Data Appendix on Market Penetration Costs and the New Consumers Margin in International Trade

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Abstract

This appendix provides empirical evidence regarding the relationship between the cost of reaching consumers in a market and population size. We find an inverse and statistically significant relationship of the logarithm of the cost of reaching a thousand consumers in market with the logarithm of the population of the market, even after correcting for per capita income of the market. The estimated coefficients that are statistically significant at the 5% level lay in the range -.107 to -.672. Tables 1-4 describes data sources used.

1   Returns of Marketing to the Population SIze of the Market

We provide information for the relation of the Cost to Reach a Thousand Consumers (CPM) and the population size of the market for a set of markets/countries across different media (TV, newspaper, radio). We use income per capita of the market as an additional explanatory variable of the CPM. We first present the sources of the data and summary statistics. We then present the results of the analysis for each media.

1.1 Data Sources

Table 1: Data Sources - U.S.A. Markets

Source	Notes
The Nielsen Company	*Market* : U.S.A. 182 designated market areas in U.S.A.[1] *Media Type*: Television *Time Period*: 2008 *CPM* : Cost per thousand consumers reached (CPM) is reported for spot TV by designated market area. *Population*: Population estimates are January 2008 estimates provided by Claritas, Inc. The estimates include all persons; those in TV Households, those in Non-TV Households, and persons who do not reside in Households. *Income Per Capita*: Income per capita is taken from the Bureau of Economic Analysis Regional Economic Accounts, available on the world wide web at http://www.bea.doc.gov/bea/regional/data.htm.
E&P Yearbook[2]	*Market*: U.S.A. 236 metropolitan statistical areas (MSA) defined by the Federal Office of Management and Budget *Media Type*: Newspapers *Time Period*: 1992 *CPM*: CPM for each MSA is computed as a weighted average of the newspaper-city level CPM. The weights are the circulation volume of a newspaper as a fraction of total circulation volume of all newspapers for a given MSA.[3] Newspaper-city level CPM is computes based on standard advertising unit (SAU) rates and circulation volume provided by the source for individual newspapers. *Population*: Population my MSA is taken from the Bureau of Economic Analysis Regional Economic Accounts, available on the world wide web at http://www.bea.doc.gov/bea/regional/data.htm. *Income Per Capita*: Income per capita is constructed using population and income data by MSA taken from the Bureau of Economic Analysis Regional Economic Accounts, available on the world wide web at http://www.bea.doc.gov/bea/regional/data.htm.

[1] The original data source provided information for 210 designated market areas. The data on income per capita was available for only 182 markets. The markets for which there is no such information are: Clarksburg-Weston, Bluefield-Beckley-Oak Hill, Alpena, Wilkes Barre-Scranton, Twin Falls, Columbus-Tupelo-West Point, Norfolk-Portsmth-Newpt Nws, Paducah-Cape Girard-Harsbg, Marquette, Juneau, Butte-Bozeman, Zanesville, Eureka, West Palm Beach-Ft. Pierce, Presque, Isle, North Platte, Harlingen-Wslco-Brnsvl-Mca, Meridian, Glendive, Helena, Tri-Cities Tn-Va, Quincy-Hannibal-Keokuk, Ft. Myers-Naples, Traverse City-Cadillac, Tyler-Longview, Ottumwa-Kirksville, Watertown, Greenwood-Greenville.

[2] The original source of the newspapers advertising data is Sunday circulations from the 1992 Editor and Publisher International Yearbook (E&P Yearbook). For the detailed description of the data see **?**. The source provides the data on advertising costs at the newspaper-city level. Each city is matched to a corresponding Metropolitan State Are as defined by the Federal Office of Management and Budget. The population of the corresponding MSA is used as a measure of market size.

