International Comparisons of Retail Density; An examination

1. Introduction

Most descriptions of the development of retailing internationally include reference to the significance of retail density (e.g. McGoldrick, 2002). Normally defined as the number of retail outlets per thousand inhabitants in a particular geographic area, such discussions normally include statistics that compare densities between different countries and offer some broad qualitative explanations of the observed differences – which are indeed often very large. The object of this paper is to examine this issue in more depth. In particular, it uses cross-sectional quantitative analysis of a multinational data set to establish the role of various different national characteristics in determining differences in reported retail densities. Understanding the dynamics of changes in retail structure is not only of interest to marketing scholars, it is also important to planners in retailing organisations as well as policy-makers in central and local governments who are interested in the economic and urban planning issues related to the industry.

2. Literature Review

The most comprehensive data on retail density is provided by Euromonitor, an international research consultancy. Examination of the Euromonitor data (Euromonitor 2000a, Euromonitor 2000b) was used to support McGoldrick's discussion (2002, op.cit.) in which he notes the declining density of stores in countries such as the UK in recent decades which he associates with the development of large retail formats. The reasons for the 'ousting of smallness' (Nooteboom et al. 1986) are familiar and widely discussed. However, McGoldrick also points out the wide differences in store density between different countries which are difficult to explain except on an 'ad hoc' basis. For example, he reports a store

density in the Czech Republic six times higher than in the UK and notes that other countries such as Portugal show *increases* in store density in the same period that many other Western European countries are showing a decline.

Pilat (1997) reported on store density in OECD countries in the general context of the impact of regulation on all aspects of economic performance in the sector. While noting the familiar trend towards large-scale outlets he suggests that new small shops have emerged either through co-operating in franchise agreements or as part of larger chains which are oriented towards specific market segments. He implies that the relatively high store density noted in his data for Italy, Belgium, Greece, Portugal and Spain could be attributable to this trend. However it is not clear what cultural or economic forces account for this differential.

McKinsey (1994) suggested a three stage model. In the first stage, stores are generally small and offer a relatively untargeted range of goods to a set of customers in a local area. These are often 'Mom and Pop' general stores. In the second stage, the development of greater mobility through widespread car ownership and the economies of scale in purchasing, logistics and in-store operations favors the development of large scale formats such as hypermarkets and department stores. This should lead to a decline in retail density, particularly in food retailing as many smaller stores are driven out of business. In the third stage, specialized chains of stores offering a more limited range of targeted products and superior service shift the balance back towards higher retail density. While mostly concentrated in non-food retailing, development of the 'convenience store' concept aimed at time-constrained households might also lead to an increase in density also in food retailing. The authors do not offer any statistical evidence to support these hypotheses, however.

In order to account more fully for retail density differences in eight major OECD countries, Pilat (1997, op.cit.) conducted a cross-sectional time series regression analysis, using dummy variables for three countries (Japan, Italy and France) where regulation or other

factors were thought to have a specific impact on maintaining high store density. The other explanatory variables and their effects on density were population density, urban concentration , per capita consumption, number of cars per capita (a proxy for consumer mobility), female labor force participation (a proxy for opportunity cost for time spent shopping), and the relative price of land (proxied by the price index of rents relative to the CPI).

Applying this approach to both food retailing and retailing as a whole, Pilat reports good results – particularly in the case of the former. The first two variables have the expected positive impact, the third and fourth have the expected negative impact. The author felt that there were arguments in both directions with regard to the impact of land prices – and, in the event, the effect turned out to be negative. The dummy variables were all significant and positive, which the author suggests reflect country specific factors which, if rendered inoperative, would lead to a substantial fall in retail density.

This final conclusion stands in contrast, at least with regard to Japan, to later work by Flath (2002). The country's high density was at one time thought to be due primarily to legislation designed to protect small shopkeepers and that it represented a major trade barrier for exporters to the country. However, as result of international pressure - particularly from the US, these laws were substantially relaxed and the author concludes that the importance of regulation has been exaggerated. He points out that two main types of economic model have been used to explain retail density; those that presume that the density of stores attains an economic optimum without explicitly modelling how prices are set, and those that presume the density of stores is the maximum consistent with positive profits given some explicit model of pricing by firms. Both theoretical approaches produce the conclusion that factors such as increasing spaciousness of dwellings and increased car usage will lead to lower retail density. Using time-series regression analysis he concludes;

> ‘Actually the fundamental forces that account for Japan’s proliferation of small stores are the relative lack of private cars, smallness of Japanese dwellings, highly developed system of transporting goods by trucks, and geographic centricity of Japan.’ (Flath 2002, p.3).

