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**Global Adoption of Convenience Foods**

Megan Sheely

**Abstract**

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Trends in the types of foods Americans purchase are evident just by looking around the grocery store. Foods stuffs requiring extensive preparation are being replaced by convenience products that require little time, energy, or preparation. Food companies constantly invest in research and development of new convenience foods to make daily life easier for consumers. The objective of this study is to determine whether the demand for convenience foods is growing around the globe, and if so, to identify the various drivers responsible for the increase in demand. Secondary data were collected for 67 different countries on the quantity and value for four different food types of convenience food: frozen processed foods, chilled processed foods, meal replacement products, and sweet and savory snacks. Data were also found on potential drivers of convenience such as age, income, food budget, etc. All data had 10 years of information (1998 to 2007) and were collected through databases from Euromonitor or the World Bank and analyzed using regression analysis. The three biggest drivers of convenience foods were found to be possession of a color TV, possession of a microwave, and median age of the population.

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Convenience foods are a part of most U.S. consumer's daily lives. Aisles upon aisles of convenience products line grocery shelves, with 1000 new products being launched each month (Buckley, Cowan, and McCarthy). It seems as if the United States is caught in a value-added craze that has been brewing since the first TV dinners were sold in 1953. It is easy to tell that convenience foods are popular in the U.S. and Europe given their annual consumption rates. The market for convenience food products in the United States reached 7.2 billion pounds in 2007, while Western Europe consumed 3.9 billion pounds. In addition, globalization has led to the consumption of convenience food consumption in other countries around the world. Questions arise as to which societal and demographic factors drive convenience food consumption.

Food manufacturers have long met the demand for convenience foods in the West. Yet flat growth rates in the U.S. and Europe are causing manufactures to consider emerging markets. By understanding the factors that likely drive the demand for these products elsewhere, food manufacturers might better anticipate successful entry of new markets.

The goal of this research project is to determine what forces drive the adoption of convenience foods globally. The ability to anticipate the demand for convenience foods can benefit any food manufacturer producing convenience foods. Companies able to predict such movements can tap into these markets to gain a first mover advantage.

**Literature Review**

Convenience is composed of three components: time, physical energy, and mental energy (Buckley, Cowan, and McCarthy). Ten lifestyle issues were identified that drive the demand for convenience foods: aging population, changing household structures, female participation in labor force and longer working hours, consumer prosperity and technology ownership, move towards healthy eating, desire for new experiences, individualism, declining cooking skills, breakdown of traditional mealtimes, and value for money. A survey was conducted of 1,000 consumers that identified 20 convenience lifestyle factors and four food lifestyles. These four food lifestyles are 'food connoisseurs' at 26% of the population, 'home meal preparers' at 25% of the population, 'kitchen evaders' at 16% of the population, and 'convenience-seeking grazers' with the remaining 33% of the population. Kitchen evaders and convenience-seeking grazers, or 49% of the population, were identified as convenience-seeking consumers.

The kitchen evaders are the most likely to select convenience foods and place heavy importance on microwave cooking (Buckley, Cowan, and McCarthy). They have a high tendency towards snacking. Factors that lead to kitchen evader's convenience preferences are the breakdown of mealtimes, eating alone, and individualism in consumption patterns. They are strong advocates for ready meals and pay premiums for takeaway meals. They are the least likely segment to cook a meal from ingredients. A high percentage of this segment is under 34 years of age. This is the largest segment of households with more than four people in residence (although they are not necessarily related).

The convenience-seeking grazers segment is also notable in their convenience food consumption patterns. They often feel the need for extra time and use convenience foods as a means to reduce ingredient waste. They are more likely to plan their shopping trips than kitchen

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evaders and are more price sensitive. They value convenience more than freshness. Breakdown of mealtimes and eating alone are factors that create the convenience-seeking grazers desire for convenience. This segment is predominately women (87% female), mainly between the ages of 25 and 45.

Harris and Shipstova used a regression model to determine which factors affect convenience food consumption in the United States. The explanatory variables included income, adjusted price, other prices, household size, U.S. geographic segments (central, east, west, south), age, rural/metropolitan, poverty, race (other, white, black, Hispanic), marital status, education level (high school, college, post graduate), children/no children, wage, and a constant.

