What Drives Home Market Advantage?

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Home Market Advantage

- Home market advantage (HMA) is a well recognized regularity:
    - Home brands' market shares tend to be high relative to their shares abroad.
    - This is true even conditional on the number of products offered.
- HMA is an indicator of market segmentation.
- Understanding the underlying reasons for HMA informs us about sources of market segmentation.

Possible explanations

- Supply-side:
    - Tariffs
    - Shipping/distance costs
    - Foreign investment costs
- Demand-side:
    - Preference heterogeneity for characteristics
    - Innate preference for local brands (home preference).

Gravity's Black Box

It is usual to impose identical preferences across countries... Henceforth trade cost is used without qualification but is understood to potentially reflect demand-side home bias. Declines in trade costs can be understood as reflecting homogenization of tastes.

— James Anderson ,"The Gravity Model" (Anv Rev Econ, 2011)

Automobiles

The automobile industry is well-suited to exploring demand versus supply drivers of HMA:

- Availability of comparable cross-country product level data on prices, shares, and characteristics.
- Strong national level brand identification.
- Heterogeneity in assembly locations within brand.

Our Approach

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1. Estimate demand model to recover consumer preference heterogeneity **across and within countries**.
2. Use equilibrium conditions to recover marginal costs.
3. Estimate cost model accounting for **endogenous sourcing** from various product assembly locations to estimate trade costs.
4. Analyze the importance of **distinct demand and supply elements** on home market advantage through a series of medium-run counterfactuals.

Literature

- Standard (gravity) trade models
  - Anderson and van Wincoop (2003); Eaton and Kortum (2002)
- Trade and investment costs
  - Coşar, Grieco, Tintelnot (2014); Tintelnot (2014)
- Preference heterogeneity and trade
  - Krugman (1980); Atkin (2013); Auer (2014)
- Brand history and consumer purchases
  - Bronnenberg, Dhar, and Dube (2009); Bronnenberg, Dube, and Gentzkow (2012)
- Automotive industry
  - Feenstra (1988); Goldberg (1995); Berry, Levinsohn and Pakes (1995, 1999); Goldberg and Verboven (2001, 2005); Anderson, Kellogg, Langer, and Salleee (2013); Head and Mayer (2015)

Data and Stylized Facts

Data

- Focus on passenger cars (including SUVs)
- Sales data for 9 countries (6 in the EU, USA, Canada, Brazil)
    - Both price and quantity
    - Characteristics: horsepower, weight, length, width, fuel efficiency
    - Dealer density and entry year of a brand
- Covers five years: 2007-2011
- Assembly location for each model & year: 50 countries
- Additional country level variables that affect demand: sales tax, number of households, level and distribution of income.

Concentration: Firms, Brands, Models

	Sales	Firms	Top 5	Brands	Top 5	Models	Top 5
BEL	496,165	20	0.68	39	0.44	314	0.13
BRA	2,555,502	17	0.82	23	0.81	98	0.36
CAN	1,137,453	16	0.65	34	0.50	207	0.22
DEU	3,011,972	20	0.71	38	0.54	323	0.18
ESP	1,082,867	21	0.72	39	0.44	290	0.16
FRA	2,045,998	20	0.81	38	0.65	271	0.25
GBR	2,026,497	22	0.63	39	0.47	311	0.21
ITA	2,016,114	22	0.70	41	0.51	283	0.26
USA	10,390,308	19	0.68	40	0.53	291	0.14

Notes: Average number of passenger cars sold annually in each country over the data period. Market shares by top manufacturing group (firms), brands and models are revenue-based.

Number of countries with firm headquarters: 12

Number of countries with brands: 15

Market Shares

	Market share of brands from						
	DEU	ESP	FRA	GBR	ITA	USA	Other
BEL	0.34	0.02	0.26	0.02	0.04	0.09	0.23
BRA	0.23	-	0.11	0.00	0.23	0.31	0.12
CAN	0.07	-	-	0.01	-	0.34	0.58
DEU	**0.55**	0.02	0.09	0.01	0.03	0.08	0.21
ESP	0.26	**0.09**	0.26	0.01	0.03	0.11	0.22
FRA	0.19	0.02	**0.52**	0.01	0.04	0.07	0.16
GBR	0.23	0.02	0.13	**0.18**	0.02	0.16	0.25
ITA	0.24	0.01	0.15	0.02	**0.30**	0.12	0.17
USA	0.08	-	-	0.01	0.00	**0.40**	0.52

Notes: Each row presents the revenue-based market share of brands originating from countries listed in the columns, adding up to one subject to rounding error. - means that brands from the origin country are not sold in the market, and 0.00 implies a market share of less than one percent. Other includes Japan, Korea, China, India, Sweden, Malaysia, Czech Republic, Romania and Russia. The bottom panel excludes these "other" countries and presents market shares within the brand-owning producers in our dataset.

