Gains through increased product diversity for consumers
Gains through increased variety of specialized intermediate inputs for producers.

TABLE: THE COMPOSITION OF WORLD MERCHANDISE EXPORTS BY COUNTRY GROUP, 1990

Country Group	Exports (billions)	Share of World Exports	Share of World GDP	Export Share in GDP (%)
World	3188	100.0	100.0	14.3
High-Income Developed	2379	74.6	71.6	14.9
Intra-HID	1816	57.0	71.6	11.4
Other High Income	177	5.5	1.5	54.7
Upper Middle Income	307	9.6	6.8	20.2
Lower Middle Income	184	5.8	4.2	19.8
Low Income	141	4.4	4.1	15.4

Table 13.2 Intra-industry Trade by Commodity and Country, 2007

Country	Organic Chemicals	Iron & Steel Products	Industrial Machinery	Office Mach. & Computers	Passenger Vehicles	Prof. & Scient. Instruments	Apparel & Accessories	Alcoholic Beverages	Average
United States	84	81	59	85	73	61	16	44	63
Canada	79	76	71	46	85	66	32	39	62
Australia	8	72	43	24	38	65	11	45	38
Germany	87	93	57	77	57	78	60	75	73
UK	92	83	72	79	97	84	52	77	79
Japan	84	44	36	96	15	89	4	37	51
R. of Korea	81	91	94	64	14	58	60	62	65
Mexico	43	76	51	93	65	81	63	30	63
Brazil	68	48	89	13	94	23	51	29	52
China	51	75	61	52	77	57	4	49	53
India	85	81	52	27	23	41	2	99	51
Average	69	75	62	60	58	64	32	53	

Source: compiled by authors from United Nations, COMTRADE database

$$ITT_j = 100 * \left[1 - \frac{|EX_j - IM_j|}{EX_j + IM_j} \right]$$

IC and IRS II: Monopolistic Competition (Chapter 12)

Gains through increased product diversity for consumers
Gains through increased variety of specialized intermediate inputs for producers.

(1) "Love of Variety"

Consumers like variety: an apple and an orange are better than two apples or two oranges.

But variety is costly. Scale economies (technical efficiency) are sacrificed by having a lot of diversity. Two apples can be produced for a lower cost than one apple and one orange.

Assume that both X and Y are produced with increasing returns to scale, a fixed cost plus a constant marginal cost.

Figure 12.1

Suppose that X and Y are symmetric, but imperfect substitutes.
(you are indifferent between one apple and one orange, but you would rather have one apple and one orange, than two apples or two oranges).

You prefer diversity. However, with scale economies, more diversity means smaller outputs of each good which in turn implies higher diversity implies higher costs (and lower quantity).

It may be optimal to have less diversity in order to have more quantity.

Figure 12.2 “Any color is ok as long as it is black”