Income has a positive effect on ready meal expenditures (Harris and Shiptsova). For every one-percent increase in income, the demand for ready meals increased 0.15%. Quality-adjusted price also had a positive effect on expenditures, with an elasticity of 0.41. Household size and some of the geographic regions had positive effects. For each extra person in the home, an additional \$15 was spent for convenience products, i.e. a larger family consumes more ready meals. The two geographic regions that were significant in the regression were the West which spent \$15 more on ready meals, while the East consumed \$18 less. Age of the household had a negative effect on ready meal consumption. This indicates that the younger head of households consume more ready meals. Metropolitan verses rural households also was significant and a positive relationship. City households consumed \$14 more per year on ready meals than rural homes. The poverty variable showed a negative relationship to expenditure on ready meals. The race variables measured the differences of ready meal expenditures compared to non-white or non-black households. These were found to be positive relationships and showed that white households spent \$21 more per year then other races. Hispanics spent \$32 less per year than non- Hispanics. Marriage showed to have a negative relationship with \$17 less per year spent on ready meals. Higher education levels showed a negative relationship as consumers with college degrees consumed \$13 less on convenience foods while post graduates spent over \$14 less on convenience foods. Households with children showed a positive relationship and spent \$17 more per year on ready meals. The number of wage earners in the home did not prove to be significant in the study.

The study conducted by Buckley, Cowan, and McCarthy was valuable in understanding the mindsets behind convenience food consumption. It broke down the population of Great Britain into four segments of consumers by their cooking practices. It focused primarily on personal preferences and behavioral tendencies that would drive a person towards or away from convenience foods. Since this study draws on global trends, it was valuable to understand what factors might contribute to individuals' food choices.

The study conducted by Harris and Shipstova also was very valuable in determining which factors to include in the model. Factors such as income, age, and prices were also used in the model for this research project. Since they focused on one country, many of their driving factors dealt with regions and race factors that cannot be applied on a global scale.

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### Data

Data were collected for the years 1998 through 2007 from 67 countries.<sup>1</sup> These 67 countries represent 80.4% of the world's population in 2007 and 97.5% of the world's GDP in 2007. All of North America and most of Europe is covered in the study. Much of South America and Australia, Asia, and the Pacific region are covered as well. The study has limited scope from Africa and the Middle East, and no coverage in Central America. Nevertheless, the sample is considered to be representative, especially of more developed countries.

Except for data on the number of women in parliament, all data were obtained from the database, Euromonitor. Women in parliament data were collected from the World Bank Development Indicators database. Both of these sources are available through Purdue University's Management & Economics library online databases ([www.lib.purdue.edu/mel/](http://www.lib.purdue.edu/mel/)). A feature of Euromonitor is it can convert all data to a common currency in real terms. For this study, all financial data are expressed in 2007 US dollars.

Data were collected for consumption and expenditures data on convenience foods. In addition, data were collected for a set of 17 potential explanatory variables: women in workforce, population, length of maternity leave, annual disposable income, women in parliament, obese population – body mass index (BMI), consumer expenditure, consumer expenditure on food/beverages, possession of refrigerator, possession of mobile telephone, possession of microwave oven, possession of Internet enabled PC, possession of freezer, possession of dishwasher, possession of color TV set, and median age of population.

Euromonitor offered data on 14 categories of food products (Table 1). Globally, in 2007, 1,586 billion \$U.S. were spent on convenience foods. In terms of money, the top three categories were bakery products, dairy products, and chilled foods at \$353.2, \$315.3, and \$181.3 billion, respectively. The average price per pound is \$2.05 with ice cream and dairy products the highest prices per pound. In contract canned products, bakery products, oils, and dried foods were priced at under \$1.50 per pound. Four categories were defined to be convenience foods in this study: Frozen Processed Foods, Chilled Processed Foods, Meal Replacement Products, and Sweet and Savory Snacks. Frozen Processed Foods were included because of the wide variety of

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<sup>1</sup> Countries are Algeria, Argentina, Australia, Austria, Azerbaijan, Belarus, Belgium, Bolivia, Brazil, Bulgaria, Canada, Chile, China, Colombia, Croatia, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Germany, Greece, Hong Kong, China, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Kazakhstan, Latvia, Lithuania, Malaysia, Mexico, Morocco, Netherlands, New Zealand, Nigeria, Norway, Pakistan, Peru, Philippines, Poland, Portugal, Romania, Russia, Saudi Arabia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Tunisia, Turkey, Ukraine, United Arab Emirates, United Kingdom, USA, Venezuela, and Vietnam.