Home Market Advantage

Variable	I	II	III
	$\ln(s_{bmt})$	$\ln(s_{bmt})$	$\ln(s_{jmt})$
Home brand	1.675	1.066	1.219
	(0.082)	(0.061)	(0.032)
$\ln(N_{bmt})$		1.533	
		(0.042)	
Observations	1471	1471	8834
R^2	0.794	0.895	0.720
Market-year FE	Yes	Yes	Yes
Brand FE	Yes	Yes	
Model FE			Yes

Notes: Standard errors in parentheses. All regressions are estimated with market-year (mt) fixed effects. First two columns are at the brand-market-year (bmt) level and use brand fixed effects. The last column is at the model-market-year (jmt) and uses model fixed effects.

▸ Margins decomposition

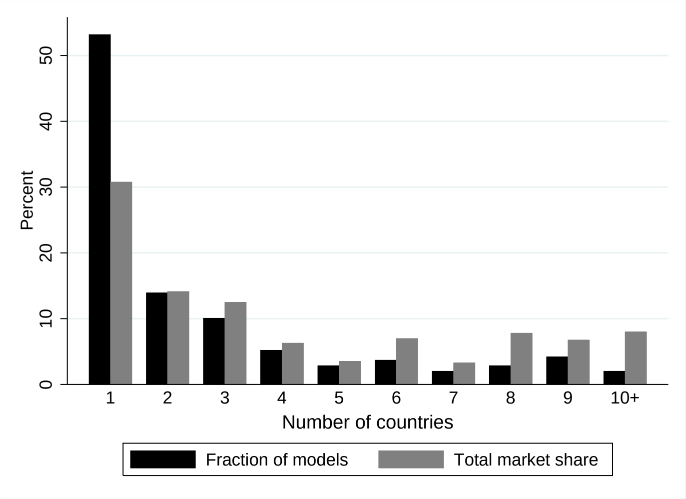
Characteristics

	Price	HP/Wt	Size	MPG	Gas price	MPD
BEL	32,578	58.4	7.6	34.4	7.3	4.7
BRA	23,801	62.3	6.8	30.1	5.6	5.4
CAN	30,507	91.8	8.3	22.3	2.9	7.6
DEU	35,940	66.8	7.6	29.3	7.3	4
ESP	31,790	60.8	7.6	32.6	5.4	6.1
FRA	29,712	57.2	7.3	35.5	7	5.1
GBR	31,390	65.5	7.5	30.4	7	4.3
ITA	27,654	57.6	7	33.4	7.2	4.7
USA	28,867	97.9	8.7	21	3.1	6.7

Notes: All variables are averages over models weighted by market share over the data period. Prices are in USD, converted from local currency using mean yearly exchange rates and averaged over the data period. HP/Wt denotes horsepower per weight (kg) times 1,000. Size is meter length times meter width. MPG is miles per gallon. Gas prices are per gallon in USD. MPD is miles per dollar (MPG/price).

▸ Characteristics by market for the same model

Supply Locations



Price Regression

	$\ln(price_{jmt})$
$\ln(hppwt_{jmt})$	0.258
	(0.0107)
$\ln(size_{jmt})$	0.538
	(0.039)
$\ln(mpd_{jmt})$	0.0194
	(0.0096)
$\ln(dist_{jmt})$	0.0192
	(0.0016)
Domestic assembly	-0.0158
	(0.0035)
Home brand	0.0192
	(0.0033)
Observations	8835
R^2	0.985
Market-year FE	Yes
Model FE	Yes

Model

Assumptions and Timing

Exogenous to our model:

1. Firms' headquarter countries.
2. Set of models by each brand.
3. Assembly locations for each model.
4. Market-specific model offerings by each brand.

▸ Margins Decomposition

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▸ Margins Decomposition

Each period:

1. Model-market-year demand shock ξ_{jmt} and marginal cost shocks ω_{jmt} are drawn. Common knowledge to all firms.
2. Firms supply each market from the lowest cost assembly location. Consumers are indifferent between assembly locations.

Demand

Random coefficients discrete choice demand system (BLP 1995):

- Utility of consumer i from model j in market m

$$u_{jmti} = \bar{u}(x_{jmt}, p_{jmt}; \beta_{mi}, \alpha_{mi}) + \xi_{jmt} + \epsilon_{jmti}$$

  with the outside option of $u_{0mti} = \epsilon_{0mti}$.

