

SUPPLEMENTAL MATERIAL FOR THE *JOURNAL'S* EDITORIAL WEB SITE

This supplemental material describes in detail how we constructed the variables of interest (product concentration index h , the one-firm concentration ratio C_I , and R&D intensity) in the case of the market labelled “rubber”. Our central results are obtained for five European countries (France, Germany, Italy, Spain and the UK) that represent our geographical markets.

The first step consists of establishing which products belong to that market. As mentioned in the text, two chemists were hired at different moments in time to construct each of our 21 markets on the basis of demand side substitutability. While they worked independently from each other, the markets they constructed coincided almost exactly. The products that they identified as end-use substitutes are presented in Table S.I below. That Table also contains the product’s name as found in Chemintell and RISC, as well as a description of final applications (end-uses) provided in the RISC database, whenever that information was available. For products not found in RISC, the chemists were asked to identify end-uses and make sure that the products were indeed demand side substitutes.

The second step consists of constructing the homogeneity index h as proxied by product concentration. Since we do not have data on sales, we have used capacity (installed or planned) measured in metric tons as a proxy for output. For each of our five geographical markets, h is defined as the ratio of the capacity of the product with the largest capacity to total capacity. Concretely, h in country j in the market “rubber” is defined as:

$$h_j = (\text{Max}_i k_i) / (\sum_i k_i) = (\text{Largest installed capacity within rubber}) / (\text{Total capacity}),$$

where k stand for capacity and i are all the products in the market

In many cases, a given product was identified as having more than one possible use. Consequently, we had to decide how to allocate recorded capacity for each product across our markets. For each geographical market, we decided on a simple rule, namely to split capacity evenly among the markets in which the product appears. Table S.II summarises that information (decimals have been eliminated).

The third step involves constructing the one-firm concentration ratio (C_I). Table S.III reports the sum of capacity owned by each firm present in “rubber” in our five geographical markets. For each cell, the number corresponds to the sum of capacity for all products listed in Table S.1 in a given country. The last line reports the one-firm concentration ratio (C_I). The latter is the Max of each column excluding the last cell, divided by the last cell (the Total). Decimals have been eliminated.

The last step involves constructing R&D intensity for each market. As mentioned in the main text, we rely on the Osiris and Worldscope databases to construct R&D intensity. Worldscope only reports firms’ 4-digit SIC affiliation, while Osiris provides a range of industry classifications. In particular, Osiris reports the (finer) US NAICS affiliation. As mentioned in the main text, we made use of both

databases to split our sample between high and low R&D intensity. Table S.IV summarises the R&D information available in the case of the market “rubber” for the years 1992-1997. For some companies, the data is not available for each of the six years. All monetary values are expressed in euros (€). *WS* and *OS* stand for Worldscope and Osiris respectively, while *DB* and *PC* stand for Database and Primary Code.

TABLE S.I
PRODUCTS BELONGING TO THE MARKET LABELLED “RUBBER”

Product name (Chemintell)	Product name (RISC database)	Description of final applications (end-uses) reported in the RISC database
Butyl rubber	- Butyl rubber, part of “Other synthetic rubbers	- Manufacture of inner tubes of rubber (75%) - Manufacture of other rubber products (25%)
Ethylene-propylene rubber	- Ethylene-propylene rubber, part of “Other synthetic rubbers	- Manufacture of adhesives based on rubber and plastic (15%) - Manufacture of semi solid or cushion tyres (35%) - Manufacture of other rubber products (50%)
Styrene-isoprene copolymers	- Styrene	- Manufacture of polystyrenes (65%) - Manufacture of ABS/SAN resins (11%) - Manufacture of other styrene in primary forms (9%) - Manufacture of unsaturated polyester resins (6%) - Manufacture of SBR rubber, part of other synthetic rubbers (9%)
	- Isoprene	- Manufacture of polyisoprene rubber, part of other synthetic rubbers (55%) - Manufacture of butyl rubber, part of other synthetic rubbers (19%) - Manufacture of other basic organic chemicals (26%)
Styrene-butadiene copolymers	- Styrene butadiene rubber, part of “Other synthetic rubbers	- Manufacture of adhesives based on rubber and plastic (5%) - Manufacture of other rubber products (10%) - Manufacture of plates, sheets and strips of vulcanized rubber (15%) - Manufacture of rubber belts (70%)
2-propenoic acid, 2-methyl-methyl ester, homopolymer	NA	NA
2-propenenitrile, polymer with 1,3-butadiene	NA	NA
Pentaeritritol	- Pentaerythritol, part of other diols and other polyhydric alcohols than D-glucitol	- Manufacture of alky resins in primary forms (90%) - Manufacture of paints and varnishes (5%) - Manufacture of basic pharmaceutical preparations
Xylène	- o-xylene	NA
	- p-xylene	- Manufacture of dimethyl terephthalate (45%) - Manufacture of terephthalic acids and its salts (55%)
Poly[imino(1-oxo-1,12-dodecanediyl)]	NA	NA
Poly[imino(1-oxo-1,2-ethanediyloxycarbonyl-1,4-phenylenecarbonyl)]	NA	NA
Polyurethane fibre	Polyurethanes, in primary form	- Manufacture of other plastic products (75%) - Manufacture of furniture of plastic (10%) - Manufacture of mattresses (15%)
Dicyclopentadiene	NA	NA

