

The Rapid Rise of Supermarkets?

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A series of articles, many of them published in this journal, have charted the rapid spread of supermarkets in developing and middle-income countries and forecast its continuation. In this article, the level of supermarket penetration (share of the retail food market) is modelled quantitatively on a cross-section of 42 countries for which data could be obtained, representing all stages of development. GDP per capita, income distribution, urbanisation, female labour force participation and openness to inward foreign investment are all significant explanators. Projections to 2015 suggest significant but not explosive further penetration; increased openness and GDP growth are the most significant factors.

1 Introduction

In a series of articles, Tom Reardon and colleagues have charted the rapid rise of supermarkets almost everywhere in the developing world and forecast their continued rapid spread (for example, Belik and dos Santos, 2002; Berdegué et al., 2004; Codron et al., 2004; Dries et al., 2004; Ghezan et al., 2002; Gutman, 2002; Hu et al., 2004; Neven and Reardon, 2004; Reardon and Berdegué, 2002; Reardon and Swinnen, 2004; Reardon et al., 2004; Rodriguez et al., 2002; Schwentesius and Gómez, 2002; Weatherspoon and Reardon, 2003). The prime purpose of the articles has been to alert academics and policy-makers to the spread of supermarkets and the implications for supply chains, particularly involving fresh produce.

The line of argument is that supermarkets are no longer places where only rich people shop; over the past ten years or so, they have spread from the wealthy suburbs of major cities to poorer areas and much smaller towns. This has happened in response to a number of forces, many of them interconnected: rising incomes (also associated with higher ownership of consumer durables like fridges and cars which facilitate supermarket shopping), urbanisation, more female participation in the labour force (increased opportunity cost of time) and the desire to emulate Western culture, spurred on by the globalisation of the media and advertising (linked in turn to the globalisation of food manufacturing and the promotion of its products as well as of fast foods and soft drinks). There has also been a movement in most developing countries towards liberalisation of trade and investment which has brought the global supermarket chains onto the scene, together with economies of scale, buyer power in purchasing and supply chain management skills.

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The process of 'supermarketisation' is described in many of the articles referred to above. The process began in Latin America in the early 1990s and by 2000 supermarkets delivered 50-60% of retail food sales in countries in the region (Reardon et al., 2004). The take-off in South-East Asia began 5-7 years later and is registering faster growth. A third wave has taken place in East-Central Europe, and Africa is rapidly following suit, led by South Africa which has seen a 'spectacular' rise since 1994 (*ibid.*: 171). Kenya and others are following, and the process is hastened by the multinational aspirations of the South African supermarket chain Shoprite. Finally, the process is taking place in low-income Mediterranean countries such as Morocco and Tunisia (Codron et al., 2004). The implication is that this is an ongoing, even accelerating, process that will soon see supermarkets as the dominant food suppliers around the world.

To support their case, the various authors have faced the habitual problem of data scarcity and have often had to rely on painstaking interviews with shopkeepers, supermarkets and their suppliers. Exceptionally the data collected in this way can be checked against data collected by industry associations (for example, ABRAS, the Brazilian Supermarket Association) or by market intelligence organisations (for example, ACNielsen).

It is not intended in this article to repeat the very detailed descriptions of the data, or the process of the spread of supermarkets; this has been done at length in the articles cited, and in others. Nor is the intention to visit the well-trodden ground of the impact of supermarkets on suppliers or the less discussed and little researched issues of the effects of supermarket spread on international trade and the locational decisions of multinational manufacturers (both of which might have important implications for domestic supply chains), or the effects on diets. The goal is the more limited one of attempting to model quantitatively the spread of supermarkets in relation to the drivers for change identified above, and secondly, on the basis of the estimated relationship, to project the spread of supermarkets over the next ten years.