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**Table 1. Euromonitor Definitions of Packaged Food Categories, by Global Sales, Consumption, and Unit Price, 2007**

Food Category	Description	Global expenditure B US\$	Global consumption B lbs	Unit Price \$/lb
Bakery	Bread, pastries, and cakes	353.1	328.7	1.07
Dairy Products	Liquid milk products, cheese, yoghurt, sour milk drinks, and other dairy products	315.3	22	14.35
Chilled processed food	Processed meats, fish/seafood products, lunch kits, fresh cut fruits, ready meals, pizza, prepared salads, soup, fresh pasta	181.3	45.2	4.01
Confections	Chocolate/ sugar confectionery, and gum	141.2	30.5	4.63
Dried processed food	Rice, dessert mixes, dried ready meals, dehydrated soup, instant soup, dried pasta, plain noodles, and instant noodles	93.6	110.6	0.85
Frozen processed food	Frozen processed red meat, poultry, fish/ seafood, vegetables, meat substitutes, potatoes, bakery products, desserts, ready meals, pizza, soup, noodles, and other	82.6	34	2.43
Sweet and savory snacks	Fruit snacks, chips/crisps, extruded snacks (processed potato or cereal products), tortilla/corn chips, popcorn, pretzels, nuts,	82	22	3.74
Sauces, dressings and condiments	Tomato sauces, bouillon, herbs and spices, MSG, table, soy, pasta, wet/ cooking, dry sauces/ mixes, ketchup, mayonnaise, mustard, salad dressing, vinaigrettes, dips, pickled products	76.6	39.9	1.92
Oils and fats	Olive oil, vegetable/seed oil, cooking fats, butter, margarine, & spreadable oils/fats	74.7	70.2	1.06
Canned/ preserved food	Canned/preserved meat & meat products, fish/seafood, vegetables, tomatoes, beans, fruit, ready meals, soup, pasta, and other	71.3	53	1.34
Ice Cream	Impulse ice cream, take-home ice cream, frozen yoghurt, artisanal ice cream (includes soy, oat, bean, rice products)	61.5	4	15.46
Baby food	Milk formula, prepared, dried, baby foods	25.7	5.9	4.35
Spreads	Jams, preserves, honey, chocolate spreads, nut based spreads, and yeast based spreads	14.4	6.1	2.35
Snack Bars	Granola/muesli bars, breakfast bars, energy bars, fruit bars, and other	7.8	1.2	6.49
Meal replacement products	Slimming products, and convalescence products	4.9	0.9	5.13
Total		1,586.2	774.1	2.05

SOURCE: Euromonitor.

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products, of particular interest were the frozen ready meals. Chilled Processed Foods were chosen because of its popularity in Europe. Chilled processed foods hold 11.4% of the total global convenience foods (Table 1). Meal Replacement Products were chosen because food manufacturers and grocers are positioning these products to offer total nutrition in a very convenient portion. Although this is the smallest segment of global convenience food consumption it is a popular segment in the US. Finally, Sweet and Savory Snacks were included because snack products are typically consumed due to their convenience.

The food variables excluded in the analysis were ice cream, dairy products, snack bars, confectionery, baby food, spreads, sauces, dressings and condiments, canned/preserved food, bakery products, oils and fats, and dried processed food (Table 1). Ice cream was excluded because though it may be considered convenient it does not offer total nutrition like three of the four variables chosen. Dairy Products, though they account for almost 20% of food expenditures, are already well established in most countries that choose to consume dairy. Meal Replacement Products were chosen over snack bars due to their ability to provide complete nutrition. Confectionery products were excluded from the model because they are not traditionally considered convenience foods, but are more of a dessert or luxury item. Baby food was excluded because of its small share of the global food budget and its limited market. Spreads and sauces, dressings and condiments were excluded because they are not a complete food in themselves. Bakery products and oils and fats were excluded due to their ingredient nature rather than a ready-to-eat product. Dried processed foods were not included in the model due to their low-value and typical requirement of hydration before consumption.

Data for quantity of the four types of convenience foods- chilled processed food (Chilled), meal replacement products (MRP), sweet and savory snacks (Snacks), and frozen processed food (Frozen) - were given in thousand tons. Quantities for the four types of food were added together to yield total convenience food consumption per country, per year, or:

$$(1) \quad Q \text{ CONV FOOD}_{i,y} = (\text{Chilled}_{i,y} + \text{MRP}_{i,y} + \text{Snack}_{i,y} + \text{Frozen}_{i,y}) * 2204.62$$

where  $i$  = country, and  $y$  = year, and 2204.62 converts metric tons to pounds.