Matsui et al. (2005) reach similar conclusions in a comparative study of retail density in China and Japan. Using a social optimality model and data for individual areas within the two countries, they conclude that retail density in Japan can be mainly explained through the rate of use of passenger cars and the average floor space of dwellings. They found it more difficult to interpret the Chinese data because of the market power of state-owned outlets which prevented private firms from entering the retail market in many cities. Nevertheless they conclude that the social optimality model had a degree of explanatory power.

The inconsistency of the impact of regulatory measures related to large stores on store density is also noted by Boylaud and Nicoletti (2001). They do, however, conclude that such measures do curb the dynamism of the industry leading to lower employment growth and higher consumer prices.

As can be seen from this literature review, researchers to date have either noted the wide variations in retail density and have made generalized qualitative comments by way of explanation or concentrated on comparative econometric studies that have included only a relatively small number of countries. The object of this study is to use a data set containing many more countries to see what general conclusions can be drawn concerning the process by which retail density is determined in relation to economic and demographic factors.

3. The Data

Such a data set is now available through Euromonitor, an international consulting and market research company. Their Global Marketing Information Database (GMID) includes detailed

breakdowns of numbers of stores by country divided by various categories and are updated annually. To ensure consistency, the Euromonitor analysts have developed precise definitions of categories of different retailing outlets which are applied to each country's national data. They crosscheck using multiple sources of information including trade associations, government departments and observations by locally-based researchers. This data set is therefore more reliable, comprehensive and recent than that used by previous researchers. Fifty-two countries, selected because the database offered complete and reliable data for the variables of interest were included in the study.

The database offers information both for retail stores in total and also grocery stores alone. Since the latter statistic represents a substantial proportion of the former (on average around 47%), there is a high correlation between the two. Previous studies generally looked at retail store density only. However, since many of the arguments used to explain international differences in store density tend to relate mostly to different patterns of grocery shopping (for example the influence of home size on storage capacity for frequently purchased grocery items), this study looks at grocery store density also. The object of doing this was to remove the possible effect of international differences in non-grocery retail store density explained by other more idiosyncratic factors. However, since grocery retailing represents such a high proportion of all store-based retailing activity, analyses using the latter data can be expected to produce very similar results.

Retail sales data reported in local currencies was converted into dollars as a common international measure. Given that the research was designed to look at the essentially domestic phenomenon of retail density, the use of purchasing power parity exchange rates was deemed to be most appropriate. Fortunately PPP exchange rates are reported in the database alongside averages for the actual rates.

INSERT EXHIBITS 1 & 2 ABOUT HERE

In order to gain a general understanding of the data, Exhibits 1 & 2 show an overall scatter plot of retail store density against retail sales per head and grocery store density against grocery retail sales per head. These both show what might be called a 'wedge-shaped' scatter with countries with low incomes and expenditures per head showing much greater variability in store density that countries where expenditures per head are high. This effect is particularly pronounced for the grocery store data. Low grocery expenditure countries show a spread from low levels in Malaysia (less than two stores per thousand inhabitants) to Egypt and Thailand with extremely high densities (up to nearly sixteen stores per thousand inhabitants). However, as incomes and expenditure increase so densities tend to converge towards a mean level that shows much less inter-country variation. Countries such as Italy and Greece, whose high retail densities have often been noted, and Taiwan are at the top of the 'wedge' in both charts, while the USA, the efficiency of whose distribution sector has often been noted (Reynolds et.al., 2008), is at the bottom. The object of this study is to provide some statistically valid insights into what is causing these wide variations.

4. Hypotheses

Based on the above discussion, it is clear that international differences in retail density remain difficult to account for. While developed countries in which income and sales per head are high generally have low retail densities, the pattern amongst those with low and medium sales per head are lower is much less clear. Based on the discussion of the literature and the initial data analysis, the following hypotheses emerge:

H1; Retail density decreases with increasing car ownership

H1a; Grocery retail density decreases with increasing car ownership

This hypothesis reflects the oft-noted fact that automobiles provide consumers with the means to shop further from their dwellings and also to carry far more items home from a single trip quite conveniently. The car thus provides a powerful tool for consumers to take advantage of large, often suburban, retail outlets which will over time displace many smaller stores.