2 Previous empirical work

Only two of the articles referred to above have performed cross-sectional empirical analysis.¹ Dries et al. (2004) present two separate linear single variable relationships for supermarket penetration in nine Central and Eastern European transition economies in 1998 and 2002. The dependent variable in each case is the share of 'modern' retail (essentially supermarkets) in total food purchases. In one equation the explanatory variable is the European Bank for Reconstruction and Development (EBRD) reform index, a measure of the extent of institutional and economic reform (including market liberalisation) in the process of transition from a centrally planned to a market economy. Regression coefficients are not given, but R^2 is a healthy 0.79. In the other equation the dependent variable is related to GDP per capita. The R^2 is an even healthier 0.82. It is reported that urbanisation and female labour force participation are at a high level in all

1. These studies are all based upon cross-sectional analysis for the simple reason that longitudinal data on supermarket penetration are rare and offer insufficient data points to permit time-series analysis. It is to be expected that the recent interest in the subject of supermarkets will, in a few years time, yield sufficient data to permit a panel-data analysis.

of the countries but that the data display too little variation to estimate significant relationships.

For China, Hu et al. (2004) model supermarket penetration at the province level (22 provinces): their dependent variable is the per capita turnover of the largest 90 chains present in the province; independent variables are the urban share of the population, disposable income per head, regional and year dummies, per capita length of expressways and per capita number of wholesale markets. The relationship is linear and adjusted R^2 is 0.75. The main variables – income and urbanisation – are highly significant. A 1 percentage point increase in urbanisation results in a \$2.5 increase in annual per capita supermarket sales, which corresponds approximately to a 5% rise.² A \$1 increase in disposable income would raise supermarket sales by \$0.27, a very high figure, suggesting that virtually all of any increased food expenditure associated with an increase in income is spent in supermarkets. The infrastructure variable is not significant.

Finally, Booz-Allen Hamilton (2003) present a diagram relating the 2001 supermarket share to GDP per capita for a number of developed European countries, the United States and a number of Latin American countries, the poorest of which is Colombia. The relationship is curvilinear (equation not specified) and the R^2 is 0.69.

3 Data and methods

The variable used to define supermarket penetration is the percentage share of supermarkets in retail food sales. In the absence of reliable international statistics on supermarket penetration, the studies already referred to in the opening paragraph are heavily relied upon. Data were checked, where possible, against other sources, notably Attaché (GAIN) retail sector reports of the US Foreign Agricultural Service (see list of references for these and other papers consulted). Most notably, Booz-Allen Hamilton (2003) data were used for developed countries and as a check on other sources for Latin American country data. With one exception, Brazil, the different series matched ‘reasonably’ well.³ For Brazil, where Reardon and Berdegué (2002) report an 80% penetration (based largely on Farina, 2002, who herself reports 86%), Booz-Allen Hamilton (2003) report 49%. In part the discrepancy appears to be definitional; ABRAS, a main data source for Farina, defines supermarkets as self-service stores with two or more cash registers, whereas most other countries define supermarkets as having three or more cash registers. There are other definitional differences across countries (for example, in terms of floor-space) which make cross-country comparisons fairly crude. The Booz-Allen Hamilton figure was more in line with the rest of Latin America than the Reardon/Berdegué/Farina figures, so these were used in the work that follows.

The supermarket share data are for around 2000-2. 2002 data were also collected for GDP per capita (in \$US at market exchange rates and PPP), the distribution of

2. Crudely, if the Chinese spend a third of their income on food and 11% of this in supermarkets (Hu et al., 2004), they spend almost \$50 per capita per annum in supermarkets – so \$2.5 would represent a 5% increase.

3. Recognising, as do the various authors, that the data collection methods used can never yield anything better than an approximation to the true supermarket share. Even ‘reasonably’ well matching data show disparities as high as 12 percentage points for Chile and 9 percentage points for Colombia (in each case the Booz-Allen Hamilton figure was higher).

income (both gini coefficient and the ratio of the share of income of the richest 20% to the poorest 20% of the population) and urbanisation (%), all from UNDP *Human Development Reports*; on female labour force participation from the UN Population Fund (UNFPA) and OECD; and on openness to inward foreign direct investment from the *Economic Freedom of the World* (Gwartney et al., 2005). For this last variable, data were available for 1995 and 2000 and, given the probable lag between opening up an economy and the full response by foreign and domestic firms, 1995 data were preferred.