Per capita consumption was then calculated as pounds of convenience food per person, or

$$(2) \quad \text{Per Cap CONV Food}_{i,y} = \frac{Q \text{ CONV FOOD}_{i,y}}{\text{Population}_{i,y}}$$

Price per pound of convenience food was finally calculated as

$$(3) \quad P \text{ CONV FOOD}_{i,y} = \frac{\$ \text{Chilled}_{i,y} + \$ \text{MRP}_{i,y} + \$ \text{Snack}_{i,y} + \$ \text{Frozen}_{i,y}}{Q \text{ CONV FOOD}_{i,y}}$$

where  $\$$  by convenience food  $i$  type denotes expenditures by country and year.

Data for consumer expenditures on food and beverages were divided by total consumer expenditures to arrive at the percentage of the budget being spent on food. Changes in quantity (equation 2) and price (equation 3) were calculated as year to year differences in quantities and prices to reflect growth rates.

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### Descriptive Statistics

The average per capita consumption of convenience foods globally from 1998 to 2007 was found to be 28.58 pounds annually (Table 2). Consumption of convenience foods ranged from 0.02 pounds in Tunisia to 126.18 pounds in the United Kingdom.

The price of convenience food has a mean of \$3.47 a pound (Table 2). However, the price of convenience foods is declining over time, falling from a mean price in 1999 of \$3.71 to \$3.20 per pound in 2007. The country with the lowest priced convenience food is Indonesia at \$1.54, while the highest prices are found in Turkey at \$9.42. Prices of convenience foods are

**Table 2. Mean, Standard Deviation, and Range of Explanatory Variables, 1998- 2007**

Variable	Mean	Standard Deviation	Minimum	Maximum
Per capita consumption of convenience foods	28.19	28.80	0.02	126.18
Change in Quantity - lbs per capita	0.81	1.09	-4.81	6.85
Price food - \$/lb	3.47	1.09	1.54	9.42
Change in Price- \$/lb	0.06	0.18	-0.78	2.04
Food Budget (%)	0.24	0.13	0.07	0.71
Women in Parliament (%)	16.42	10.23	0.00	47.30
BMI - index	13.75	7.77	0.00	38.40
Possession of refrigerator (%)	81.28	25.57	9.00	100.00
Possession of microwave (%)	38.51	29.72	0.10	95.30
Possession of Internet PC (%)	20.74	22.47	0.00	84.10
Possession of freezer (%)	33.08	28.81	0.20	98.70
Possession of color TV set (%)	85.79	17.54	19.30	99.80
Median age (years)	32.25	7.04	16.90	45.00
Women in Workforce (%)	40.52	9.13	9.71	53.04
Length of Maternity Leave (weeks)	16.96	7.15	6.00	52.00
Possession of mobile phone (%)	48.56	29.78	0.00	99.5
Possession of dishwasher (%)	17.77	20.80	0.00	71.60
Annual Disposable Income (\$000/Person)	9.78	9.23	0.31	34.46

Sources: Euromonitor and World Bank Development Indicators

falling on a global average, while consumption is increasing. The price of convenience foods is expected to show a negative relationship with consumption.

Engle's Law states that since people only need to consume a certain amount of food, they will spend a smaller proportion of their income on food as income climbs. Thus, countries with less disposable income should spend a higher percentage of their budget on food than countries with a higher disposable income. The average percentage of the budget spent of food is 24% throughout the years in the study (Table 2). When looking at the means for the individual years the percentage has fallen from 25.7% in 1999 to 22.6% in 2007. The highest percentage spent on food is in Azerbaijan at 70.5%, the lowest occurs in the United States at 7%.



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The average annual disposable income is \$9,780 per capita for the years 1998 through 2007 (Table 2). In 1999, the yearly average was \$9,160 and by the year 2007 the average had increased to \$10,770 per capita. Norway has the greatest percent annual disposable per capita income with \$34,460, while Vietnam has the lowest at \$310. It is expected that a higher disposable income will lead to more convenience food consumption.