[3] Suppose for a given metropolitan area the SAU rates and the corresponding circulation rates are provided for three newspaper. The CMP for that MSA is computed as follows $1000 \cdot \frac{\text{SAU}_1 + \text{SAU}_2 + \text{SAU}_3}{\text{Circ}_1 + \text{Circ}_2 + \text{Circ}_3}$

Table 2: Data Sources - European Countries

Source	Notes
ZenithOptimedia	*Market*: Europe. 16 European countries.[1]
	Media Type: Television
	Time Period: 2004
	CPM: CPM is reported based on the 30 second commercial during the peak time for major TV channels by country. CPM for each country is computed as the weighted average of each channel's CPM. The cost of commercial time is reported in local currency. The exchange rates for 2004 reported by IMF are used to convert all nominal values into $US.
	Population: Provided by the source and is measured as the number of people over the age of 15 (or 16).
	Income Per Capita: Income per Capital is taken from the World Development Indicators and is measured as GDP per capita in current $US for the year 2004.

[1] Austria, Belgium , Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherland, Norway, Portugal, Spain, Sweden, Switzerland, UK.

Table 3: Data Sources - Caribbean Countries (Television and Newspapers)

Source	Notes
ReachCaribbean	*Market*: Caribbean. 16 Caribbean countries.[1] *Media Type*: Television *Time Period*: 2008 *CPM*: CPM in 2008 for each country is computed as the average of the TV channel-country level CPM. TV channel-country level CPM is computed based on the before tax cost of one 30 second spot in Prime Time, provided by the source for individual channels, and country's population.[3] *Population*: Population of a country is taken from the World Development Indicators. *Income per Capita*: Income per Capital is taken from the World Development Indicators and is measured as GDP per capita in current \$US.
	Market: Caribbean. 13 Caribbean countries.[2] *Media Type*: Newspapers *Time Period*: 2008 *CPM*: CPM in 2008 for each country is computed as a simple average of the newspaper-country level CPM.[4] The weights are the circulation volume of a newspaper as a fraction of total circulation volume of all newspapers for a given country. Newspaper-country level CPM is computed based on the before tax cost per half page black and white advertisement and circulation volume provided by the source for individual newspapers. *Population*: Population of a country is taken from the World Development Indicators. *Income per Capita*: Income per Capital is taken from the World Development Indicators and is measured as GDP per capita in current \$US.

[1] Antigua and Barbuda, Aruba, The Bahamas, Belize, Bermuda, Cayman Islands, Dominica, Grenada, Guyana, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago, Virgin Islands (U.S.A.). The income per capita data are not available for the following countries: Aruba, Bermuda, Cayman Islands, and Virgin Islands (U.S.A.).

[2] Antigua and Barbuda, Aruba, The Bahamas, Belize, Bermuda, Cayman Islands, Dominica, Grenada, Guyana, Jamaica, St. Kitts and Nevis, St. Lucia, Trinidad and Tobago. The income per capita data are not available for the following countries: Aruba, Bermuda, and Cayman Islands.

[3] Suppose a country has three TV stations. The CPM for that country is computed as follows $1000 \cdot \frac{C_1 + C_2 + C_3}{3 \cdot \text{Population}}$, where C_i is the cost of a 30 second spot in Prime Time on station i.

[4] The cost per half page is reported for 2008 expect for the two newspapers: Royal Gazzet and The Trinidad Express.

Table 4: Data Sources - Caribbean Countries (Radio)

Source	Notes
ReachCaribbean	*Market*: Caribbean. 16 Caribbean countries.[1]
	Media Type: Radio
	Time Period: 2008
	CPM: CPM in 2008 for each country is computed as the average of the Radio channel-country level CPM. Radio channel-country level CPM is computed based on the before tax cost of one 30 second ad in Prime Time, provided by the source for individual channels, and country's population.[2]
	Population: Population of a country is taken from the World Development Indicators.
	Income per Capita: Income per Capital is taken from the World Development Indicators and is measured as GDP per capita in current $US.

[1] Antigua and Barbuda, Aruba, The Bahamas, Belize, Bermuda, Cayman Islands, Dominica, Grenada, Guyana, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago, Virgin Islands (U.S.A.). The income per capita data are not available for the following countries: Aruba, Bermuda, Cayman Islands, and Virgin Islands (U.S.A.).