Data on supermarket share, the Openness Index, income per capita at market exchange rates and urbanisation are shown in Table 1 for 2002 and, in the latter two cases, as projected by independent UN sources to 2015.

Table 1: Background data for 2002 and 2015 projected

	Supermarket share of retail food market % c.2002	Income per capita (US\$) 2002	Projected income per capita 2015	Urbanisation % 2002	Projected Urbanisation % 2015	Openness Index 0-10 1995
Argentina	54	2797	4143	89.9	92.1	9.5
Austria	67	25536	37464	65.8	79.4	8.5
Bangladesh	1	351	530	23.9	29.5	0
Belgium	89	23749	33447	97.2	97.5	9.3
Brazil	49	2593	3951	82.4	88.4	3.6
Bulgaria	23	1944	3746	69.4	74	5
Chile	62	4115	7328	86.6	90.2	6.5
China	11	989	2109	37.7	49.8	4.9
Colombia	47	1850	2693	76	81.3	6
Costa Rica	55	4271	5717	60.1	66.8	8
Croatia	42	5025	8383	58.6	64.6	2
Czech R	55	6808	11645	74.2	75.7	5.7
Denmark	75	32179	43628	82.1	86.8	8.8
Egypt	10	1354	2047	42.1	44.9	7.1
El Salvador	54	2226	3175	59.3	64.2	5
Finland	74	25295	39560	61	62.1	8.7
Germany	79	24051	35525	87.9	90	9.6
Greece	65	12494	19883	60.6	65.2	6.5
Guatemala	35	1941	2276	45.9	51.9	8
Honduras	42	966	1286	45.2	51.3	5
Hungary	48	6481	13036	64.7	70	6.4
India	2	487	827	28.1	32.2	2.3
Italy	54	20528	30175	67.3	69.2	8
Kenya	10	393	497	38.2	51.8	8
Mexico	45	6320	9648	75.2	78.8	6.4
Morocco	5	1218	1840	56.8	64.8	2
Norway	70	41974	56521	77.6	86.4	8.6
Pakistan	1	408	521	33.7	39.5	2
Panama	50	4182	6623	56.8	61.7	10

Table 1: Cont'd

	Supermarket share of retail food market % c.2002	Income per capita (US\$) 2002	Projected income per capita 2015	Urbanisation % 2002	Projected Urbanisation % 2015	Openness Index 0-10 1995
Paraguay	35	1000	1109	56.6	64.3	10
Poland	44	4894	9237	61.8	64	5.2
Portugal	70	11948	17977	54.1	60.9	8.3
Romania	8	2052	3633	54.5	56.4	0
Russia	10	2405	3989	73.3	74.3	3.5
Slovakia	49	4403	8007	57.2	60.8	3.6
South Africa	55	2299	3340	56.5	62.7	4
Spain	60	15961	25302	76.4	78.1	8.3
Sweden	80	26929	39546	83.3	84.3	9.3
Switzerland	74	36687	49402	67.6	68.7	9.6
Tunisia	5	2149	3397	63.4	68.1	2
Turkey	37	2638	4334	65.8	71.9	5.5
UK	88	26444	36774	89	90	9.4
US	90	36006	48485	79.8	83.6	8.4