The variable women in parliament is measured as the percent of women in elected offices of state government. Worldwide, an average of 16.4% of government offices are held by women (Table 2). Female participation in government increased from 13.9% in 1999 to 19.1% in 2007. There is still a large range when individual countries are considered. Two countries, United Arab Emirates and Saudi Arabia, have no women in their parliaments. Sweden has the greatest percentage of women in parliament at 47.3%. Women in parliament is being used as a proxy measure of equality among the genders. It is predicted that more equal balance between genders will lead to higher consumption of convenience foods. Women in the workforce is also an indicator of women outside the home. The average percentage of women in the workforce is 40.52%. Algeria has the least amount of women working at 9.71%. Belarus has the highest percentage of women working at 53.04%. With women being away from the home at work an increase in convenience food consumption is expected.

The variable obesity was measured as the percentage of the population above the age of 15 with a body mass index of over 30 kilograms per square meter. The average over the ten year period was 13.75%. The range was from 0% in Vietnam to 38.4% in the United States. Obesity increased from 12.58% in 1999 to 15.38% in 2007. The hypothesis is that countries with a higher obesity rate consume more convenience foods.

Since many convenience foods are refrigerated or frozen, it seems likely that consumption levels will increase with possession of a refrigerator or freezer. Most households in the world own a refrigerator, while freezers are less common. The percentage of households with a refrigerator rose from 78.5% in 1999 to 84.58% in 2007 (Table 2). Vietnam only has 9% of their population with refrigerators while Switzerland and Spain have 100% possession rates. For freezers, 33.1% of households have a freezer unit. The range is from 0.2% in Nigeria to 98.7% in Sweden. The average percentage in the countries studied has increased from 30.2% in 1999 to 36.28% in 2007.

Microwaves and dishwashers are additional kitchen appliances supporting consumption of convenience foods. For the 10 year period, 38.5% of the households owned a microwave, increasing from 30.6% in 1999 to 48.0% in 2007 (Table 2). The lowest recorded value for microwave possession was found in Azerbaijan with just 0.1% of the households owning a microwave oven. On the other end of the spectrum, 95.3% of Canadian households owned a microwave oven. Azerbaijan reported 0% of homes had dishwashers, while Norway had the highest dishwasher adoption at 71.6 % of homes. Since many convenience foods require heating and the convenience of the products lies in the ability for microwave preparation this will be very important in determining if a country consumes a high percentage of convenience foods. Dishwashers indicate a high importance on convenience so they too should show a positive relationship with convenience foods.

The variable of Internet enabled PCs was measured as the percent of total households. As a measure of technology adoption in each country, it is thought that as countries adopt

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computer technology, they place a high value on convenience. The average number of households with Internet was found to be 20.74%, with a yearly range of 8.9% in 1999 to 34.3% in 2007 (Table 2). With this rapid expansion of technology, the highest percentage of possession is in the Netherlands at 84.1%, and while several countries started out in 1999 with 0% Internet enabled PCs. It is expected that countries with a high percentage of Internet enabled PCs will tend to be more urban and that should show a higher consumption of convenience foods.

Possession of color TVs was used as a measure of media coverage for each country. It is measured as a percent of total households with at least one color TV set. The mean for this variable was 85.8% of households own a color TV set, with a range from 19.3% in Nigeria to 99.8% in United Arab Emirates (Table 2). The yearly averages increased from the 79.9% in 1999 to the 91.8% in 2007. This variable was expected to show a positive relationship to convenience food consumption.

The average median age of the populations in the countries studied was 32.3 years. Age ranged from 16.9 years in Nigeria to 45 years in Japan (Table 2). In 1999, the average for all countries was 31.2 years, by 2007 it was 33.5 years. The hypothesis is the younger the country, the higher the convenience food consumption. This is based on Harris and Shipstova's finding that the younger generations seem to be less proficient in the kitchen and thus purchases more convenience foods.

The length of maternity leave had a global average of nearly 17 weeks (Table 2). Australia provides 52 weeks while Tunisia only has 6 weeks. The hypothesis is that a longer maternity leave may signify a higher value on family and family time. With that, convenience food consumption may decline since traditional meals lend more to family together time.

The average number of households with possession of mobile phone was 48.6% (Table 2). The highest phone possession rate is in Singapore with 99.5%, while the Ukraine has only 0.7% adoption of mobile phones. The expected sign between mobile phone ownership and convenience foods is uncertain because mobile phones are gaining popularity in countries that are still very poor and lack a landline telephone infrastructure.

