and wellbeing*

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33 Contrary to many livelihood studies that classify livelihood strategies on realised
34 income, we qualified contemporary livelihood strategies based on the main productive
35 assets of rural households: land and labour (cf. Jansen *et al.*, 2006). We classify
36 livelihood strategies in terms of assets allocation across distinct activities as it reflects
37 the (strategic) choices of the households to generate household income flows and
38 well-being, while the income composition is also affected by random shocks. We
39 distinguished household time allocated to different types of productive activities (farm
40 self-employment, farm labour employment, non-farm wage-employment, non-farm
41 self-employment, and unskilled domestic labour) and the household land-use pattern
42 (land allocation to maize production, other crops, and pasture).
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51 We used a Ward's linkage hierarchical cluster analysis to agglomerate clusters of
52 observation within our data set (Lattin *et al.*, 2003). Based on statistical results and
53 common sense checks of the resulting groupings, we identified three distinct strategy
54 clusters in the data. This result and the cluster means are used as input for the *k*-means
55 cluster analysis that is used to assign each household to a distinct group or in our case
56 livelihood strategy.
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4 We analysed the determinants of household choice between livelihood strategies
5 using multinomial logistic regression. Multinomial logistic regression predicts the
6 probability that a household will select each of a set of alternative strategies compared
7 to a reference strategy. We used the traditionally dominant strategy of maize farming
8 as the reference and thus analyse the characteristics of the households that have
9 adjusted to the new situation and revert to an alternative strategy. A positive estimated
10 coefficient indicates an increase in the likelihood that a household chooses the
11 alternative livelihood strategy; a negative coefficient indicates a lower likelihood that
12 a household selects the alternative livelihood strategy.
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20 As we do not have complete income or consumption data, we used the
21 possession of consumer assets as a quantitative indicator for household wellbeing.
22 Following Filmer and Pritchett (2001), we have used the Principal Component
23 Analysis (PCA) to detect one or more underlying factors that are responsible for the
24 co-variation between variables. In this context the factor “wellbeing” is assumed to be
25 underlying the ownership of all the included assets (Clarke, 2006:6). We used the
26 PCA method to compose an Asset Index for comparisons of wellbeing across
27 households. To ensure the sampling adequacy the Kaiser-Meyer-Olkin (KMO) test
28 was used for comparing the magnitudes of observed correlation coefficients with the
29 magnitudes of partial correlation coefficients. The Kaiser-Meyer-Oklin (KMO)
30 measure of sampling adequacy is equal to 0.68, indicating that the assets share a
31 common factor (Sahn and Stifel, 2003).
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44 5. LOCAL CONTEXT: NEOLIBERAL OPPORTUNITIES AND CONSTRAINTS

45 5.1 *The study area*

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48 The people of Morelos are indigenous Popoluca, for whom Spanish is a second
49 language. The municipality Soteapan is one of the most deprived regions in the state
50 of Veracruz and among the most marginal in the nation. In 2005, about 75 per cent of
51 the population of the municipality lived in extreme poverty and below the food-based
52 poverty line, with incomes of less than US\$51.60 per month (Buckles and Erenstein,
53 1996; CONEVAL, 2005).
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Agriculture is the main economic activity and the key source of income for
households in Soteapan. Traditionally, farmers used the *milpa* system, an

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intercropping system of maize, beans, and squash that is managed through slash and burn with fallow periods and the use of mulch (Blanco Rosas, 2006). Nowadays, the study area is primarily a maize-producing area. In terms of maize production, it belongs to the top five municipalities of a total of 212 municipalities in Veracruz (INEGI, 2005:955-979). Maize production takes place under rain-fed conditions and is entirely manual, due in part to the steep, rocky terrain. The maize farming system is based on both subsistence and commercial production through which farmers interact with (local) maize markets.

Apart from maize, other important agricultural products cultivated in the region are black beans, sugar cane, coffee, pineapple, mango, and papaya. . Since the second half of the 1980s – stimulated by government programmes and rising export of meat to the United States – an increasing number of smallholders have become engaged in cattle breeding in Morelos. According to informants, smallholders consider cattle a more lucrative activity, as maize prices are low.