Sources: 1. Supermarket shares: Argentina, Mexico, Brazil, Chile, Costa Rica, Colombia and the developed countries: Booz-Allen Hamilton (2003); Panama, El Salvador, Guatemala, Honduras: Reardon and Berdegué (2002); Paraguay: Balsevich (2003); South Africa: Weatherspoon and Reardon (2003), and Louw et al. (2004); Kenya: Neven and Reardon (2004); Egypt: Own calculations from Retail Planning Innovations (2004) and GAIN Reports; India, Pakistan and Bangladesh: Development Alternatives (2004), Sustainable Development Policy Institute (2004), GAIN Reports; China: Hu et al. (2004), Xiang et al. (2004); Russia: Reardon et al. (2004); Turkey, Morocco and Tunisia: Codron et al. (2004); transition countries: Dries et al. (2004). 2. Urbanisation and GDP per capita: *UNDP Human Development Index*. 3. GDP per capita projections based on GDP per capita growth rate projections employed by FAO (see Bruinsma, 2003), originally from the World Bank. 4. Urbanisation projections from the UN Population Division (UNPD).

The functional form of the relationship between the variables is not known, but is unlikely to be linear. The procedure adopted here is to begin with a very general functional form (log-log-inverse) with respect to all of the independent variables and then to let the model 'choose' the best relationship using backward stepwise regression to eliminate variables that do not contribute significantly (at the 10% level of significance) to the explanatory power of the equation. The dependent variable is log supermarket share and each independent variable is entered as an inverse and in logarithmic form. If the logarithmic form is eliminated with respect to a specific independent variable, the remaining functional form is log-inverse. If only the inverse form is eliminated, the function becomes double-log. Although the dependent variable is censored,⁴ OLS is used for its simplicity, flexibility (with respect to stepwise techniques) and interpretability.

The results are shown in Table 2. Only two variables have been 'eliminated'; the inverse of GDP per capita (implying that the relationship between GDP and supermarket share is logarithmic) and the log of openness (implying that the

4. Because it is a % share, numbers cannot lie outside the range 0 to 100.

relationship between openness and supermarket share is log-inverse). For the remaining three independent variables the log-log-inverse form is retained because the variable is significant in both logarithmic and inverse forms. The adjusted R^2 is a fighting fit 0.91, especially high for cross-section data of doubtful quality. All retained variables are highly statistically significant.

Table 2: Determinants of supermarket share of retail food markets

Independent variable	Coefficient
Constant	16.526*** (3.011)
Inverse Openness Index 1995	-1.624*** (-4.637)
Ln GDP per capita (\$US)	0.372*** (4.499)
Inverse Urbanisation	-145.769*** (-3.436)
Ln Urbanisation	-2.181** (-2.492)
Inverse Female Participation Rate (%)	-79.323*** (-3.146)
Ln Female Participation	-1.539** (-2.098)
Inverse Rich/Poor Ratio	7.552*** (2.668)
Ln Rich/Poor Ratio	1.074*** (3.370)
R^2	.930
Adj R^2	.913

Significant at 5%; *Significant at 1%

Notes: The total number of observations used in the regressions was 42. Variable sources as in the text above. The dependent variable is the natural log of the supermarket share of retail food sales (%). The openness index is an index of restrictions on inward FDI and takes values from 0 (completely closed) to 10 (completely open). To take logarithms, values of 0 are changed to 1. GDP is taken at market exchange rates because, for projection purposes, these are the only ones independently available (and the equation fits slightly better than when using PPP). For income distribution, the ratio of the richest to poorest 20% of the population is employed because it fits better than the gini coefficient (perhaps because there is more variation in the data). Urbanisation and female participation are in %.

The variables all have the expected sign – the share of supermarkets increases with income, openness, urbanisation (up to a maximum at about 70%, after which it falls slightly) and female labour force participation (up to a maximum at just over 50%). The more unequally income is distributed, beyond a rich 20%/poor 20% ratio of about 7, the higher the supermarket share. The implication is that, for developing countries, inequality is necessary to achieve a sufficiently large middle class who can afford to shop in supermarkets.⁵

5. The variable has a minimum at around 7 – below that point, reductions in inequality also increase supermarket incidence. Seven is about the level in the UK and Italy; Norway, the most equal country in the data set, has a value of 4, while Latin American countries and South Africa have values between 20 and 35.