H2; Retail density decreases with increasing average home size.

H2a; Grocery retail density decreases with increasing average home size.

Smaller homes imply less storage space for food so that more frequent trips are required to provide for family requirements. Conversely, larger homes particularly combined with automobile usage, increases the advantage of the larger stores referred to above.

The shift of population from rural to urban areas that accompanies economic development is another factor that is likely to have an impact on retail store density. Other things being equal, one would expect more densely populated areas in a country to require fewer shops. Thus;

H3; Retail density decreases with increased urbanization

H3a; Grocery retail density decreases with increased urbanization

Having put forward the hypothesis in this form, it should be acknowledged that the prevalence of subsistence farming in the poorest countries may be a confounding factor. Rural populations with in these circumstances may be self-sufficient to a high degree and

therefore make little use of any store-based retailers. One might hypothesize that this effect would be particularly strong with regard to grocery retailing so that H3a may turn out to be insignificant or could even operate in the opposite direction (i.e. Grocery store density actually increasing with urbanization).

Following Pilat (1997, op. cit.), high female participation in the workforce is expected to increase the size of their average purchase given the opportunity costs related to time spent shopping. This argument suggests fewer shopping trips with more items purchased and so favors decreasing store density. Thus;

H4; Retail density decreases with increasing female participation.

H4a; Grocery retail density decreases with increasing female participation.

Another confounding factor that has to be acknowledged is the degree to which regulatory intervention has distorted the distribution of stores even if studies such as Matsui et al. (2005 op.cit.) have suggested a more limited impact than might otherwise be supposed. Nevertheless when looking at data for ex-communist countries (e.g. Russia, Hungary, Ukraine and Bulgaria) some of the wide variation in density may reflect the differing impact of centrally planned interventions that are still reflected in the structure of the retail sector.

INSERT EXHIBIT 3 ABOUT HERE

To test these hypotheses and gain further insight into the data an overall correlation matrix (Exhibit 3) was calculated using data derived directly from GMID. Since data for average home size was not directly available from the database, a proxy variable based on an estimate of the average number of rooms per house was calculated. The results supported

H1a and H2a comfortably with Pearson Coefficients of -.429 (Two-tailed significance 0.002) and -.367 (Two-tailed significance 0.002 and 0.009 respectively). H1 and H2 were not supported, however, with the Pearson Coefficients of -0.065 and -0.111 being insignificant.

Urbanization as a factor turns out to be significantly negatively correlated with grocery store density with a Pearson Coefficient of -0.448 (P-value 0.002) but the correlation between urbanization and the retail store density (-0.093) was insignificant. Thus H3a is supported but not H3. Female participation also correlates significantly in the expected way with the two retail density measures (H4 and H4a).The negative relationship with retail density and grocery retail density were -0.291 (P-value 0.036) and -0.403 (P-value 0.003). . These statistics again suggest that capturing systematic differences in retail store density related to the factors being considered requires the analysis of the grocery store data alone.

Finally, out of curiosity, overall population density (people per sq. kilometre) was also included in the correlation matrix. *Prima facie*, one might wonder if less densely populated countries might lead to higher retail density as people found themselves living further from suitable outlets. Population density is however a global measure which in many countries is highly influenced by vast desert or mountain areas where there are very few inhabitants (and shops). This effect might be expected to overwhelm any impact of population density in areas where significant numbers of people live and shop. This turned out to be the case as no significant correlations between population and retail densities was found.