5.2 *Local effects of neoliberal reforms*

In Morelos, the liberalisation of trade in combination with the privatisation of the markets for land, fertilisers, and credit affected competitiveness, relative (input) prices, and farm practices. The land reforms made legal sale and rental of land possible and allowed smallholders to extend the amount of land they own and benefit from economies of scale. Alternatively, individual land property rights allow smallholders to sell their land, exit agriculture, and migrate to urban areas to look for a better paid job. Since the privatisation of the credit market, *despachos* have arisen: local-level institutions taking advantage of the imperfect credit market by mediating between semi-governmental financial institutions and groups of local smallholders. The new financial intermediaries have made access to credit possible. However, key informants indicated that most smallholders that took loans have ran into debt and did not benefit from the loans in terms of improved productivity. Smallholders indicated that they mainly use the financial support provided by PROCAMPO to buy means of production. Therefore, these subsidies can be seen as an (unintended) opportunity to intensify maize production. Furthermore, PROCAMPO Capitaliza enables smallholders to switch to cattle breeding or start a small business.

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3 After NAFTA, imported maize caused increased competition in the maize
4 market. This resulted in a dramatic fall of maize prices at local and regional markets.
5 According to Nadal and García Rano (2006), local commercial producers saw their
6 incomes, adjusted for inflation, declining by over 40 per cent between 1993 and 2005
7 (INEGI, 2005; Nadal and García Rano, 2006). To compensate for the lower maize
8 prices and to boost their income, smallholders use more and expensive fertilisers to
9 increase their production. However, the privatisation of the fertiliser industry caused a
10 dramatic increase in prices for fertilisers and other agrochemical inputs. For example,
11 in 2005 real prices of the Urea and Phosphate Diamónico - commonly used in
12 Morelos – were respectively 191 per cent and 153 per cent higher than the 1990 prices
13 for the average Mexican farmer (SAGARPA, 2002).
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23 During focus group discussions, local smallholders indicated that during the last
24 two decades, significant shifts took place at the local labour market. While in the past
25 people mainly worked at their own parcel, nowadays they can easily find seasonal
26 work at fruit and vegetable plantations in neighbouring villages. Groups of 12 to 15
27 mostly male villagers travel together to these plantations and stay there for six days.
28 Other types of local employment are working in construction, the cattle industry, or
29 the petroleum industry located in the nearby cities of Minatitlán or Coatzacoalcos. In
30 addition, local smallholders can also (temporary) migrate to the north of Mexico to
31 work in the fruit and vegetable sector or manufacturing industry. According to in-
32 depth interviews, an increasing number of young adults leave Morelos temporarily to
33 work off-farm. Our household survey data suggest that only a few households have
34 members who have permanently migrated to the United States or other parts of
35 Mexico. Remarkably, these migrated household members do not contribute
36 significantly to the household budget and therefore remittances are not considered as
37 an important source of income.
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50 Summarising, the changed economic landscape has greatly affected the context
51 in which smallholder farmers operate. These traditional maize farmers faced the
52 privatisation of the land and credit market, lower maize prices, higher prices for
53 agrochemicals, and a shift in employment towards the manufacturing and agricultural
54 export sector. The general hypothesis underlying this study is therefore that the
55 adaptation process of the local smallholders is characterised by less maize production,
56 an increased involvement in alternative agricultural activities (for example, a switch
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3 towards the cultivation of fruits and vegetables or towards growing pasture in
4 response to the increasing demand for meat) and more off-farm employment in
5 manufacturing and agro-export industries. Due to the large number of changes and the
6 short time in which they were implemented, it is impossible to disentangle the effects
7 of each policy. Therefore, this study focuses on the adaptation process to the total
8 spectrum of changes.
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14 15 16 17 6. RURAL LIVELIHOODS IN A LIBERALISED ECONOMY