4 Projections

To assess the potential importance of the likely development of the independent variables, a number of projections have been made.⁶ These are shown in Table 3. The first column repeats the actual supermarket share of around 2002. The second column, called 'income effect', employs the projected 2015 GDP per capita figures with all other variables held at their base (2002) levels. The following observations can be made. First, for a number of developed countries the projections suggest, unrealistically, that virtually the entire retail food market will be taken over by supermarkets. However, this is based on projecting far outside the range of the original data, which is inappropriate. It is advised not to treat as realistic any projections above an 80-90% supermarket share (in this or any of the following projections); casual observation would suggest that supermarket shares in modern developed countries are determined mainly by planning regulations and consumer preferences rather than by economic variables. Second, at low supermarket shares, projected income growth alone has little impact on penetration. In Pakistan and Bangladesh the growth is not sufficient to overcome the effects of rounding to the nearest integer. Even in China, where income per head is projected to more than double, penetration increases only from 11% to 15%. Income growth in fact has a bigger effect at higher levels and is responsible for substantial supermarket penetration growth in the transition economies and Latin America.

The next set of projections, labelled urbanisation effect, use projected urbanisation rates and hold all other variables, including income, at their 2002 levels. Urbanisation, already at a high level in Latin America, transition and developed countries, has virtually no projected impact in any of the countries in these groups. In fact the only countries where its independent effects are projected to be important are China, where urbanisation growth has slightly more impact than income growth; India, Pakistan and Bangladesh (not evident from the table because of rounding), though in absolute terms the effects remain small; and Kenya where urbanisation growth is much more important than income growth.

Of course, per capita GDP and urbanisation are strongly related, so in some sense looking at their separate influences, although informative, is rather artificial. The third column, headed 'combined effect', is based on income and urbanisation projected forwards to 2015, with other variables, including openness, held at 2002 levels. The result is an approximate sum of the income and urbanisation effects. In other words, even without further liberalisation of their economies, the spread of supermarkets will continue in the middle-income economies of Latin America and the transition countries, though their share, generally in the 50-70% range, will remain below the current levels in the developed world. These variables are also important in South Africa and Kenya (the only two sub-Saharan African countries for which there are data), China (where they are responsible for supermarket penetration doubling), Russia and, from a very low level, India. However, projected income and urbanisation growth will not lead to high levels of supermarket penetration in those countries where it is currently very low.

6. Independent projections of income distribution and female labour force participation are not available and so have been kept at their current levels in all of the projections. Both are related, imperfectly, to income, but it is beyond the scope of this article to carry out the analysis needed to project these variables.

Table 3: Projections of the spread of supermarkets to 2015*

	Actual share c.2002 %	Income effect 2015 %	Urbanisation effect 2015 %	Combined effect 2015 %	Openness effect 2015 %
Argentina	54	61	53	60	61
Austria	67	80	65	77	80
Bangladesh	1	1	2	2	8
Belgium	89	99	89	99	100
Brazil	49	58	47	56	76
Bulgaria	23	30	23	30	36
Chile	62	73	61	72	77
China	11	15	16	23	27
Colombia	47	53	46	52	58
Costa Rica	55	60	56	61	63
Croatia	42	47	43	48	74
Czech R	55	68	55	67	76
Denmark	75	85	73	83	85
Egypt	10	11	11	12	13
El Salvador	54	60	55	60	68
Finland	74	90	75	91	93
Germany	79	91	78	90	91
Greece	65	75	66	76	82
Guatemala	35	38	40	42	44
Honduras	42	45	45	48	54
Hungary	48	62	48	62	67
India	2	3	4	5	9
Italy	54	65	54	65	68
Kenya	10	11	14	15	16
Mexico	45	55	44	54	61
Morocco	5	6	5	7	15
Norway	70	82	66	77	80
Pakistan	1	1	1	1	3
Panama	50	63	52	65	65
Paraguay	35	37	36	38	38
Poland	44	54	44	54	61
Portugal	70	79	72	81	83
Romania	8	10	8	10	40
Russia	10	15	10	15	26
Slovakia	49	58	50	59	74
South Africa	55	63	57	65	83
Spain	60	72	60	72	74
Sweden	80	93	80	93	94
Switzerland	74	84	74	84	84
Tunisia	5	7	5	7	18
Turkey	37	41	37	41	45
UK	88	97	88	97	97
US	90	99	89	98	101