[2] Suppose a country has three radio stations. The CPM for that country is computed as follows $1000 \cdot \frac{C_1 + C_2 + C_3}{3 \cdot \text{Population}}$, where C_i is the cost of a 30 second spot in Peak Time on station i.

Table 5: Data: Summary Statistics

Market(Source)	Variable	Obs.	Mean	Std. Dev.	Min	Max
U.S.A. (The Nielsen Company)	*Television*					
	CPM	210	19.06	26.48	6.29	361.04
	Population (in mills)	210	1.45	2.35	0.01	20.83
	Inc per Capita (in ths)	182	36.69	6.19	22.35	61.75
Europe (ZenithOptimedia)	*Television*					
	CPM	16	24.63	21.36	4.87	80.52
	Popln 15+ or 16+ (in mills)	16	20.37	21.81	3.22	69.30
	Inc per Capita (in ths)	16	35.96	10.17	17.04	56.31
Caribbean (ReachCaribben)	*Television*					
	CPM	16	0.61	0.67	0.02	2.34
	Population (in mills)	16	0.43	0.69	0.05	2.69
	Inc per Capita (in ths)	12	8.62	5.98	1.52	20.70
U.S.A. (E&P Yearbook)	*Newspapers*					
	CPM	236	0.53	0.15	0.25	1.31
	Population (in mills)	236	0.41	0.49	0.06	3.38
	Inc per Capita (in ths)	236	18.45	2.47	10.23	29.59
Caribben (ReachCaribbean)	*Newspapers*					
	CPM	13	43.91	28.06	10.46	103.93
	Population (in mills)	13	0.47	0.76	0.05	2.69
	Inc per Capita (in ths)	10	9.34	6.41	1.52	20.70
Caribbean (ReachCaribbean)	*Radio*					
	CPM	16	0.15	0.15	0.01	0.59
	Population (in mills)	16	0.43	0.69	0.05	2.69
	Inc per Capita (in ths)	12	8.62	5.98	1.52	20.70

1.2 Analysis

1.2.1 Television

Table 6: OLS Results: Television

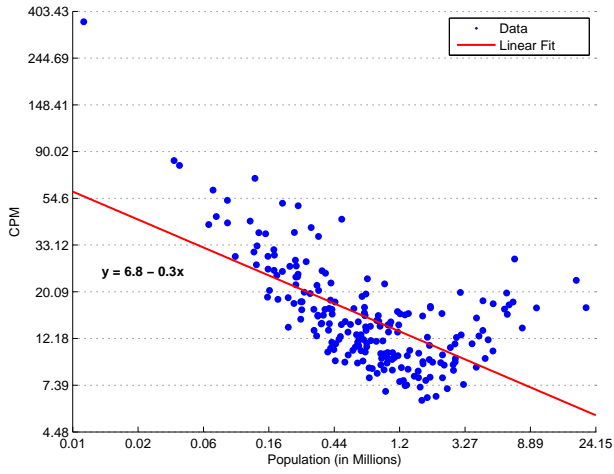|	$(1)^1$	$(2)^1$	$(3)^2$	$(4)^2$	$(5)^3$	$(6)^3$	$(7)^4$
Constant	6.764*	3.163	8.854*	-5.991*	7.764*	-2.220	3.163
	(0.342)	(2.074)	(2.683)	(6.920)	(2.579)	(4.540)	(2.319)
D(Europe)							-9.153
							(5.734)
D(Carib)							-5.383
							(3.263)
ln(MrktSize)	-0.299*	-0.230*	-0.364*	-0.230	-0.727*	-0.565*	-0.230*
	(0.025)	(0.033)	(0.164)	(0.156)	(0.211)	(0.215)	(0.037)
ln(MrktSize)* D(Europe)							-0.000
							(0.124)
ln(MrktSize)* D(Carib)							-0.335*
							(0.115)
ln(Inc per Capita)		0.252		1.211*		0.888*	0.252
		(0.217)		(0.531)		(0.376)	(0.243)
ln(Inc per Capita)* D(Europe)							0.960*
							(0.470)
ln(Inc per Capita)* D(Carib)							0.636*
							(0.308)
R-squared	0.40	0.24	0.26	0.47	0.46	0.61	0.84
Number of Obs.	210	182	16	16	16	12	210