5. The Model

In order to explore the data further a linear regression model was developed to see which of the identified factors, when taken together, might contribute most to explaining store density differences. The two linear regression models were as follows;

Store-based Retail Density = F (Store-based Retail Sales per capita, Passenger Car Density, House size, Urbanization Index, Female participation)

Grocery Store Density = F (Grocery Sales per capita, Passenger Car Density, House size, Urbanization Index, Female participation)

INSERT EXHIBITS 4 & 5 ABOUT HERE

The results are shown in Exhibits 4 and 5. The overall goodness of fit was in both cases significant but superior in the case of the Grocery Store model as compared to the broader Retail Store model (Adjusted R-squares of .365 and .158, respectively). In both cases, however, the only explanatory variable that had a significant P-value associated with its beta coefficient was the Female Participation rate (.003 and .002 respectively). As for the other explanatory variables, the signs associated with their beta coefficients generally confirmed earlier hypotheses in that increased sales was associated with increased store density while increased car-ownership, house size, and urbanization had a negative influence on density. (The one exception to this result was that in the Retail Store model the beta coefficient associated with car-ownership had a *positive* sign associated with it. However, the significance of the t-value associated with this variable (t = .171 P = .865) suggested that very little should be read into this result). In every case, however, the significance of the associated beta coefficients was very low, suggesting that the results found in the correlation analysis matrix were a function of these variables' co-linearity with female participation rather than a significant independent effect.

In neither model did the inclusion of relevant sales per capita variable have any significant impact. As indicated in the discussion of the scatter plot data (Exhibits 1 & 2) above, sales per head do not appear to relate to retail density in any obvious way and statistically significant way.

The use of stepwise regression essentially confirmed these results. Using the five possible independent variables discussed above, the only one that consistently entered the 'best fit' models of all sizes was again female participation. A two variable model for Grocery Store density, however, also included passenger car density as a significant predictor. In this instance the associated beta was significant and had the expected negative sign associated with it ($t = -1.885$ $P = .003$).

6. Discussion of Findings

These results suggest that female participation in the work-force is the most significant factor in accounting for inter-country differences in retail density. This does, at first sight, seem to be counter-intuitive. It certainly suggests, however, that more conventional 'textbook' explanations in terms of house size or the degree of urbanization need to be revisited. Increasing car ownership does however seem to have a role to play in explaining declining grocery store density. This would seem to be logical given the importance of using private transportation for households to be able to make infrequent trips to large grocery outlets rather than frequent trips to small local stores in order to satisfy their food shopping requirements. Nevertheless the high correlation between car ownership and female participation rates makes it difficult to be confident about the independent impact of each variable. Overall, however, the relatively poor fit of the proposed regression models suggests that much remains to be understood about the factors that drive differences in retail density.

While clearly speculative, some possible explanations present themselves for the importance of female participation. First there is the opportunity cost of time argument used by Pilat (1997, op.cit.). If females who are working, their time available for shopping is more limited and they will tend to concentrate their purchases into fewer visits to a more limited number of retail outlets. If 'time is money' the costs of search are correspondingly increased. Logically, they will be prepared to make sacrifices in terms of the degree to which they seek out the best bargains by making trips to multiple stores in order to compare prices. Fewer, well-located stores will, under these circumstances, win out over multiple competing retailers, even if these offer some bargains. Moreover, it is clear that these effects are more important than a possible tendency for increased female participation to bring about an *increase* in retail density through increasing economic affluence. Indeed the insignificant relationship between sales per capita and retail density in the data supports this conclusion.

In addition, there may be other factors at work in explaining the link between female participation and retail density. As Tauber (1972) hypothesized; "..... people's motives for shopping are a function of many variables some of which are unrelated to the actual buying of products". These could be both personal and social, and he suggested that retailers see themselves as being part of "the social-recreational industry" competing directly for consumer's time. This view is supported by the work of Davies and Bell (1991) who find that, while shopping can still be regarded as primarily a 'gendered' activity, male involvement has become increasingly important as male-female roles become increasingly blurred. Dholakia (1991) notes that the activity is under pressure due to time constraints, changing social roles, and technological advances. His study, which was restricted to married couples in the United States suggests that males and females generally differ in their motivations towards shopping with females more often reporting 'shopping as pleasure' as being important especially in relation to non-grocery shopping. Further support for these

findings is found in a recent study entitled, “Men buy, women shop” (Knowledge@ Wharton, 2007). As the trend toward increasing female participation in the workforce occurs in different countries around the world, women may have less time and need for these non-utilitarian gratifications from shopping activity.

A possible interpretation of the results therefore is that increasing female participation drives down demand for multiple retail outlets both in the grocery and non-grocery sectors as a result of a combination of economic, personal and social factors. It appears therefore that the number of retail outlets per head declines as a result both in the grocery field and in store-based retailing in general.