The change in quantity, measured in pounds per person, averages 0.81 pounds per year. The greatest decline in convenience food consumption is observed in Russia in 1998 with -4.81 pounds per year, while in 2007 Russia has the highest increase at 6.85 pounds per year. The expected results will be that countries with a high growth rate will be the counties consuming the most convenience foods.

The change in price, measured in dollars per pound, averaged \$0.06 a year. In Ukraine convenience food prices are dropping \$0.78 a year. In Tunisia, convenience food prices are climbing \$2.04 a year. The change in price captures the demand for the product, if the prices are increasing it indicates there is an increase in demand and consumption.

## Regression Models

Five regression models were run using an Excel spreadsheet model. For the first model all 15 variables were included. Though the regression results had an adjusted  $R^2$  value of 0.808, inconsistent signs suggested the presence of multicollinearity (Table 3). An analysis of the correlation among the variables found 47 of 105 variable pairs with .5 correlation or higher

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(Table 4). This is especially true among the household possessions. One remedy for multicollinearity is to drop variables. Thus, in Model Two, three variables were excluded: length of maternity leave, possession of mobile telephone, and possession of dishwasher. This regression yielded an adjusted  $R^2$  value of 0.804. In Model Three, three variables were added to the model, change in consumption, change in price, and trend variables. This third model gave an adjusted  $R^2$  value of 0.821. Since trend did not prove to be significant it was removed for the fourth model. Women in parliament had not proved significant in any of the regression models,

**Table 3. Regression Analysis of Consumption of Convenience Foods Model Results**

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	-43.553 <sup>a</sup>	-44.005 <sup>a</sup>	-34.221 <sup>a</sup>	-34.347 <sup>a</sup>	-30.530 <sup>a</sup>
Price Food	1.959 <sup>a</sup>	1.988 <sup>a</sup>	1.958 <sup>a</sup>	1.941 <sup>a</sup>	2.190 <sup>a</sup>
Food Budget	42.970 <sup>a</sup>	45.419 <sup>a</sup>	39.214 <sup>a</sup>	39.802 <sup>a</sup>	39.497 <sup>a</sup>
Women In Workforce	0.341 <sup>a</sup>	0.370 <sup>a</sup>	0.357 <sup>a</sup>	0.356 <sup>a</sup>	NA
Length Of Maternity Leave	-0.003 <sup>a</sup>	NA	NA	NA	NA
Annual Disposable Income	0.001	1.149 <sup>a</sup>	1.164 <sup>a</sup>	1.159 <sup>a</sup>	1.066 <sup>a</sup>
Women In Parliament	0.047	0.064	0.032	0.034	0.145 <sup>a</sup>
Obese Population	0.363 <sup>a</sup>	0.368 <sup>a</sup>	0.341 <sup>a</sup>	0.346 <sup>a</sup>	0.307 <sup>a</sup>
Refrigerator	-0.015	-0.020	-0.014	-0.016	-0.017
Mobile Telephone	-0.049	NA	NA	NA	NA
Microwave Oven	0.485 <sup>a</sup>	0.482 <sup>a</sup>	0.430 <sup>a</sup>	0.429 <sup>a</sup>	0.451 <sup>a</sup>
Internet Enabled PC	-0.126 <sup>a</sup>	-0.162 <sup>a</sup>	-0.110 <sup>a</sup>	-0.101 <sup>a</sup>	-0.115 <sup>a</sup>
Freezer	0.301 <sup>a</sup>	0.309 <sup>a</sup>	0.288 <sup>a</sup>	0.287 <sup>a</sup>	0.258 <sup>a</sup>
Dishwasher	0.059	NA	NA	NA	NA
Color TV Set	-0.176 <sup>a</sup>	-0.206 <sup>a</sup>	-0.243 <sup>a</sup>	-0.237 <sup>a</sup>	-0.258 <sup>a</sup>
Median Age	0.523 <sup>a</sup>	0.491 <sup>a</sup>	0.307 <sup>a</sup>	0.306 <sup>a</sup>	0.664 <sup>a</sup>
Change In Q	NA	NA	3.817 <sup>a</sup>	3.824 <sup>a</sup>	3.939 <sup>a</sup>
Change In P	NA	NA	-0.117	-0.066	-0.863
Trend	NA	NA	0.074	NA	NA
$R^2$	0.808	0.812	.821	.821	0.816

<sup>a</sup>denotes significance at the 95 percent level of confidence.