- Heterogeneous tastes for characteristics and price represented by

$$(\beta_{mi}, \alpha_{mi}) \sim F_m(\ \cdot \ | \theta^d)$$

- Each consumer chooses the option that maximizes her utility

$$d_{mti} = \underset{j \in C_{mt} \cup 0}{\text{argmax}} \ u_{jmti}$$

Demand

- Probability that a consumer buys a car of model j:

$$Pr(d_{mti} = j|\beta_{mi}, \alpha_{mi}) = \frac{e^{\bar{u}_{jmti}+\xi_{jmt}}}{1 + \sum_{k \in C_{mt}} e^{\bar{u}_{kmti}+\xi_{kmt}}}$$

- Aggregate over consumers i to market shares

$$s_{jmt} = \int Pr(d_{mti} = j|\beta_{mi}, \alpha_{mi}) dF_m(\beta_{mi}, \alpha_{mi}|\theta^d)$$

Supply

The cost of sourcing a car i of model j for market m from location ℓ:

$$c_{jm\ell ti} = c_1(h_{jm}, \kappa) \cdot c_2(g_{jm\ell}, \delta) \cdot e^{\omega_{jmt} - \nu_{jm\ell ti}}$$

- $c_1(\cdot)$: car characteristics that are independent of assembly location.
- $c_2(\cdot)$: source-destination specific costs.

Supply - Sourcing

Given the set of available assembly locations $L_t(j)$ for model j:

$$c_{jmti} = \min_{\ell \in L_t(j)} c_{jm\ell ti}.$$

Assume $\nu_{jm\ell ti}$ distributed Type-I extreme value with scale parameter σ_ν. Probability of sourcing a car from location ℓ is:

$$Pr(i \text{ is sourced from } \ell) = \frac{c_2(g_{jm\ell}, \delta)^{-1/\sigma_\nu}}{\sum_{k \in L(j)} c_2(g_{jmk}, \delta)^{-1/\sigma_\nu}}$$

Supply - Average Costs

Firms set prices prior to $\nu_{jm\ell ti}$ realizations according to their expected average costs c_{jmt}.

The (log) average marginal cost to sell a car of model j is,

$$\log c_{jmt} = \log c_1(\cdot) - \sigma_\nu \log \left(\sum_{k \in L_t(j)} \exp \left(\frac{-\log c_2(\cdot)}{\sigma_\nu} \right) \right) + \omega_{jmt}$$

Pricing Equilibrium

- Each firm f takes as given its set of models $J_{mt}(f)$ and its rivals' prices $\mathbf{p_{mt}^{-f}}$. Nash-Bertrand pricing equilibrium solves,

$$\max_{p_{jmt}} \sum_{j \in J_{mt}(f)} \left[p_{jmt} - c_{jmt}\right] \cdot N_{mt} \cdot s_{jmt}(p_{jmt}; \mathbf{p_{mt}^{-f}})$$

- So we can solve for costs,

$$c_{mt} \;=\; p_{mt} - \Omega^{-1} s(p).$$

where,

$$\Omega_{jk} \;=\; -\frac{\partial s_k(p)}{\partial p_j} \cdot \mathbf{1}\left[j, k \text{ jointly owned}\right].$$

Identifying Trade Costs

Variation in trade cost shifters and model costs identify trade cost parameters.

- σ_ν identified by extent to which variation in the number of available locations lowers c_{jmt}.
- Given identification of σ_ν, parameters are $c_2(\cdot)$ are identified from variation in trade cost characteristics.
- Note as $\sigma_\nu \to 0$,

$$\lim_{\sigma_\nu \to 0} \log c_{jm} = \log c_1(h_{jm}, \kappa) + \min_{k \in L(j)} \left\{ \log c_2(g_{jmk}, \delta) \right\} + \omega_{jm}.$$

Estimation and Results

Demand Estimation

$$u_{jmti} = \bar{u}(x_{jmt}, p_{jmt}; \beta_{mi}, \alpha_{mi}) + \xi_{jmt} + \epsilon_{jmti}$$

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Parameterize as quasi-linear in price and quadratic in tastes for characteristics:

$$\begin{aligned}
\bar{u}(x_{jmt}, p_{jmt}, \beta_{mti}, \alpha_{mti}) &= \beta^{hp}_{mi}\text{hppwt}_{jmt} + \beta^{hp2}_{m}\text{hppwt}^2_{jmt} \\
&+ \beta^{sz}_{mi}\text{size}_{jmt} + \beta^{sz2}_{m}\text{size}^2_{jmt} \\
&+ \beta^{md}_{mi}\text{mpd}_{jmt} + \beta^{md2}_{m}\text{mpd}^2_{jmt} \\
&- \alpha_{mti} p_{jmt} + \iota_t + \psi_{mb(j)}
\end{aligned}$$

Home preference is absorbed into $\psi_{mb(j)}$, recover later.