*In all projections the original regression residual is added to the projection from the regression equation. This assumes that countries presently above or below the fitted regression remain so to the same extent in the projection period.

The final column assumes that, on top of projected urbanisation and income growth, all countries completely open their economies to inward foreign direct investment (as represented by an Openness Index value of 10) by around 2010 (given the presumed lag in impact on 2015 supermarket penetration). This is a somewhat unrealistic timeframe, but the results are informative. For those countries that were even moderately closed in 1995, opening up to foreign competition has a substantial impact on supermarket penetration. For those that were virtually completely closed, the impact is dramatic. The data suggest that many Latin American and transition countries would have a 10 percentage point or more higher level of supermarket penetration if they were completely open and would genuinely approach developed country levels. For Brazil, in which the index in 1995 was only 3.6, complete liberalisation would increase the supermarket share by 20 percentage points to 76%, and for Romania which was completely closed, the share would increase from 10% to 40%. In percentage terms, dramatic change would also take place throughout South Asia and in Morocco and Tunisia. All of this suggests that the biggest impetus to supermarket penetration comes from opening the economy to world class competition. This does not necessarily imply foreign ownership; the threat of competition and potential entry could be sufficient.⁷

5 Summary and conclusions

The rate of spread of supermarkets in developing countries is an issue of topical interest because of their potentially important impact on farming, food businesses, other retailers, trade in processed food products and diets. A large number of articles have described the rapid spread of supermarkets and predicted its continuation and acceleration. In this article, a quantitative estimate has been made of the relationship between the share of supermarkets in the retail food sector for a cross-section of 42 countries and the accepted main drivers of change: income and its distribution, urbanisation, female participation in the labour force and openness to foreign competition through foreign direct investment. Data were obtained for 42 countries covering the spectrum from very rich to very poor and with supermarket shares from 90% down to 1%.

Despite the inevitably dubious quality of some of the data, over 90% of the variation in supermarket shares is explained. Projections of supermarket shares to 2015 employed independent projections of GDP and urbanisation and assessed the impact of countries opening their markets completely to inward investment. Projected income growth will have a significant impact on supermarket penetration in middle-income Latin American and transition countries, leading to shares increasing by around 10 percentage points to, in many cases, the 60-70% level, comparable to present Southern European levels. In contrast, projected income increases have little impact in the poorest countries like Bangladesh and Pakistan. Urbanisation and incomes are highly correlated so their separate effects cannot be identified with confidence, but when urbanisation as well as income is taken into consideration there is a significant impact in China, where

7. Too much should not be drawn from individual country projections where special circumstances may exist. For example, South Africa, as an exporter of supermarket FDI, is already exposed, in that sector, to international competition. It is therefore unlikely that its complete openness to inward FDI would increase its supermarket share as dramatically as is suggested in Table 3.

supermarket share would double to 23%, and Kenya where it would increase by 5 percentage points to a 15% share. The effect of opening its economy to foreign competition depends, of course, on how open a country was to start with, but the effect can be very substantial in those countries that were moderately closed in the base-period. The continued liberalisation of inward foreign direct investment, resulting as it does in competition with and/or entry of multinational retailers, is likely to be the main driving force for the continued spread of supermarkets in developing countries. However, even an open economy will not quickly bring high levels of market share to the low-income and highly rural economies of Southern Asia.

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