TABLE S.II
 PRODCUT CONCENTRATION (HOMOGENEITY INDEX) h IN “RUBBER”

Product	Germany	Spain	France	Italy	UK
Butyl rubber			10400		12000
Ethylene-propylene rubber	10250		20000	53750	
Styrene-isoprene copolymers				51666	
Styrene-butadiene copolymers					
2-propenoic acid, 2-methyl-methyl ester, homopolymer	179281	55540	89961	157364	90100
2-propenenitrile, polymer with 1,3.butadiene	23050		9400	8000	4000
Pentaeritrita	5833	2000	2300	8000	
Xylène	260347	47500	182000	282500	182937
Poly[imino(1-oxo-1,12-dodecanediyl)]	1555				
Poly[imino(1-oxo-1,2-ethanediyloxycarbonyl-1,4-phenylenecarbonyl)]	9194		5000		1500
Polyurethane fibre	300				
Dicyclopentadiene				4566	
Total	489812	105041	319062	565847	290538
Homogeneity Index h	0.532	0.529	0.570	0.499	0.630

TABLE S.III
ONE-FIRM CONCENTRATION RATIO (C_1)

Company	Germany	Spain	France	Italy	UK
BASF	128300	1800			
BAYER	19810		7000	2000	
Courtaulds PLC		12400			17000
DEGUSSA	11393				
DOW	13000				
DSM	800		11120	11120	
Enterprise de Recherches et d'Activites Petroliere			8000		
EXXON			30400		12000
Freudenberg & Co.			5560		
HOECHST	27893		11120		
HUELS	17365				
ICI		5560		5560	200560
Kohlberg Kravis Roberts & Co.					
MOBIL				51250	
Montedison S.p.A.		12000		31793	
RHONE-POULENC			6460		
SHELL	43750		2000		17500
TORAY INDUSTRIAS			5000		
UCB S.A.		300			
Redestillations Gemeinschaft	6250				
VEBA AG	37500	5560			
RWE AG	105847				
Industrieanlagen Import	14800				
STATE	666				
DU PONT	2194				
DAINIPPON INK	14000				
TOTAL S.A.	11120		185720		
BOEHRINGER	5560				
E.H. Worlee & Co. (GmbH & Co.) KG	5560				
Markische Faser	20000				
Filmfabrik Wolfen GmbH	4000				
Derivados Forestales S.A.		2000			
Espanola de Petroleos S.A., Cia. (CEPSA)		53060			
Rhodiamul		5560			

TABLE S.III (CONTINUED)

Company	Germany	Spain	France	Italy	UK
CRODA		1000			800
REPSOL		2800			
ROHM & HAAS		3000	22600	12560	
CDF			2000		
SNPE			300		
The Goodyear Tire & Rubber Co.			2400		
Protex S.A.R.L.			4600		
Peterlite			220		
ELF			1000		
Dispersions Plastiques			5560		
Norsohaas			8000		
Perstorp AB				3666	
ALDER				1000	
Polioli				1666	
Ferruzzi Finanziaria S.p.A.				97500	
ENI				246626	
Polivar				1200	
Fratelli Lamberti S.p.A.				5560	
Italchemi				5560	
Ivisud				5560	
Stabilital				5560	
Sicind S.p.A.				11120	
Fabbrica Adesivi Resine				5560	
Ashland Oil Inc.				5560	
Industria Vernici				5560	
Pagani Cetesel Industrie Chimiche				5560	
SCIC di Petrucelli & Sintoni				5560	
Mario Geronazzo Industrie Chimiche				5560	
Chimiver Svan Industria Chimica				5560	
Vedril				4000	
ARGUS				5560	
Filital Industrie Chimiche				5560	
Montepolimeri				12500	
BITMAC					438
Doverstrand					2000
Baxenden Chemicals					5560
Harlow Chemical Co. Ltd					5560
Cray Valley					5560
UNILEVER					21560
Nippon Zeon Co. Ltd.					2000
Total	489812	105041	319062	565847	290538
C ₁	0.262	0.505	0.582	0.436	0.690