7. Conclusions

The unexpected discovery of the importance of female participation in economic activity as a driver of changes in retail density raises some intriguing questions. For example, why don’t the more traditional explanations of variations in retail density such as changes in car ownership or size of homes prove to be more powerful as explanatory variables? Why aren’t sales per head related to retail density in any systematic way? Are there other, as yet to be identified, factors that drive changes in retail densities and, if so, what are they? Future researchers might also try to investigate the relative strength of the economic and non-economic factors suggested above for the association between female participation and changes in retail density. Or, indeed they might propose and test other hypothesized mechanisms driving this relationship. One such consideration might be the increasing importance of online shopping. While this activity has been growing at a very rapid rate, it still represents a small part of overall shopping activity in most sectors, accounting for approximately 3% of the world retailing total (Euromonitor 2010). Nevertheless, there is no doubt that retailers of all types in the more advanced economies have been forced to develop

web-based strategies alongside traditional bricks-and-mortar operations. While the importance of these initiatives may not be enough to have had a major impact on the international differences in retail density analysed in this paper, future researchers may wish to consider this issue.

From a managerial point of view, this study clearly suggests that female participation rates should be viewed as one of the key factors in any analysis of current and future changes in retail structure. As more and more retailers seek to operate on a global basis, understanding of the underlying dynamics of trends in this industry becomes of increasing importance. Observing and predicting changes in female participation seem to be a fundamental task in achieving this objective. This conclusion is also of importance to regulators and urban planners for whose work the changing structure of retailing is an important consideration.

8. References

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Exhibit 1: Retail sales per capita v. Retail store density