18 19 6.1 *Past livelihood strategies*

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21 Traditionally, people living in the study area cultivated many different food crops
22 (horticulture) at small plots scattered out over the different zones of the Sierra de
23 Santa Marta (Velázquez Hernández, 2001). Maize was the most important crop and
24 source of calorie-intake. Important other plants grown at the plots were squash,
25 *chayote*, sweet potato, sweet manioc, sugar cane, pineapple, papaya, banana, yam
26 bean, and small unions (Blanco Rosas, 2006). In 1956, Morelos became officially an
27 *ejido* - a community based organisation in which members, or *ejidatarios*, held
28 permanent usufruct rights to one or several plots. The implementation of the *ejido*
29 system affected local livelihood activities as the *ejido* law forced farmers to cultivate
30 within the borders of the land surface allocated to the *ejido*. Hence, they became
31 excluded from access to the areas more adequate for producing coffee, hunting, and
32 fishing situated in other parts of the Sierra de Santa Marta. As a result, agriculture
33 transformed from a horticulture system into, what is called, a *milpa* system during the
34 1960s and 1970s. This farming system occupied mostly upland areas in southern
35 Mexico and Central America. In the study area, the system was characterized by (i) a
36 central role, both agriculturally and culturally, of maize and beans; (ii) a small size of
37 holdings; and (iii) a high degree of on-farm consumption of production (Dixon *et al.*,
38 2001). Maize (*Zea mays*) and kidney beans (*Phaseolus vulgaris*) became the main
39 crops for subsistence and were used in barter to exchange for pots, lime, salt and other
40 commodities from towns nearby (Foster, 1942).
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57 According to key informants, smallholders substituted monoculture hybrid maize
58 for their traditional *milpa* system during the 1980s, a process stimulated by
59 government programmes that provided subsidised agrochemicals. Consequently,
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maize changed from an important food crop into a combined food and cash crop, and the cultivation of beans and other crops was reduced to a minimum. Only a handful of smallholders had an additional source of income such as cattle breeding or a small shop. A few smallholders started growing pastures instead of maize in response to the expanding cattle breeding industry. At that time, many children and wives were involved in the maize production process, while nowadays children are obligated to go to school, and mothers stay at home to do domestic work.

6.2 Contemporary livelihood strategies

The agricultural policies under liberalisation removed most of the support towards maize farmers. Due to the withdrawal of the state support, along with rising prices for agricultural inputs and low maize prices, the crop lost all relevance as a profitable venture (cf. Preibisch *et al.*, 2002). In this section, we use a cluster analysis to examine the different adaptation strategies in response to these changes (see Table 1). Contrary to what economic models have predicted, the cluster analysis demonstrates that maize farming still is the main economic activity in the study area: 67 per cent of the households is classified as maize farmers. Hence, the majority of the households have not adapted to the new market conditions and continue the tradition of producing maize instead of switching to non-farm or off-farm livelihood activities. The other households either diversify into off-farm activities or take up cattle farming. Below we discuss the three strategies in more detail.

Table 1. Livelihood strategy categories estimated via K-median cluster analysis

	Cluster 1	Cluster 2	Cluster 3
Land allocation (% of cultivated land)			
Maize cultivation	98.8	49.3	100.0
Pasture	1.2	50.7	0.0
Labour allocation (% of productive time)			
Agricultural time on maize	99.3	74.7	95.3
Farm self-employment	97.4	74.1	39.0
Farm wage employment	0.7	6.1	21.6
Non-farm self-employment	1.4	11.8	12.2
Non-farm wage employment	0.5	7.9	24.2
Domestic time and education (% of total)	57.2	36.1	67.3
Asset Index	- 0.31	0.56	0.68
n (%)	135 (67)	31 (16)	34 (17)

Name livelihood strategy	Maize farmer	Cattle and maize farmer	Diversified smallholder
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Strategy 1: Maize farmer

This livelihood strategy corresponds to the biggest cluster and comprises about 67 per cent of the households in the sample. The most distinguishing feature of households in cluster 1 is that they primarily allocate their household productive time (about 97%) and land (99%) to the production of maize. The survey data indicate that smallholders choosing for this type of livelihood strategy have often used the opportunity to apply for financial support of PROCAMPO to intensify their maize production. They have not used the new opportunities created by market liberalisation to supplement their maize income with on-farm and off-farm alternatives, and consequently have the lowest consumptive wealth of the three clusters.

Strategy 2: Cattle and maize farmer

Cluster 2 includes households that use their agricultural land and labour not only for the production of maize but also for pasture: 50 per cent of land and 25 per cent of agricultural labour. In addition to farm self-employment, these households dedicate 25 per cent of productive time to non-farm and off-farm activities. This cluster represents 16 per cent of the households in the sample and has the second highest Asset Index. Key informants explained that these smallholders have used the opportunity created by the support programmes of the government (such as PROCAMPO Capitaliza) to invest money to start cattle-breeding and so respond to the increasing demand for meat.

Strategy 3: Diversified smallholder

17 per cent of the households in the sample have diversified their income by engaging in activities outside their farm. The households in this cluster use spend all of their land and about 40 per cent of their productive time for maize production. The remainder of their time they spend mostly in temporary wage-employment at pineapple and sugar cane plantations or in the non-farm sector (45% of productive

time). Besides, they spend a small percentage of time (about 12%) on non-farm self-employment. They have the highest average Asset Index of the three clusters, and therefore seem to have benefited most from the opportunities offered by the neoliberal landscape. Notably, households in this cluster spend a high percentage of time on domestic work and education. This is another indication of a relatively higher wellbeing since they do not have to spend all their time on productive activities.