[1] U.S.A. Markets data is used.
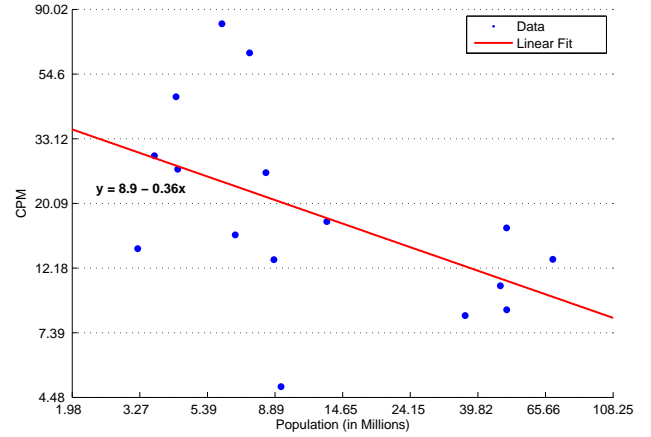[2] European countries data is used.
[3] Caribbean countries data is used.
[4] Data from the pooled sample is used (U.S.A. markets, European countries, Caribbean countries).
* Statistically significant at the 5% level.
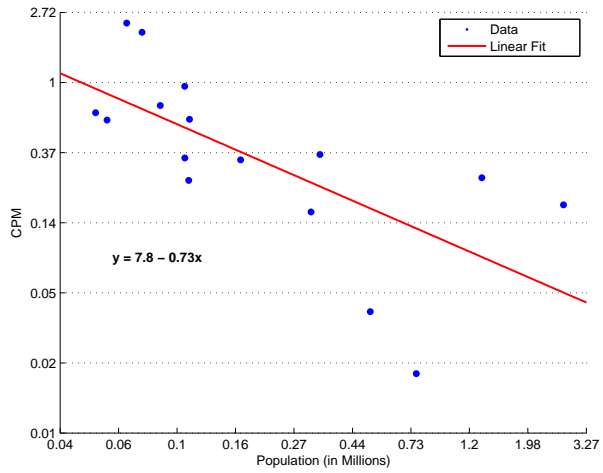
Figure 1: **Advertising Costs by Market Size: Television**

U.S.A. Markets   **Caribbean Countries**
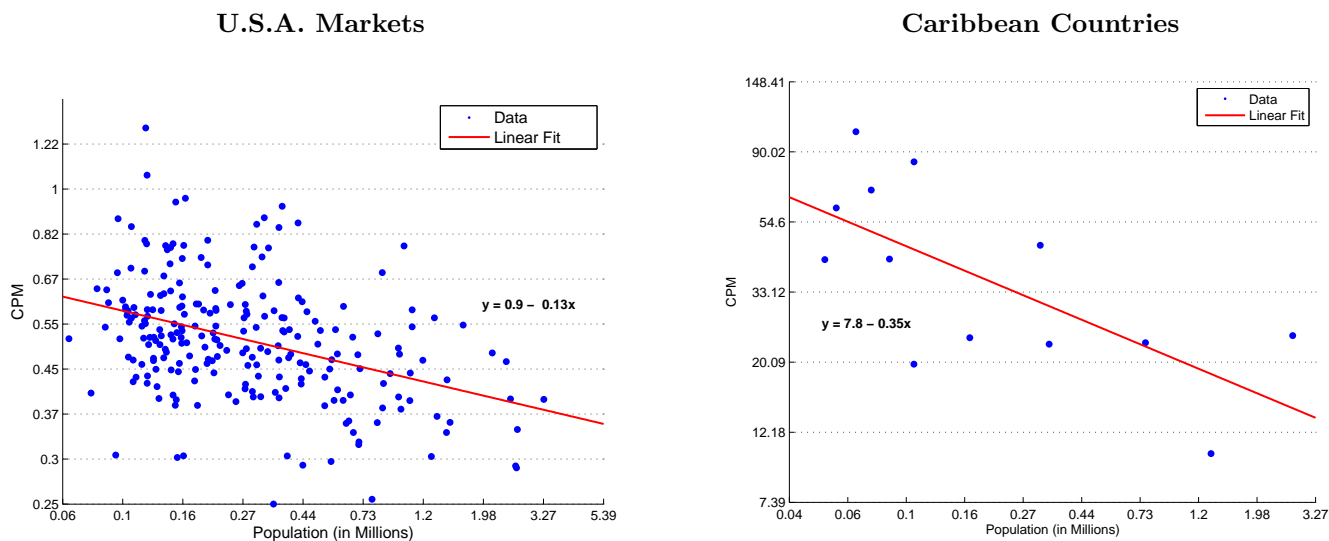
Figure 2: **Advertising Costs by Market Size: Newspapers**