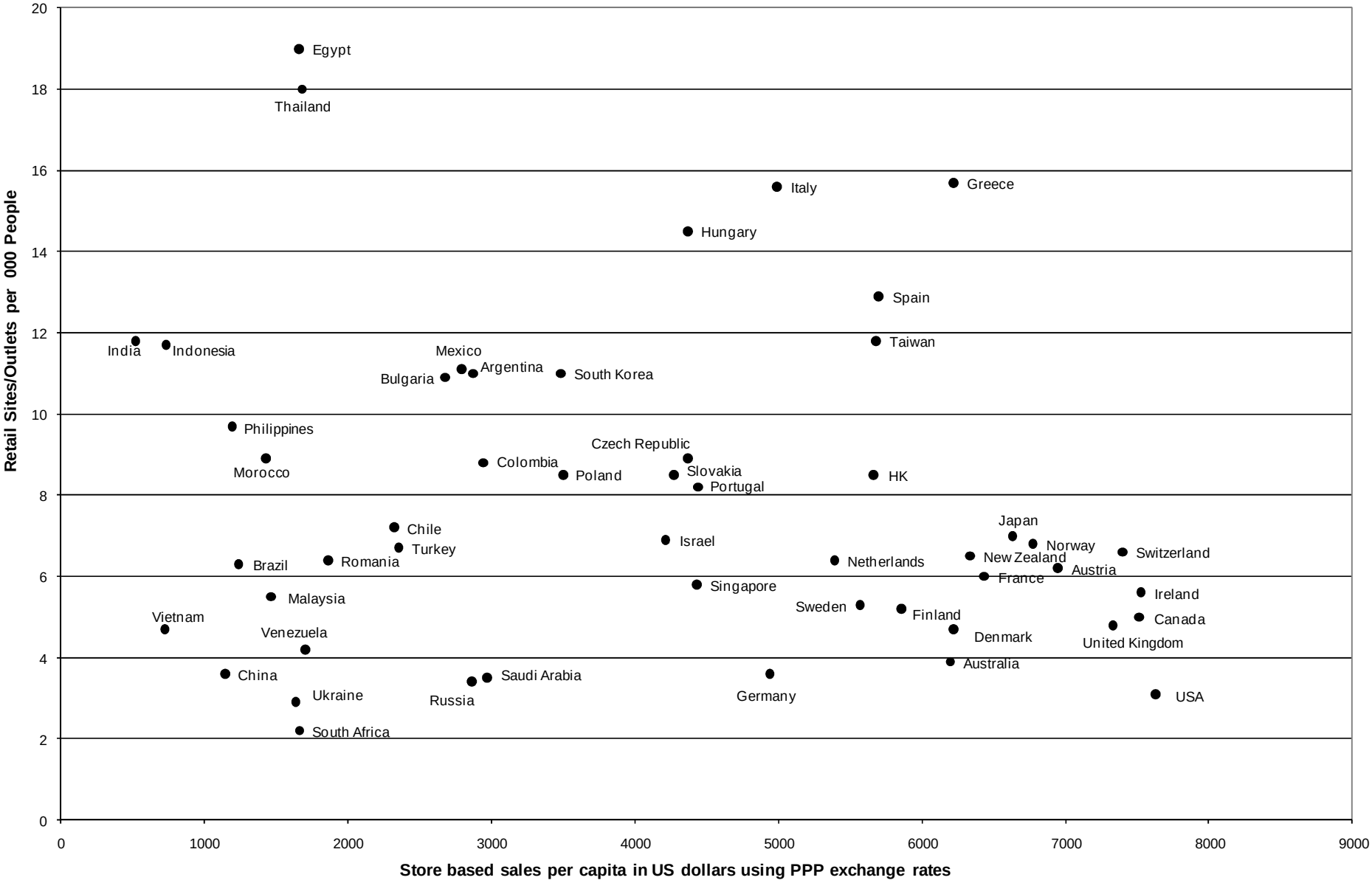

Exhibit 2: Grocery sales per capita v. Grocery retail store density

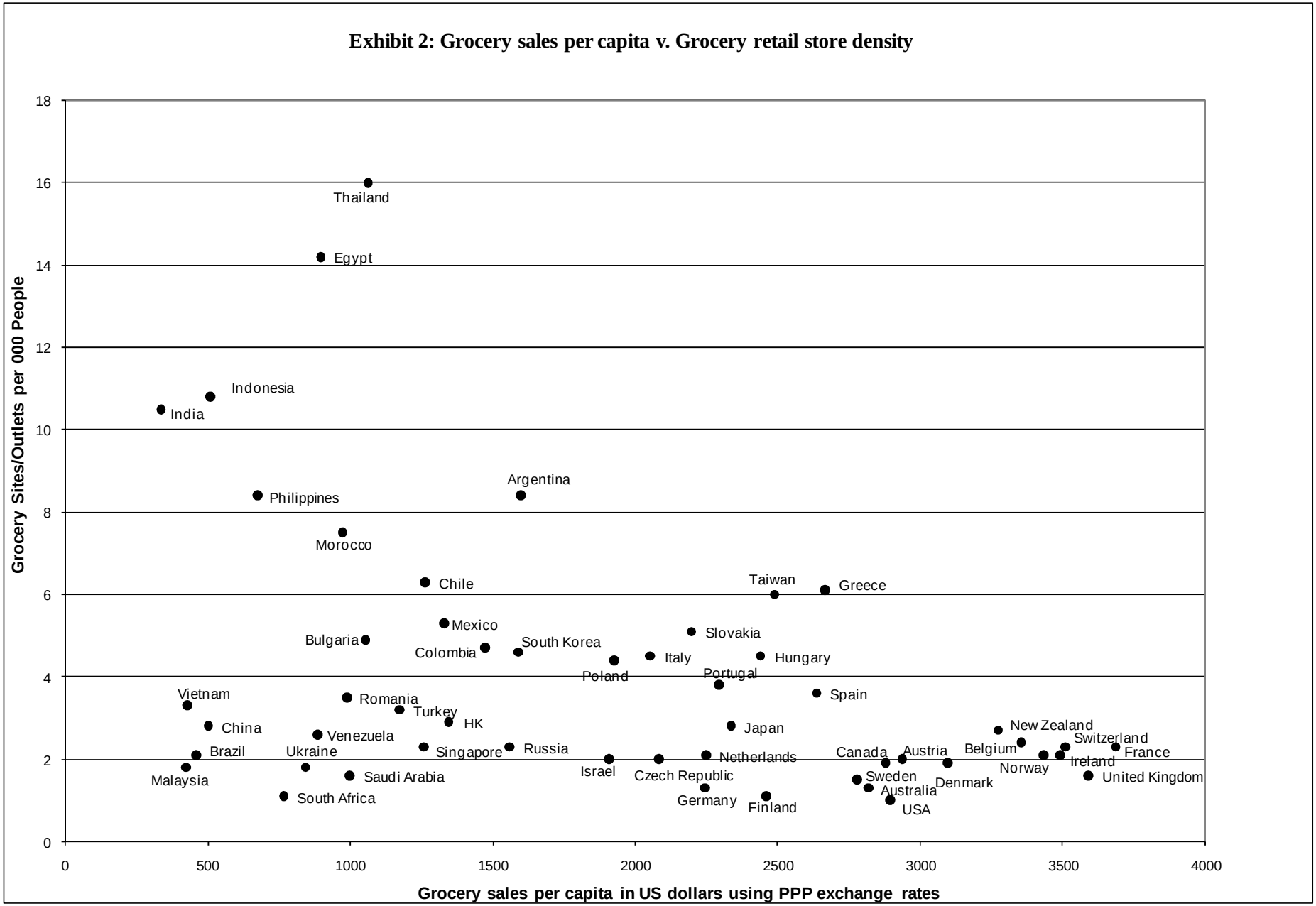

Exhibit 3: Correlation Matrix

* P- Value < 0.05 ** P-Value <0.01		Store Based Retailing Density	Grocery Retailers Density	Passenger Car Density (2 007)	No. of rooms per house	Urbanization Index	Female Participation	Population Density
Store Based Retailing Density	Pearson Correlation	1.000	.797**	-.154	-.168	-.227	-.291*	-.017
	Sig. (2-tailed)		.000	.277	.244	.105	.036	.908
	N	52.	52	52	50	52	52	51
Grocery Retailers Density	Pearson Correlation	.797**	1.000	-.497**	-.370**	-.381**	-.403**	-.076
	Sig. (2-tailed)	.000		.000	.008	.005	.003	.598
	N	52	52	52	50	52	52	51
Passenger Car Density (2007)	Pearson Correlation	-.154	-.497**	1.000	.602**	.315*	.395**	-.207
	Sig. (2-tailed)	.277	.000		.000	.023	.004	.145
	N	52	52	52	50	52	52	51
No. of rooms per house	Pearson Correlation	-.168	-.370**	.602**	1.000	.352*	.188	.154
	Sig. (2-tailed)	.244	.008	.000		.012	.192	.292
	N	50	50	50	50.	50	50	49
Urbanization Index	Pearson Correlation	-.227	-.381**	.315*	.352*	1.000	.189	.035
	Sig. (2-tailed)	.105	.005	.023	.012		.179	.808
	N	52	52	52	50	52	52	51
Female Participation	Pearson Correlation	-.291*	-.403**	.395**	.188	.189	1.000	.105
	Sig. (2-tailed)	.036	.003	.004	.192	.179		.465
	N	52	52	52	50	52	52	51
Population Density	Pearson Correlation	-.017	-.076	-.207	.154	.035	.105	1.000
	Sig. (2-tailed)	.908	.598	.145	.292	.808	.465	
	N	51	51	51	49	51	51	51