6.3 Explaining persistence of maize production

Despite the strong disincentives to produce maize, many households in the study area continued to grow maize rather than purchase it at the (global) market between 2007 and 2010. Table 2 summarises the main reasons for producing maize given by the respondents in Morelos attesting the importance of maize for not only economic reasons.

Table 2. Reasons for the persistence of maize production as reported by farmers

Main reason for producing maize	Percentage of farmers
I do not know how to growth other crops	24.5
Maize is basis of local diet/ implies food security	20.5
Family tradition	18.5
Other crops have many pests	12.0
There is no market for other crops	8.5
Village tradition/Everybody cultivates maize	6.0
The soil is not adequate for other crops	7.0
Climate is not adequate for producing other crops	1.0
Other	2.0

About a quarter of the smallholders indicated that they do not have adequate knowledge or education to switch to other, more profitable crops. The same number of smallholders continues to produce maize because their own family (18.5%) and other families in Morelos (6.0%) have cultivated maize for many generations. Fathers teach their sons how to produce maize from childhood. Respondents explained as such:

'Producing maize is a family tradition. My father, grandfather, and all my brothers are farmers and all sow primarily maize. Since I was 6 years old, I go together with my father to our parcel and by doing I learned all aspects of the work'.(Ernesto, 28)²

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'Since early childhood I go together with my nephews to the parcel of my grandfather. When we were young, my grandfather teaches us how to produce maize. Today, we help him with the heavy physical work on the land. I am happy that we have learned how to cultivate maize because that is what we eat every day.' (Horacio, 42)

'At school boys do not learn how to provide food for their family. That is what they should know! Here (in Morelos) life is a daily struggle, also for those who have a formal diploma. Look at the sons of the doctor, despite that they both have finished secondary school, they do not have any advantage of being educated, as (non-farm) jobs are hardly present in this area!' (Guadalupe, 41)

In addition, respondents indicated that eating homemade tortillas is part of their culture. For many generations, women make tortillas for their husband and children. This is one of the main daily activities of women, which occupies a major share of their daily time. Making tortillas is a key role of women in household food security, and many times we have heard smallholders phrasing it like *'My wife makes my tortillas. I would starve to death if my wife dies.'* (Louis, 32) Eating homemade tortillas is also a source of masculine pride and is linked to farmer identity. A key informant illustrated this as follows:

The people of San Pedro de Soteapan (a neighbouring village) are lazy. They do not produce maize for the market and just live from the money they receive from PROCAMPO. They do not make their own tortillas but buy them in a tortillería (mechanised tortilla shop). Here in Morelos, there are no tortillerías because we are farmers. The tortillas from a tortillería are not filling and my husband would soon be hungry when working in the field. (Francisca, 22)

During informal discussions women declared that homemade tortillas taste better and can be stored longer. Moreover, the fresh maize dough is also an important ingredient in other traditional dishes that are not for sale such as *tamales*, *chamchamitos* and *potzole*³. In in-depth interviews, people indicated that another important reason for producing maize is that maize is the key source of calorie-intake while *'other crops do not take off the edge of hunger'* (Paco, 25). Producing your own staple is considered safer in terms of food security. Being able to feed oneself is a important drive to produce maize. People do not want to depend on the market and justified the production of maize like this:

'If you sow maize, you have the certainty that you will have something to eat. What if you depend on the market and you have no money to buy tortillas? You will starve to death!' (Liz, 19)

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'In Morelos, people are poor but we always have tortillas to eat. When we have no money, I prepare many tortillas for my children that we eat with salt, tomatoes, or fresh eggs. That gives them energy for the rest of the day. If we did not have our own grains how could I then feed my children?' (Patricia, 33)

'If you produce maize, you have food and do not need money.' (Roberto, 43)

We can conclude that the preference to cultivate maize reflects mainly cultural tradition, a source of identity, the multifaceted role of maize in food security and household reproduction. Remarkable is that more economic reasons such as the limited market for other crops and constraining soil qualities for producing other crops are less frequently mentioned.

