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Domestic Rivalry and Export Performance: Theory and Evidence from International Airline Markets

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Two Contending Theories on Domestic-Concentration / Export Relationship

- National Champion Hypothesis: Large Domestic Competitors (enabled by high domestic concentration) → Enhanced Exports
- Rivalry Hypothesis: Vigorous Domestic Rivalry (enabled by low domestic concentration) → Enhanced Exports
- Empirical Work generally supports Rivalry Hypothesis
  - Particularly cross-industry studies
- Yet, Theoretics not Well Developed for Rivalry Hypoth.
  - White ’74; Clark, Kaserman & Melese ’92; Kim & Marion ’97; Hollis ’03
  - Striking as theoretical basis behind the national champion rationale is relatively well-developed (Martin, ’99).

Three Main Concerns with Pre-Existing Literature

(1) Scarcity of theoretical literature regarding how domestic rivalry positively impacts exports (only 4 studies above)

(2) Limits to the pre-existing theoretical literature

- models lack oligopoly market structure and/or enhanced exports driven by strategic effect of having multiple national competitors (number-of-competitors effect)

(3) Empirical Work undertaken at broad level of analysis

- E.g., some measure of export performance regressed on some measure of domestic concentration at the industry-wide level of analysis
  - Thus, difficult to elicit the different paths (number-of-competitors, joint-economies, & enhanced-performance effects) via which domestic concentration impacts exports.

Our Aims

- To Provide a theoretical framework for the rivalry rationale that draws out different paths (number-of-competitors, joint-economies, & enhanced-performance effects) via which domestic rivalry impacts exports
- To pay particular attention to the enhanced-performance of competitors effect: a pure-rivalry effect at the heart of the rivalry hypothesis
- To empirically test for the enhanced-performance effect (while abstracting away from the number-of-competitors effect and holding constant the joint-economies of production effect) in the world airline industry.

Theoretical Model

- Set-Up
  - Two markets: 1 domestic + 1 international
  - 'Home-international' firms (*n*) compete with 'foreign' firms (f) in the international market;
  - Plus, 'home-international' firms (*n*) compete with 'home-domestic' firms (*m*) in the domestic market.
- Comparative statics of *n* shows that more home-international firms increases net-exports (national market share)
  - Not testing this 'number of competitors' effect
  - Not our focus, we want to abstract this away.

Effects of Rivalry on Export Market Share

- Focus is on comparative statics of *m*
  - our data contain a relatively high number of entries/exits by home-domestic firms
    - 1) a 'joint-economies of production' effect
      - Thus, if joint-economies exist, an increase in *m* -- a decrease in domestic concentration -- reduces exports
    - 2) an 'enhanced performance of competitors' effect
- Key Equation We Obtain: where 2nd term is positive.
  - Thus, if θ=0, increased rivalry – due to home-domestic firms' entry – increases export share per home firm.

$$\frac{d\hat{x}_i}{dm} = n\frac{-\Pi^{\hat{Z}}_{\hat{Z}\hat{Z}}}{\Delta}\left(A\frac{\theta}{n} + \Delta_1\Pi^{\hat{X}}_{\hat{X}m}\right)$$

Propositions

(1a) Joint-Economies Effect: an increase in home-domestic firms – a decrease in domestic concentration – reduces (increases or does-not-impact) each home-international firm's export market share if joint-economies (dis-economies or no-relations) exist between the production of domestic and international output.

(1b) Enhanced-Performance Effect: an increase in home-domestic firms increases – in the absence of the joint-economies effect – each home firm's export market share.

IV. The Data

- Source: International Civil Aviation Organization - TRF & TFS series
  - Panel Data: Country-Pair Market Segments for 37 International Airlines from 19 Nations over 1987-92 Period
- Main Constructs:
  - International-Market-Share: Airline's Percent of Passengers in International Market
  - Domestic-Concentration: Domestic HHI for Airline's Home-Nation
  - Domestic-Market-Share: Airline's Percent of Total Passengers in Domestic Market
  - Domestic-Network: Number of Domestic Departures
  - Merger: Dummy Variable for all Years Post 1st Acquisition
  - Domestic-Competitor-Network: Number of Domestic Departures
  - Home-Competitors: # of home competitors
  - Foreign-Competitors: # of foreign competitors

V. Econometric Issues

- Dynamic Panel Data with lagged dependent variable calls for GMM estimation
- Time specific data trends call for fixed period-specific effects
- Panel data and choice between fixed and random effects
- Potential for Serial Correlation and/or heteroskedasticity call for Windmeijer correction for GMM estimations and Huber/White standard errors for non-GMM treatments
- Importance of exogeneity for Domestic Concentration – variable of main concern – calls for a comparison of the results from GMM instrumenting for this variable with non-instrumented results (akin to Durbin-Wu-Hausman test to ensure that both coefficient estimates converge)
- Table 2 presents these results:

	Regression #1: Random Effects	Regression #2: Fixed Effects	Regression #3: GMM, Instrument for Lagged Y Variables	Regression #4: GMM, Instrument for Lagged Y & HHI Variables
Explanatory Variables				
Domestic-Concentration (HHI)	-0.00054*** (0.00017)	-0.00086*** (0.00027)	-0.00036* (0.00019)	-0.00043* (0.00023)
Domestic-Market-Share	0.095*** (0.015)	0.126*** (0.040)	0.058*** (0.022)	0.073*** (0.018)
Domestic-Network (mlns. of dom. departures)	2.69* (1.51)	11.8*** (3.12)	2.11* (1.17)	1.01 (1.09)
Merger	1.52*** (0.49)	0.91 (0.67)	2.76*** (0.83)	2.17*** (0.61)
Domestic-Competitor-Network (mlns. of dom. departures)	-74.6*** (26.0)	1.48 (1.31)	-51.1*** (14.0)	-41.1*** (14.9)
Home-Competitors (natural log)	-3.22*** (0.42)	-2.85*** (0.51)	-3.15** (1.58)	-2.97*** (0.97)
Foreign-Competitors (natural log)	-2.47*** (0.54)	-2.03*** (0.89)	-1.38** (0.70)	-1.79*** (0.68)
International-Market-Share $_{t-1}$	0.687*** (0.045)	0.502*** (0.049)	0.835*** (0.087)	0.838*** (0.059)
International-Market-Share $_{t-2}$	0.026 (0.040)	-0.036 (0.040)	-0.047 (0.040)	-0.071* (0.041)
Constant	12.84*** (1.60)	17.42*** (2.86)	9.23** (4.21)	9.67*** (2.85)

VI. Empirical Results for Domestic Concentration

– Negative and Statistically significant in all four regression equations
  - From -.00036 in Reg #3 to -.00086 in Reg #2

- Using conservative results from Reg #3 (GMM estimation yet HHI acts as own instrument) suggests an in increase in HHI by 1000 leads to a drop in international-market-share by over 1/3 percentage point on average

  For example:

  - Canadian domestic market went from 2618 in 1984 to 5000 in 1992; thus, reduced structural conditions for rivalry might result in almost a 1 percentage point decrease in international market shares for Canadian airlines.
  - US HHI averaged 1100 and French HHI averaged 6500 over this period; thus, US airlines would generally have a 2 percentage point advantage over French airlines due to greater US domestic rivalry

- Results robust to Behavioral Measure of Rivalry a la Sakakibara & Porter

VII. Conclusions

- Domestic rivalry – measured in structural & behavioral terms – positively impacts airlines' international market shares
  - Firm-level market data allows going beyond a net-effect and eliciting an enhanced-performance of competitors effect (heart of the rivalry rationale)
- We provide a useful theoretical basis by analyzing the rivalry rationale in an imperfectly competitive setting with a connection between domestic and international production
  - By allowing for a number-of-competitors, joint-economies of production and enhanced-competitors effects in one framework, we synthesize earlier work
- Firm-level analysis (like this exercise) holds the potential for better teasing out the different paths via which domestic rivalry might influence exports.

Additional Measure of Domestic Rivalry

- Domestic Concentration (HHI) measures the structural conditions for domestic rivalry
- Sakakibara & Porter (2001) employ a behavioral measure of domestic rivalry and we create a measure in line with them:

$$\sum_{j=1}^{2} (S_{t-j-1} - S_{t-j})$$

  - where *S* is the domestic market share of a focal airline
  - higher levels of this measure indicate a worsening competitive position (enhanced domestic rivalry)
- Replacing the HHI measure of domestic concentration with this behavioral measure of domestic rivalry yields consistent results with those presented in Table 2
  - Except, we are unable to replicate Reg #4 from Table 2 due to observation numbers and lack of uncorrelated instruments with the error terms
- Table #3 illustrates how this behavioral measure for domestic rivalry also supports a positive relationship with exports

	Regression #1: Random Effects	Regression #2: Fixed Effects	Regression #3: GMM, Instrument for Lagged Y Variables
Explanatory Variables			
Market-Share-Instability	0.049**	0.058*	0.151***
	(0.024)	(0.033)	(0.059)
Domestic-Market-Share	0.064***	0.075**	0.015**
	(0.011)	(0.039)	(0.008)
Domestic-Network (mlns. of dom. departures)	4.02***	14.7***	3.54***
	(1.52)	(3.15)	(85.9)
Merger	1.36***	0.73	0.68
	(0.49)	(0.67)	(0.67)
Domestic-Competitor-Network (mlns. of dom. departures)	-57.8**	2.56*	-39.6***
	(24.9)	(1.32)	(11.5)
Home-Competitors (natural log)	-3.24***	-3.04***	-0.41
	(0.43)	(0.50)	(0.81)
Foreign-Competitors (natural log)	-2.55***	-2.06**	-0.65
	(0.55)	(0.90)	(0.50)
International-Market-Share $_{t-1}$	0.688***	0.501***	1.03***
	(0.045)	(0.049)	(0.047)
International-Market-Share $_{t-2}$	0.027	-0.041	-0.095***
	(0.041)	(0.040)	(0.034)
Constant	11.00***	14.19***	2.17
	(1.46)	(3.05)	(2.22)
R-square	0.92	0.56	

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