Exhibit 4: Linear Regression Model

Dependent Variable - Store-based Retail Density

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.494[a]	.244	.158	3.61770

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	185.838	5	37.168	2.840	.026[a]
	Residual	575.862	44	13.088		
	Total	761.700	49			

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	25.226	4.883		5.166	.000
	Store based retail sales per capita using PPP	.000	.000	.094	.345	.731
	Passenger Car Density (Cars per 000 people)	.001	.005	.042	.171	.865
	Average Number of rooms per household	-.662	.827	-.150	-.801	.428
	Urbanization Index (Urban /Urban + Rural households)	-.968	2.931	-.048	-.330	.743
	Female Participation (%age economically active)	-.351	.107	-.486	-3.281	.002

Exhibit 5: Linear Regression Model
Dependent Variable – Grocery Retail Density

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
2	.656[a]	.430	.365	2.58238

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
2	Regression	221.472	5	44.294	6.642	.000[a]
	Residual	293.423	44	6.669		
	Total	514.895	49			

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
2	(Constant)	18.104	3.419		5.296	.000
	Grocery sales per capita using PPP	.001	.001	.189	.803	.426
	Passenger Cars Density (Cars per '000 People)	-.006	.004	-.395	-1.667	.103
	Average Number of rooms per household	-.466	.546	-.128	-.853	.398
	Urbanization Index (Urban /Total households)	-1.979	2.105	-.120	-.940	.352
	Female Participation (% economically active)	-.239	.076	-.403	-3.143	.003