6.4 Household characteristics and adaptation

In this section, the household variables differentiating adaptation strategy patterns among households are identified. We ran a multinomial logit regression to analyse the relationship between household characteristics and adaptation strategy to get a better understanding of the type of households that are involved in alternative livelihood activities.

Table 3 shows the results of the logistic regressions that examine which variables would affect the probability for households to choose an alternative livelihood strategy other than maize farmer (the reference group). We distinguished human capital (household composition and education level), natural capital (hectares land owned), physical capital (heads of cattle owned) and social capital (membership of a farmer organisation). We do not have good data on financial capital, but assume it is positively correlated with (especially) natural and social capital. Since we dealt with one small sub-location, the households can be assumed to be reasonably homogenous in terms agro-ecological (for example, climate) and physical (for example, access to regional markets) conditions.

Table 3. Household determinants of livelihood strategy choice using mlogit

Variable	Diversified smallholder		Pasture and cattle farmer	
	Coefficient	St. Error	Coefficient	St. Error

Sex household head (female = 1)	2.612	0.774***	1.132	0.978
Age household head	-0.026	0.024	-0.039	0.034
Education level household head (primary school completed 1 = yes)	0.4287	0.683	-0.845	1.434
Illiteracy household head (yes = 1)	-0.969	0.559*	0.871	0.933
Household has no children (yes = 1)	-0.922	0.928	1.1539	1.431
Household has children under 5 years old (yes = 1)	-0.41	0.957	0.009	1.729
Household has children 5 - 14 years old (yes = 1)	-0.213	0.774	0.8579	1.346
Household size	0.502	0.175***	-0.199	0.319
Household dependency ratio	-1.526	0.622**	0.176	1.076
Proportion of female household members	0.168	1.176	-1.468	1.841
Land owned (ha.)	0.059	0.04	0.218	0.059***
Quality soil (good = 1)	-0.711	0.359**	0.589	0.631
Cattle owned (heads)	0.147	0.093	0.554	0.122**
Member farmer group	-1.036	0.477**	1.478	0.849**
Constant	1.179	1.676	-5.901	3.315**
* significant at 10%; ** significant at 5%; *** significant at 1%				
Log Likelihood = -104.870				
R ² = 0.3810				
Prob. Chi = 0				
Maize farmer strategy (strategy 1) is the base category				

Based on the data provided in Table 3, we can conclude that households that have a female household head had a higher likelihood to be engaged in the diversified livelihood strategy. Survey data and key informant interviews indicate that female household headship exists primarily in case a woman becomes a widow. These households look for additional income outside the farm to compensate the loss of the main agricultural producer, especially since agriculture in the area is physically very demanding.

Moreover, households that had an illiterate household head had a lower likelihood to pursue a diversified livelihood strategy than the maize producing strategy. Giving literacy, completing primary school had no significant effect on the probability of engaging in a diverse livelihood. Key informants indicated that people without any education often don't speak Spanish properly, which limits access to information and the possibilities to switch to wage employment, even though the employment itself (at fruit and vegetable plantations and the manufacturing and tourism industry) does not require much education. Uneducated household heads may not be well informed about market prices and benefits of pursuing other activities than

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3 producing maize, or they just do not have the knowledge and skills to change to
4 alternative crops or to start up their own business. Household survey data on the main
5 reason for producing maize confirm the relevance of access to information, as 24.5
6 per cent of the smallholders have indicated that they cultivate maize because they do
7 not know how to produce other crops than maize (see Table 2).
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12 Households that are involved in a diversified livelihood strategy have in general
13 relatively large families with many members at working age. This stimulates them to
14 engage in other activities besides farming, as the household members can be involved
15 in different income-generating activities in addition to the production of maize.
16 Households that consider the quality of the soil as good have a lower likelihood to be
17 engaged in the diversified livelihood strategy. Presumably, because household that
18 cultivate land with relatively good soil assume that this should enable them to
19 generate sufficient income to provide in their basic needs and therefore do not switch
20 to additional livelihood activities.
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29 Households that own more land have a higher likelihood to be engaged in the
30 cattle breeding strategy. These households have the security of permanent access to
31 land for fodder and are therefore willing to invest in a stock of cattle. In Morelos, the
32 land rental market is insecure, as it is based on informal agreements (mainly verbal)
33 among villagers. The high risk on arbitrariness and abrupt ending of access discourage
34 smallholders from investing in cattle. Moreover, for smallholders who rent land,
35 income from maize production is hardly profitable and does not allow for high
36 investments such as cattle. Another interesting finding we can extract is that there is a
37 positive association between membership of farmer organisations and pursuing the
38 cattle strategy. This indicates that smallholders use the social network of a farmer
39 organisation to buy and sell their cattle or to obtain market information. By contrast,
40 households that are member of a farmer group are less likely to be engaged in the
41 diversified livelihood strategy. This may be because farmer group members have
42 loans that they use to buy agricultural inputs such as fertilisers and pesticides. Also,
43 diversified farmers may be less interested in joining a farmer group.
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59 7. DISCUSSION AND CONCLUSIONS