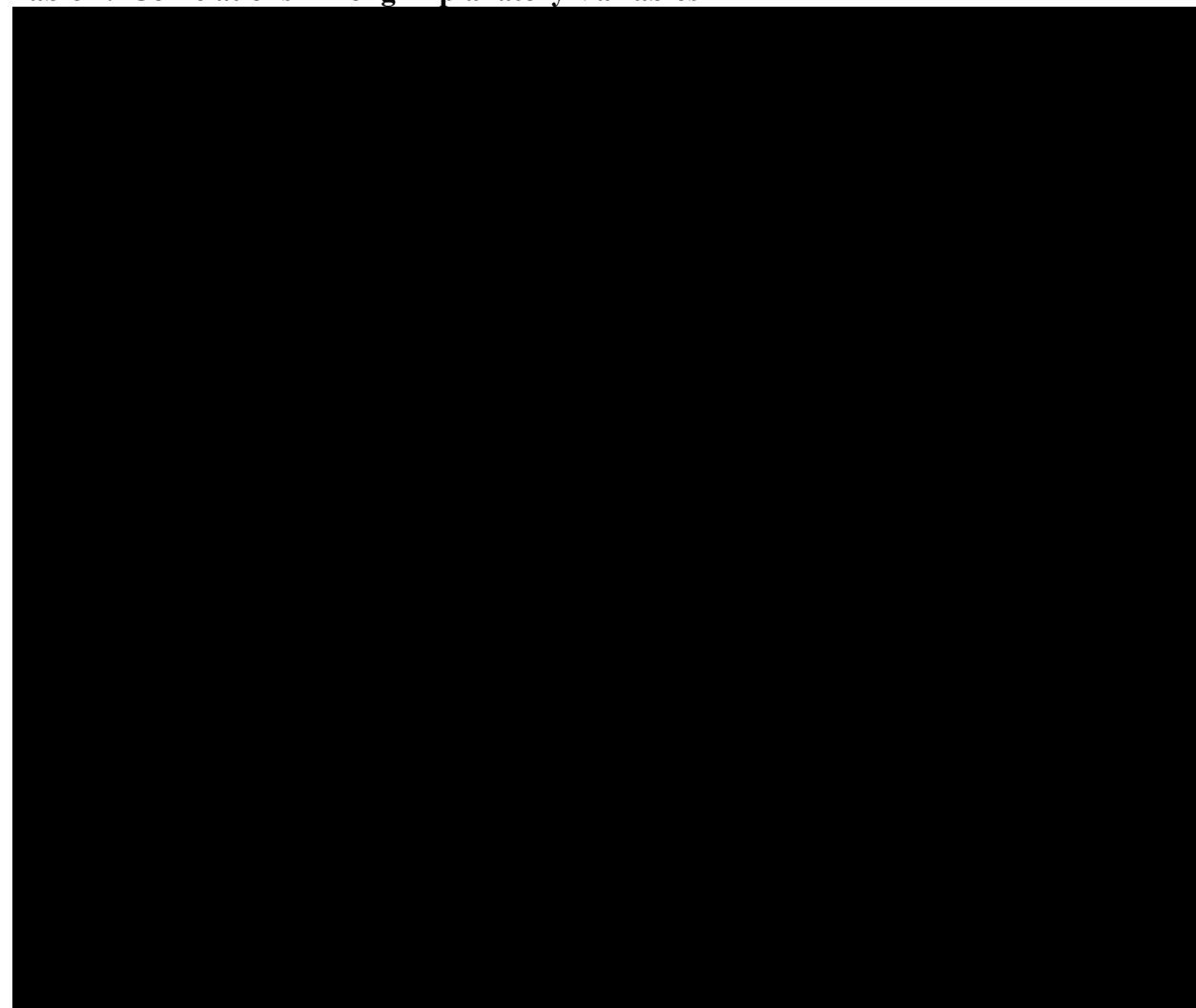
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but was correlated with women in the workforce. For the fifth and final regression, the variable women in the workforce was removed.

Coefficients from Model 5 and the mean values for the variables were used to calculate how a 10 percent change in each independent variable, *ceteris paribus*, affects final per capita consumption. Results can be interpreted as elasticity.