Demand Estimation

Tastes for characteristics are normally distributed,

$$\begin{bmatrix} \beta_{mi}^{hp} \\ \beta_{mi}^{sz} \\ \beta_{mi}^{md} \end{bmatrix} \sim N\left(\begin{bmatrix} \bar{\beta}_{m}^{hp} \\ \bar{\beta}_{m}^{sz} \\ \bar{\beta}_{m}^{md} \end{bmatrix}, \begin{bmatrix} \sigma_{hp}^2 & 0 & 0 \\ 0 & \sigma_{sz}^2 & 0 \\ 0 & 0 & \sigma_{md}^2 \end{bmatrix} \right),$$

Price sensitivity is distributed log-normally and varies with income (simulated from national distribution),

$$\log \alpha_{mti} \sim N(\bar{\alpha} + \pi_\alpha \log \text{inc}_{mti}, \sigma_\alpha^2).$$

Demand Estimation

- Estimate
$$\theta^d = (\bar{\beta}_m^{x}, \beta_m^{x2}, \sigma_x, \bar{\alpha}, \pi_\alpha, \sigma_\alpha, \iota_t, \psi_{mb})$$
where $x \in \{hp, sz, md\}$.

- Given θ^d and the observed market shares, there is a one-to-one mapping to the vector of demand shocks $\xi(\theta^d)$ — Berry (1994):
$$\xi_{mt} = s^{-1}(s_{mt}, p_{mt}; \theta^d)$$

- Using a vector of instruments Z_{jmt},
$$E[\xi_{jmt} Z_{jmt}] = 0$$

Demand Estimation

- Estimate by GMM

$$\hat{\theta}^d = \underset{\theta^d}{\operatorname{argmin}} \; \xi(\theta^d)' Z \hat{W} Z' \xi(\theta^d),$$

- Instruments, Z:
  - model characteristics including time and brand dummies
  - competing model characteristics (BLP)
- Cost Shifters:
  - domestic assembly dummy
  - tariff rate to the closest assembly location
  - number of assembly locations interacted with a market dummy
  - minimum distance to an assembly location interacted with a market dummy.

Demand Estimates

Variable	Estimate									
	BRA	BEL	CAN	DEU	ESP	FRA	GBR	ITA	USA	R.C. Std
HP per Weight	0.783	0.102	0.348	0.484	-0.305	0.779	0.364	0.237	0.282	0.008
	(0.754)	(0.195)	(0.178)	(0.205)	(0.439)	(0.256)	(0.103)	(0.171)	(0.134)	(0.023)
HP per Weight^2	-0.023	-0.000	-0.004	0.000	0.045	-0.017	-0.006	-0.004	-0.005	
	(0.043)	(0.008)	(0.005)	(0.006)	(0.025)	(0.012)	(0.004)	(0.007)	(0.004)	
Size	3.928	10.424	8.169	4.916	9.579	8.488	7.757	7.369	6.601	0.095
	(2.688)	(2.920)	(1.616)	(1.779)	(2.089)	(1.914)	(1.909)	(1.766)	(1.303)	(0.158)
Size^2	-0.037	-0.465	-0.350	-0.100	-0.445	-0.387	-0.343	-0.333	-0.312	
	(0.185)	(0.168)	(0.083)	(0.101)	(0.126)	(0.105)	(0.107)	(0.104)	(0.073)	
Miles per Dollar	1.055	-2.273	0.077	2.927	1.600	0.744	-0.706	-2.501	-2.070	0.142
	(0.761)	(0.782)	(0.289)	(0.832)	(0.538)	(0.612)	(0.680)	(0.788)	(0.491)	(0.158)
Miles per Dollar^2	-0.065	0.179	-0.001	-0.227	-0.141	0.001	0.067	0.273	0.086	
	(0.046)	(0.071)	(0.015)	(0.082)	(0.041)	(0.059)	(0.059)	(0.080)	(0.024)	

Price Sensitivity Parameters			R.C. on Const.
$\overline{\alpha}$	π_α	σ_α	
9.434	-0.709	1.003	-0.310
(1.803)	(0.173)	(0.209)	(1.027)

The units for HP per weight, size, and price are horse power per 100 kg, m^2, and 10 thousand dollars, respectively. This specification uses brand-country dummies. Weighted bootstrap standard errors in parenthesis.

Demand Estimates

- Heterogeneity in price sensitivity within countries (σ_α).
- Price sensitivity of falling with income (π_α).
- Evidence of decreasing marginal utility for size.
- Cross country variation in characteristic preferences, particularly miles per dollar.

Home Preference

Project brand-market fixed effects on

$$\hat{\psi}_{mb} = \rho \cdot \mathbf{1}\left[b \text{ is a domestic brand in } m\right] + \gamma X + \eta_b + \mu_m + u_{mb}$$

Home Preference

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Table: Home preference estimates

Variable	I	II	III	IV
Home Preference, ρ	1.136	1.013	0.804	0.745
	(0.092)	(0.094)	(0.096)	(0.082)
Years in Market		0.005		0.003
		(0.002)		(0.001)
Dealer Density			0.178	0.169
			(0.024)	(0.014)

Home Preference: country-specific

	I	II
DEU	0.812	0.212
	(0.193)	(0.286)
ESP	1.489	1.350
	(0.697)	(0.704)
FRA	1.533	1.296
	(0.211)	(0.262)
GBR	1.455	0.978
	(0.224)	(0.216)
ITA	1.712	1.094
	(0.304)	(0.303)
USA	0.645	0.177
	(0.159)	(0.199)
Brand controls	No	Yes

Home Preference

- Median willingness to pay for a home brand varies from \$800 to \$1,050 across countries.
- This is after controlling for brand characteristics: number of dealers, years in the market.
- Across countries, local preference seems to be particularly high for Spain, France, Italy and the UK, smaller for Germany and US.