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3 In the 1990s, the Mexican government signed various free trade agreements and
4 implemented neoliberal policy reforms to stimulate economic growth and alleviate
5 poverty. Due to the introduction of the NAFTA and the neoliberal policy reforms,
6 farmers in the Sierra de Santa Marta in Veracruz no longer operate in a protected,
7 semi-closed market, and their private incomes and livelihoods at the turn of the
8 century were subject to both the opportunities and constraints of international
9 markets. These traditional maize farmers faced the privatisation of the land and credit
10 market, lower maize prices, higher prices for agrochemicals, and a shift in
11 employment towards the manufacturing and agricultural export sector. To adapt to
12 these changes, they could change their focus on maize production to alternative crops
13 such as tomatoes and fruits, livestock, or off-farm employment.
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23 We have assessed to what extent farmers have made these adaptations and who
24 are most likely to adapt and thus benefit from the new opportunities. The outcomes of
25 this study contribute to the limited micro-level knowledge on adaptation processes of
26 local actors to get a better understanding of the decisions that poor people make to
27 specialise or diversify their livelihood activities. Moreover, they show the relation
28 between livelihood strategies and levels of household wellbeing.
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34 We find that local smallholders still primarily cultivate maize in spite of the
35 enormous pressure of maize imports from the United States on the local price. Only
36 32 per cent of households combine maize farming with cattle breeding or off-farm
37 activities. Perhaps local producers need more time to adapt, so it would be interesting
38 to repeat this study in ten years time. Farmers also lack education, which limits their
39 access to the information needed for change. However, the extensive interviews that
40 we held among the local population suggest that at least part of the reason for sticking
41 to maize cultivation against odds is the social significance of maize in Mexican
42 society. The production and consumption of maize are deeply engrained in the
43 nation's social and cultural fabric. In the study area, maize has not only a market
44 value; rather maize symbolises food security, pride, and identity, and employment for
45 family members. The designers of NAFTA failed to take these 'shadow values' into
46 account, leading to their inability to predict widespread refusal to exit maize
47 production. This finding supports the few articles recognising that even though this
48 behaviour is not income-maximizing, it has economic meaning because it reflects the
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3 social embeddedness of the livelihood adaptation process (Preibisch *et al.*, 2002; Ali,
4 2005; King, 2007).
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8 Local smallholder farmers seek to overcome the lower maize prices and dropping
9 incomes by intensifying their maize production. Unfortunately, the intensive
10 cultivation of hybrid maize requires the application of high levels of agrochemicals.
11 This trend has had a dramatic impact on the (agro) biodiversity and put pressure on
12 income levels after the abolishment of subsidies on fertilisers and pesticides.
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17 A minority of the smallholder households has diversified their income into other
18 activities than maize farming. A first group engages in off-farm activities, mostly as
19 wage labourers. These households are relatively likely to have female heads and large
20 families with many members in the productive age. This induces them to search
21 employment other than maize cropping. Other households have sufficient land to
22 combine maize farming with cattle production. These are often older farmers who
23 lack the physical strength needed for maize farming. The fact that households with
24 more diversified incomes have higher consumptive wealth and are therefore better off
25 than pure maize farmers, supports the notion of a large intrinsic value of maize
26 production over and above its market price.
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NOTES

¹ Eligible land is defined as having been cultivated with maize, sorghum, beans, wheat, barley, cotton, safflower, soybeans, or rice in any of the agricultural cycles from fall-winter 1990-91 to spring-summer 1993 (Sadoulet et al., 2001).

² All quotes are taken from interviews conducted by the first author between 2007 and 2010. Interview took place in Spanish and all quotes are her translation. Names have been changed to preserve informant anonymity.

³ *Tamales* are a traditional Mexican dish made of *masa* (starchy maize dough), which is steamed or boiled in a leaf wrapper. *Chamchamitos* are a local type of *tamale*. *Potzole* is a Mexican maize drink.

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