**Table 4. Correlations Among Explanatory Variables**

Eleven of the 13 variables included in the regression model five were statistically significant (Table 3). Nine of the 11 variables were statistically significant in the regression, with a positive relationship to convenience food consumption. Those were: change in consumption (growth rate), price of food, food budget, annual disposable income, women in parliament, obesity, microwave oven, freezer, and the median age (Table 3). The two variables

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with a negative significant relationship to convenience food consumption were Internet enabled PCs and color TV sets. The variables of refrigerator possession and change in price were statistically insignificant

Price was anticipated to have a negative impact on consumption of convenience products (Table 3). However, it was found to have a positive relationship. When prices of convenience food products increase by 10% there is a 2.6% increase in pounds consumed per person (Table 5). This means that price is not the only driver of convenience and this is behaving like a consumption function, rather than as a demand function. This may reflect a tradeoff of price for convenience. The change in P variable measured the rate of price increase. Although not significant in the regression, it did show a negative relationship (Table 3). This indicates that over time, a demand function as we would expect would come into play. An inelastic demand for convenience due to price is observed (Table 5).

**Table 5. Calculated Elasticity for Quantity of Convenience Food Consumption with respect to:**

A 10% change in this variable	leads to % change in consumption
Color TV set	-7.8%
Median age	7.5%
Microwave	6.3%
Income per capita	3.7%
Food Budget	3.3%
Freezer	3.0%
Price food	2.6%
Obese population	1.5%
Change in consumption	1.1%
Women in Parliament	0.8%
Refrigerator	-0.5%
Internet enabled PC	-0.9%
Change in price	0.0%

The technology variables of Internet enabled PC's and color TV sets were predicted to show a positive relationship to consumption of convenience products. However, negative relationships were observed for both variables (Table 3). This could indicate that when a country has a high percent of population with the means to afford technology they also can afford high quality foods, which is not wholly consistent with the market for convenience foods.

The percentage of population that owned a refrigerator was expected to be an important driver of convenience food consumption. This particular variable was statistically insignificant in all 5 regression models (Table 3). Upon closer observations of the data, it seemed that the majority of the countries have a high percentage of possession. Thus, it would not have yielded significance because of limited variability in the data.

Median age was predicted to yield higher consumption if the country had younger population (Table 3). This turned out to be incorrect and as the population ages they consume

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more convenience foods. Older more established populations may have the disposable income needed to afford convenience. It may also be that poverty rates are higher in younger counties.

The three variables with the greatest impact on consumption of convenience foods were possession of color TV sets, the median age of population, and the possession of microwaves (Table 5). When a ten percent increase in possession or age was calculated a 6.3% increase in consumption was observed with microwaves and 7.5% was observed with the increase in age. A ten percent increase in possession in color TV sets is accompanied by consumption drops of 7.8%.

### Conclusions

After all is said and done there is not simply a single driver of convenience food consumption. Rather complex interactions exist among variables and many different factors seemingly are important drivers of consumption. The variables are at times highly interrelated.

The biggest factor that positively affected consumption was median age of the population. Harris and Shiptsova's results concerning the age of the populations differed from the findings of this work. This is observed primarily due to differences in US consumption versus world consumption behaviors and how a low average age in other countries typically means lower standards of living. When Harris and Shiptsova broke down the US population by age groups, they saw higher consumption of convenience foods among younger consumers. In short, this age variable is not comparable when taken to a global scale. In contrast, Harris and Shiptsova's findings for income and prices were consistent with the results of this study.

Some results that were inconsistent with the hypothesis statements were technology variables (Internet and color TV), food budgets, and the price of convenience foods. Why the technology variables showed a negative relationship to convenience consumption is still unclear. However, most of the world already has a color TV which could be leading to some inaccuracies. Food budgets were expected to have a negative relationship, but instead were positive. Countries who spend more of their disposable income on food are buying more convenience foods. Future studies may break down the sample into different types of people and household structures similar to Buckley, Cowan, and McCarthy. This allowed them to see how lifestyle choices lead to convenience consumption rather than country averages to see why this variable showed a positive relationship.

The price of convenience food was expected to follow a typical demand curve by showing a negative relationship. However, like Harris and Shipstova, this study showed a positive relationship. This can be explained by the nature of the products themselves. When consumers purchase convenience foods they are actually buying time. Price is not a "deal breaker" if companies are charging more due to higher quality, the consumer may actual view it as a win-win situation.

Many variables affect the consumption of convenience foods and vary by country. Keeping an eye on potential markets for convenience foods will not be a simple task. The drivers identified in this study depend heavily on what is happening with other variables. Yet the trend towards convenience worldwide is so important that food companies must consider these drivers.

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