Supply Estimation

- First order condition for p_{jmt}:

$$s_{jmt}(\mathbf{p}) + \sum_{k \in J_{mt}(f)} (p_{kmt} - c_{kmt}) \frac{\partial s_{kmt}(\mathbf{p})}{\partial p_{jmt}} = 0.$$

- Parameters of $s_{jmt}(\mathbf{p})$ already estimated $\Rightarrow$ back out $\hat{c}_{jmt}$.

Supply Estimation

$$\log \hat{c}_{jmt} = \log c_1(\cdot) - \sigma_\nu \log \left(\sum_{k \in L_t(j)} \exp \left(\frac{-\log c_2(\cdot)}{\sigma_\nu} \right) \right) + \omega_{jmt}$$

Supply Estimation

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For market-model costs:

$$\begin{aligned} \log c_1(\cdot) &= \kappa^{hp} \log \mathrm{hp}_{jmt} + \kappa^{wt} \log \mathrm{wt}_{jmt} + \kappa^{sz} \log \mathrm{size}_{jmt} \\ &+ \kappa^{mg} \log \mathrm{mpg}_{jmt} + \kappa_m + \kappa_j + \kappa_t \end{aligned}$$

For assembly location specific costs:

$$\begin{aligned} \log c_2(\cdot) &= \delta^{mdist} \log \mathrm{dist}_{m\ell} + \delta^{hqdist} \log \mathrm{dist}_{hq(j)\ell} \\ &+ \delta^{dom} \mathbf{1}[\ell = m] + \delta^{ctg} \mathbf{1}[\ell \text{ is contiguous to } m] \\ &+ \log(1 + \zeta \cdot \mathrm{tariff}_{m\ell t}) + \delta^{xr} \log \mathrm{fxrate}_{\ell t} + \delta_\ell \end{aligned}$$

Supply Estimation

- Estimate $\theta^s = (\kappa, \delta, \sigma_\nu)$ by nonlinear least squares,

$$\hat{\theta}^s = \underset{\theta^s}{\operatorname{argmin}} \sum_{m=1}^{M} \sum_{t=1}^{T_m} \sum_{j=1}^{J_{mt}} \omega_{jmt}(\theta^s)^2,$$

where,

$$\omega_{jmt}(\theta^s) = \log \hat{c}_{jmt} - \log c_1(\cdot) + \sigma_\nu \log \left(\sum_{k \in L_t(j)} \exp\left(\frac{-\log c_2(\cdot)}{\sigma_\nu} \right) \right).$$

- In practice, we find that σ_ν is small, consistent with single-sourcing, low gains from variety, and assembly locations being used to economize on reaching local markets.

Supply Estimates

Variable	I	II	III	IV
Horsepower, κ^{hp}	0.277	0.277	0.299	0.299
	(0.041)	(0.041)	(0.041)	(0.041)
Weight, κ^{wt}	0.172	0.171	0.174	0.173
	(0.033)	(0.032)	(0.033)	(0.033)
Size, κ^{sz}	0.331	0.331	0.331	0.332
	(0.016)	(0.016)	(0.016)	(0.016)
Miles per Gallon, κ^{mg}	0.036	0.036	0.036	0.036
	(0.012)	(0.012)	(0.012)	(0.012)
Assembly to Market Distance, δ^{mdist}	-0.002	-0.002	0.015	0.015
	(0.004)	(0.004)	(0.004)	(0.004)
Domestic Location, δ^{dom}	-0.019	-0.020	-0.003	-0.003
	(0.007)	(0.007)	(0.007)	(0.007)
Contiguous Location, δ^{ctg}	-0.011	-0.011	-0.001	-0.001
	(0.004)	(0.004)	(0.004)	(0.004)
Assembly to HQ Distance, δ^{hqdist}	0.004	0.004	0.009	0.009
	(0.008)	(0.007)	(0.006)	(0.006)
Tariff, ζ			0.697	0.697
			(0.076)	(0.075)
FX rate, δ^{xr}		-0.010		-0.017
		(0.015)		(0.015)
Fixed σ_{ν}	0.01	0.01	0.01	0.01