TABLE S.IV
R&D INTENSITY IN "RUBBER" (1992-1997 AVERAGE)

Company	DB	NAICS PC	NAICS PC description	SIC PC	SIC PC description	Operating Revenue	R&D expenditure
JSR CORPORATION	OS	325212	Synthetic Rubber <i>mf</i>	2822	Synthetic rubber <i>mf</i>	1593439	38726
ANSELL LIMITED	OS	326211	Tire <i>mf</i> (except Retreading)	3011	Tires and inner tubes <i>mf</i>	8070975	69510
MRF LIMITED	OS	326211	Tire <i>mf</i> (except Retreading)	3011	Tires and inner tubes <i>mf</i>	1587079	10699
CHENG SHIN RUBBER INDUSTRY CO.,LTD	OS	326211	Tire <i>mf</i> (except Retreading)	3011	Tires and inner tubes <i>mf</i>	285648	7579
YOKOHAMA RUBBER CO LTD	OS	326211	Tire <i>mf</i> (except Retreading)	3011	Tires and inner tubes <i>mf</i>	14980450	1414930
TITAN TECHNOLOGIES, INC.	OS	326211	Tire <i>mf</i> (except Retreading)	3011	Tires and inner tubes <i>mf</i>	169	19
WILSHIRE TECHNOLOGIES	OS	31332	Fabric Coating Mills	3069	Fabricated rubber products <i>n.e.s. mf</i>	29233	2881
QUIXOTE CORP	OS	31332	Fabric Coating Mills	3069	Fabricated rubber products <i>n.e.s. mf</i>	488546	12394
FEMALE HEALTH CO	OS	31332	Fabric Coating Mills	3069	Fabricated rubber products <i>n.e.s. mf</i>	18215	2872
CARLISLE COMPANIES INC	OS	326299	All Other Rubber Product <i>mf</i>	3069	Fabricated rubber products <i>n.e.s. mf</i>	4466918	66911
YULE CATTO & CO. PLC	WS	NA	NA	2822	Synthetic rubber <i>mf</i>	1570671	18368
PUMA AG RUDOLF DASSLER SPORT	WS	NA	NA	3021	Rubber and plastics footwear <i>mf</i>	273628	7093
HOZELOCK GROUP PLC	WS	NA	NA	3052	Rubber and plastics hose and belting <i>mf</i>	250525	2621
PHOENIX AG	WS	NA	NA	3052	Rubber and plastics hose and belting <i>mf</i>	768501	32909
SPA INDUSTRIA ARTICOLI GOMMA SAIAG	WS	NA	NA	3061	Moulded, extruded and lathe-cut mechanical rubber goods <i>mf</i>	524075	9071
A.G. PETZETAKIS	WS	NA	NA	3069	Fabricated rubber products, <i>n.e.s. mf</i>	493291	3722
HUTCHINSON SA	WS	NA	NA	3069	Fabricated rubber products, <i>n.e.s. mf</i>	6357577	214181
LONDON INTERNATIONAL GROUP PLC	WS	NA	NA	3069	Fabricated rubber products, <i>n.e.s. mf</i>	2791841	32103
WELLINGTON HOLDINGS PLC	WS	NA	NA	3069	Fabricated rubber products, <i>n.e.s. mf</i>	210779	1135
CONTINENTAL AG	WS	NA	NA	3011	Tires and inner tubes <i>mf</i>	20834206	833368
NOKIAN RENKAAT OYJ	WS	NA	NA	3011	Tires and inner tubes <i>mf</i>	898465	24537
PIRELLI TYRE HOLDING N.V.	WS	NA	NA	3011	Tires and inner tubes <i>mf</i>	15564745	543978
Total						82058975	3349609
R&D intensity (both databases)						4.08%	
R&D intensity (Worldscope only)						3.41%	

Source: Worldscope and Osiris Databases, and own calculations

Legend: *n.e.s.*: not elsewhere specified

mf: manufacturing