1.2.2 Newspapers

Table 7: OLS Results: Newspapers

	(1)[1]	(2)[1]	(3)[2]	(4)[2]	(5)[3]
Constant	0.904*	3.407*	7.848*	10.426*	1.483*
	(0.241)	(1.178)	(1.370)	(2.218)	(0.368)
D(Carib)					8.495*
					(1.342)
ln(MrktSize)	-0.126*	-0.107*	-0.350*	-0.355*	-0.107*
	(0.019)	(0.021)	(0.112)	(0.106)	(0.021)
ln(MrktSize)*D(Carib)					-0.248*
					(0.066)
ln(Inc per Capita)		-0.279*		-0.281	-0.279*
		(0.128)		(0.180)	(0.132)
ln(Inc per Capita)*D(Carib)					-0.003
					(0.170)
R-squared	0.16	0.17	0.47	0.64	0.91
Number of Obs.	236	236	13	10	246

[1] U.S.A. markets data is used.

[2] Caribbean countries data is used.

[3] Data from the pooled sample is used (U.S.A. markets and Caribbean countries).
Nominal variables (CPM and income per capita) are expressed in 1992 $US. U.S. GDP
deflator from the World Development Indicators is used to convert nominal values in
2008 to 1992 dollars.

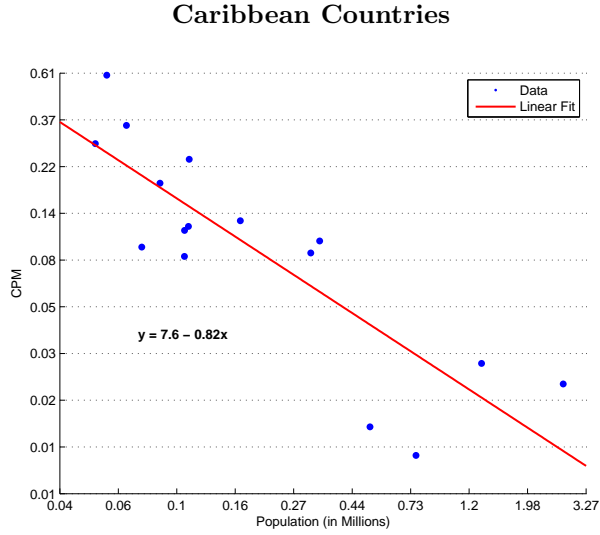* Statistically significant at the 5% level.

Caribbean Countries

y = 7.6 − 0.82x

Figure 3: **Advertising Costs by Market Size: Radio**

1.2.3 Radio

Table 8: OLS Results: Radio

	(1)[1]	(2)[1]
Constant	7.565[*]	0.896
	(1.662)	(2.575)
ln(MrktSize)	-0.818[*]	-0.672[*]
	(0.136)	(0.122)
ln(Inc per Capita)		0.538[*]
		(0.213)
R-squared	0.72	0.82
Number of Obs.	16	12

[1] Caribbean countries data is used.

[*] Statistically significant at the 5% level.