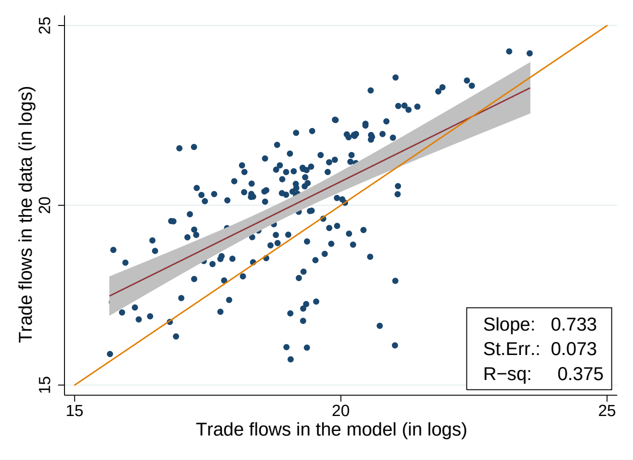
Car cost, distance measures, tariff, and car characteristics are in logarithm. Weighted bootstrap standard errors in parentheses.

Supply Estimates

- Controlling for tariffs has big effect on cost estimates.
- Tariffs are paid on about 70 percent of overall cost (presumably rest is marketing costs incurred after import).
- Effect of distance to market is on the low end of range from Head and Mayer (2013) survey, consistent with substantial efficient (water-born) shipping.
- Effect of HQ distance is about 2/3 of Market distance.
- FX rate has expected sign but little impact on other parameters.

Trade Flows: Model vs Data

To check the model, we compare the implied trade flows with data aggregate trade data on assembled cars (WITS).



Shipping vs. Remote Production

(Model sales weighted) average shipping and remote production costs as percent of overall marginal cost for firms across markets:

	BRA	BEL	CAN	DEU	ESP	FRA	GBR	ITA	USA
Shipping costs									
Fiat	0.0	4.8		2.3	2.7	2.2	3.8	1.2	2.5
Ford	0.2	3.9	0.7	2.2	3.3	2.5	4.1	3.3	0.2
GM	0.2	4.0	0.6	1.3	2.2	1.9	1.7	2.1	0.2
PSA	0.4	4.4		2.2	1.5	1.5	3.2	2.3	
Toyota	0.3	6.0	0.9	3.8	3.9	3.3	4.3	3.8	1.1
VW	0.2	3.7	2.5	1.1	1.4	1.8	2.9	2.0	1.6
Remote production costs									
Fiat	2.8	0.8		1.1	1.1	1.0	1.3	0.7	1.7
Ford	1.4	1.1	0.1	1.0	0.9	1.2	1.0	1.1	0.1
GM	1.3	1.3	0.1	1.3	1.3	1.3	1.3	1.4	0.1
PSA	2.8	0.9		1.0	0.9	0.9	1.1	1.2	
Toyota	3.5	1.7	2.6	1.8	1.5	2.0	1.7	1.9	2.0
VW	3.1	0.8	2.2	0.6	1.1	0.9	0.9	0.8	2.0

Drivers of Home Market Advantage

Quantifying the Channels

To gauge the contribution of each channel, we solve the pricing equilibrium and calculate counterfactual market shares under various scenarios:

1. Supply:
    - All tariffs eliminated
    - No shipping cost
    - No remote production cost
    - No tariffs, shipping or remote production costs

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2. Demand:
   - All countries have French tastes for characteristics
   - All countries have US tastes for characteristics
   - All countries have German gas prices
   - No home preference

Quantifying the Channels

For each scenario, we estimate:

$$\log(s_{jmt}) = \lambda \cdot \mathbf{1}\left[b(j) \text{ is a home brand in } m\right] + \gamma_j + \gamma_{mt} + \varepsilon_{jmt}$$

Where λ determines HMA (increase in share associated with being a home brand).

Quantifying the Channels

Scenario	**Coefficient** λ	**Home Market Advantage (% Chg)**
Baseline	1.22	
Supply:		
All tariffs eliminated	1.19	-4.0
No international trade frictions	1.13	-11.8
No multinational production frictions	1.21	-1.1
No tariffs, trade or multinational production frictions	1.12	-12.9
Demand: Taste Heterogeneity for Characteristics		
All countries have French tastes for characteristics	1.19	-4.0
All countries have US tastes for characteristics	1.36	21.2
All countries have German gas prices	1.23	1.3
Demand: Home Preference		
No home preference, homogeneous	0.63	-62.9
No home preference, country-specific	0.72	-55.6
No home preference, homogeneous, no local controls	0.32	-84.2

Market shares

Quantifying the Chanels

- Trade frictions (ex-tariffs) twice as important as tariffs. Multinational production frictions have small effects.
- Taste heterogeneity matters, but can raise or lower HMA. Germans sell less fuel-efficient cars than US, but US cares least about efficiency.
- Home preference is the largest driver of HMA. More than 4x as large an impact as cost side frictions.

Value of domestic brand status

Buying a local brand may be an attractive mode of entry for foreign firms due to consumers' innate preference for local brands.

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Case	Percent Change in		
	Price	Quantity	Profit
Seat in Spain (VW)	-0.8	-69.6	-71.9
Vauxhall in UK (GM)	-1.1	-53.6	-58.1
Chrysler in US (Fiat)	-0.1	-14.0	-14.3
Opel in Germany (GM)	-0.2	-13.8	-15.1

Conclusion

- We estimate a model of demand and supply for automobiles accounting for home preference, taste heterogeneity, and trade costs.
- Use features of auto industry:
  - Availability of price and quantity data at model level.
  - "Brand home" may be different from assembly location.
- We find home preference is the largest determinant (about 60 percent) of home market advantage.
- Implications for:
  - Firms' foreign market entry strategies
  - Response in trade flows after trade liberalization

Thank You

Characteristics by Market

Variable	I	II	III
	$\ln(hppwt_{jmt})$	$\ln(size_{jmt})$	$\ln(mpg_{jmt})$
BEL	-0.276	-0.00876	0.251
	(0.00583)	(0.00118)	(0.00616)
BRA	-0.0444	0.00308	0.187
	(0.0111)	(0.00307)	(0.00830)
CAN	-0.000410	0.000774	0.0160
	(0.00572)	(0.00108)	(0.00546)
DEU	-0.195	-0.00600	0.155
	(0.00571)	(0.00106)	(0.00604)
ESP	-0.228	-0.00667	0.226
	(0.00573)	(0.00117)	(0.00613)
FRA	-0.239	-0.00648	0.265
	(0.00582)	(0.00113)	(0.00610)
GBR	-0.210	-0.00758	0.187
	(0.00581)	(0.00107)	(0.00618)
ITA	-0.235	-0.00840	0.227
	(0.00577)	(0.00111)	(0.00612)
Observations	8835	8835	8835
R^2	0.952	0.985	0.928
Year FE	Yes	Yes	Yes
Model FE	Yes	Yes	Yes

US is the omitted dummy. All coefficients represent differences in country means against the US.

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Market Share Decomposition

Intensive and extensive margins:

$$s_{bm} = \bar{s}_{bm} \cdot N_{bm}$$

Estimate

$$ln(\bar{s}_{bm}) = \alpha + \beta_{int} \cdot ln(s_{bm})$$
$$ln(N_{bm}) = \alpha + \beta_{ext} \cdot ln(s_{bm})$$

Variable	I	II	III	IV
	$\ln(\bar{s}_{bmt})$	$\ln(N_{bmt})$	$\ln(\bar{s}_{bmt})$	$\ln(N_{bmt})$
$\ln(s_{bmt})$	0.619	0.381	0.578	0.422
	(0.007)	(0.006)	(0.007)	(0.007)
Observations	1471	1471	1471	1471
R^2	0.810	0.617	0.781	0.654
Share	Units	Units	Revenue	Revenue
Margin	Intensive	Extensive	Intensive	Extensive

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Own- and Cross-price Elasticities

	Audi A6	Ford Focus	Mercedes E350	Renault Clio	Toyota Corolla
Audi A6	-6.475	0.017	0.124	0.002	0.010
Ford Focus	0.036	-10.756	0.020	0.232	0.323
Mercedes E 350	0.065	0.004	-6.035	0.002	0.001
Renault Clio	0.004	0.280	0.001	-11.346	0.032
Toyota Corolla	0.002	0.380	0.001	0.270	-11.478

This table shows the substitution elasticity of models in the row with respect to the prices of models in the column. Each entry represents the median of elasticities across country-years.

Markups

Weighted by their models' market shares:

	BRA	BEL	CAN	DEU	ESP	FRA	GBR	ITA	USA
Fiat	10.8	8.6		11.8	10.7	12.4	10.9	16.8	8.7
Ford	9.5	9.7	13.1	11.9	11.6	12.9	12.8	12.6	13.3
GM	10.4	9.5	13.6	12.1	12.0	12.8	12.6	12.6	15.4
PSA	10.2	10.6		11.7	13.1	18.4	11.5	12.6	
Toyota	12.3	9.7	13.0	11.7	12.1	13.6	11.9	11.9	14.0
VW	10.7	12.9	12.6	18.6	15.5	16.6	15.3	16.6	14.0

- Home brands have pricing power.
- Luxury cars have high markups. Model-level markups

Median model level markups

	BRA	BEL	CAN	DEU	ESP	FRA	GBR	ITA	USA
Audi A4	13.3	17.4	17.4	20.6	21.2	23.0	19.7	21.8	16.1
Audi A6		20.4	21.6	22.6	23.2	25.7	20.8	23.6	23.1
BMW 530		21.3		19.7	23.2	25.7	21.6	23.5	22.4
BMW X3		18.5	17.6	18.0	20.3	23.6	20.0	21.2	20.0
Chrysler 300		16.0	16.0	15.1	17.1	20.6	16.6	17.0	16.4
Ford Fiesta	9.1	7.9		12.5	13.0	11.8	12.0	11.6	10.8
Ford Focus	11.5	8.8	9.8	10.7	12.7	12.8	12.5	13.6	10.0
Honda Accord		11.9	13.9	11.5	16.2	17.4	15.0	15.7	12.8
Honda CR-V	14.3	11.7	14.9	11.8	16.1	17.7	14.7	16.2	12.2
Jaguar XF		19.1	21.0	16.5	21.5	22.9	21.1	19.8	23.9
Jeep Grand Cherokee		17.4	18.8	15.8	18.8	21.3	17.4	18.2	18.4
Lexus RX 450		21.8	24.0	19.0	24.5	25.9	21.0	21.6	24.8
Mercedes E 350		21.4	21.5	20.3	23.0	24.9	20.4	21.8	23.9
Mini New Mini	13.3	8.6	10.4	10.8	12.3	12.7	10.6	13.9	9.3
Renault Clio	7.8	8.8		12.4	14.0	15.8	11.3	11.2	
Toyota Corolla	12.0	8.3	11.6	10.8	12.1	11.3	8.7	10.4	11.1
Toyota RAV-4	13.8	12.1	13.3	11.9	15.6	17.0	14.6	16.1	12.4
VW Golf	11.9	11.5	9.5	17.1	17.0	15.4	14.3	16.2	10.1
VW Passat	13.4	14.6	13.1	19.7	19.4	19.8	16.1	20.3	13.6
VW Tiguan	13.3	15.5	13.4	19.0	20.4	20.5	17.9	20.4	13.0

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Marginal utilities

Marginal utility for x to the median consumer within market m:

$$\text{med}\left(\frac{\partial u_{jmti}}{\partial x_{jmt}}\right) = \bar{\beta}_m^x + 2\beta_m^{x2} x_{jmt}$$

	BRA	BEL	CAN	DEU	ESP	FRA	GBR	ITA	USA
Average car hppwt	7.41	6.77	10.85	7.82	6.80	6.77	7.86	6.90	10.94
Marginal utility for hppwt	3.54	0.75	2.04	3.85	2.42	4.35	2.18	1.49	1.43
Average car size	7.58	7.88	8.72	7.87	7.89	7.78	7.92	7.75	8.78
Marginal utility for size	26.95	24.71	16.49	26.72	20.51	19.77	18.66	17.62	8.95
Average car MPD	5.14	4.13	6.54	3.64	5.48	4.46	3.84	4.09	6.07
Marginal utility for MPD	1.77	-3.69	0.27	5.89	0.27	3.48	-0.88	-1.25	-4.78

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Taste counterfactuals:

Table: Change in market share (percentage points)

Change to French Tastes	BRA	BEL	CAN	DEU	ESP	FRA	GBR	ITA	USA
US brands	4.5	-3.3	-17.6	0.5	-4.8	0.0	-3.8	0.2	-26.1
FRA brands	1.0	-4.5	0.0	3.1	-4.2	0.0	3.9	0.3	0.0
DEU brands	-3.5	1.5	-1.4	-13.1	5.7	0.0	-3.0	-6.0	-6.2
JPN brands	-3.7	5.8	14.4	2.9	8.6	0.0	3.7	2.4	26.4
Other brands	1.8	0.4	4.5	6.6	-5.3	0.0	-0.8	3.1	5.9
Home brands	0.0	0.0	0.0	-13.1	-0.9	0.0	-6.3	0.9	-26.1
High-efficiency models[a]	3.5	31.1	36.8	11.5	23.2	0.0	21.8	10.7	46.3
Change to US Tastes	BRA	BEL	CAN	DEU	ESP	FRA	GBR	ITA	USA
US brands	-6.9	-5.3	0.5	-4.1	-4.7	-3.8	-6.8	-3.6	0.0
FRA brands	-5.9	-14.4	0.0	-7.0	-22.8	-40.9	-8.1	-3.5	0.0
DEU brands	1.6	25.0	16.0	25.0	27.2	40.0	16.9	6.2	0.0
JPN brands	5.5	-2.0	-13.8	-3.4	7.7	0.4	-1.3	2.1	0.0
Other brands	5.6	-3.3	-2.6	-10.4	-7.3	4.3	-0.7	-1.3	0.0
Home brands	0.0	0.0	0.0	25.0	-8.8	-40.9	3.4	-2.2	0.0
High-efficiency models[a]	-35.4	-35.2	-38.5	-44.8	-47.3	-47.5	-33.5	-23.8	0.0

[a] High-efficiency models are those above the share-weighted median fuel efficiency for that country.

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