Figure 12.1

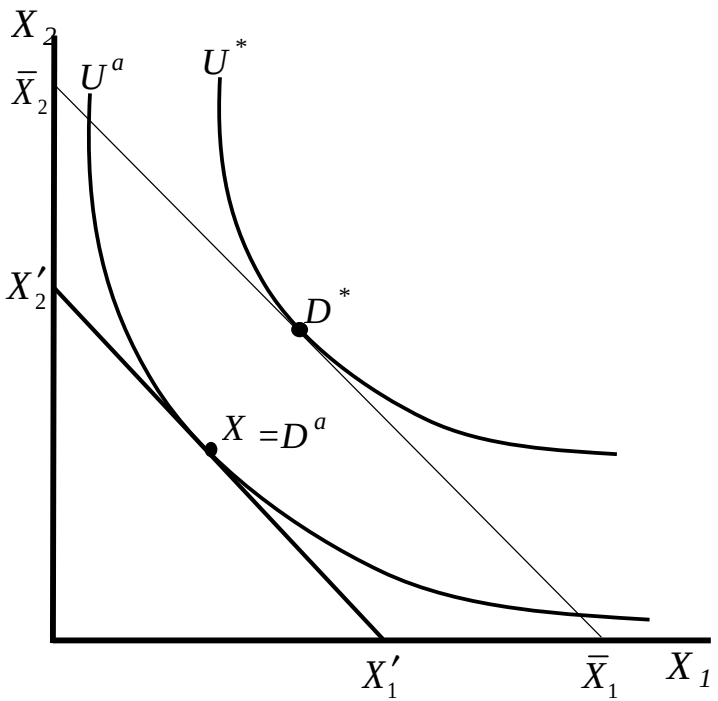
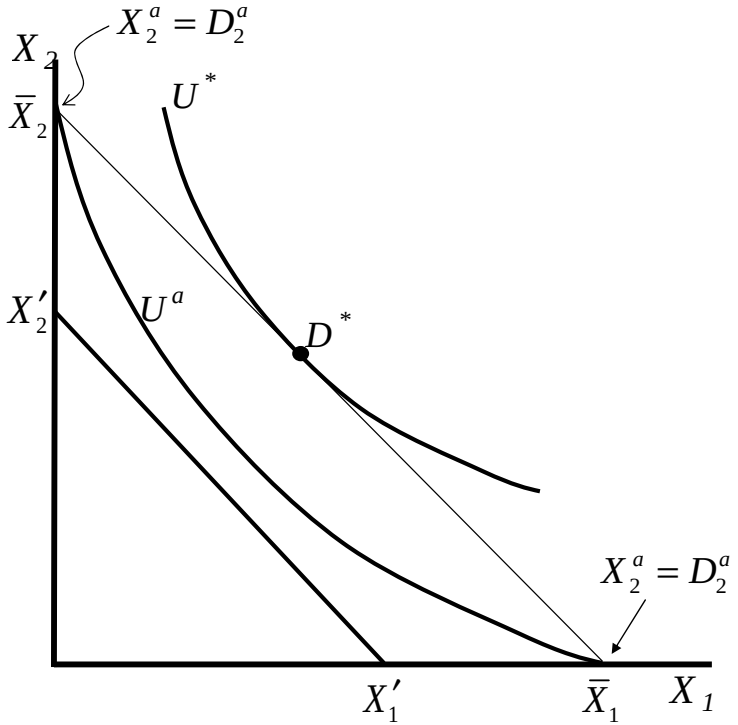


Figure 12.2



In the case shown in Figure 12.2, it is better to have just one good produced in autarky. Utility is higher than if both are produced.

Now suppose that we put two identical countries together. By specializing, both countries can have both goods. Each country consumes at T in Figure 12.2.

There is no increase in technical efficiency, but a gain in utility due to more diversity. In Figure 12.2, consumers get half as much of each of twice as many goods.

$$U = \sum_{i=1}^{n} X_i^{\alpha} \qquad 0 < \alpha < 1 \qquad \text{where } n \text{ is } \textit{endogenous} \qquad (12.1)$$

Suppose that there are initially n_0 goods, and that each good is initially produced in the same amount X^0 .

$$U^0 = \sum_{i=1}^{n} (X_i^0)^{\alpha} = n^0 (X^0)^{\alpha} \qquad (12.2)$$

Now suppose that we give the consumer twice as many goods, but give them only half as much of each. New utility U_1 is given by

$$U^1 = (2n^0)(X^0/2)^{\alpha} = 2^{1-\alpha} n^0 (X^0)^{\alpha} > U^0 \qquad (12.3)$$

This is in fact exactly the outcome when two identical countries are put together in trade: half as much as each of twice as many goods.

Figures 12.1 and 12.2 can be reinterpreted to be two specialized inputs into production, and the indifference curves are now isoquants.

The larger market with trade supposed more specialized intermediate goods and hence higher productive efficiency.

A carpenter, instead of having one general purpose saw, can have

table saw, ripping blade
table saw, cross-cut blade
radial arm saw
portable rotary saw
band saw
mitre saw
jig saw
bow saw
coping saw

$$Y = G(L_y, \bar{K}) \qquad X = \left[\sum_i^n S_i^{\beta}\right]^{1/\beta} \qquad \sigma = \frac{1}{1-\beta} \tag{12.16}$$

Each S_i is produced with increasing returns to scale, consisting of the constant marginal cost and fixed-cost technology that we have now used many times. One unit of S requires a single unit of labor and each good requires a fixed cost F.

$$L_{xi} = S_i + F \qquad \bar{L} = L_y + nL_{xi} \tag{12.17}$$

Let superscript "a" denote a situation in which only the final X and Y goods can be traded and n^a the number of goods and S^a the amount of each S good in the "a" equilibrium. The X technology reduces to

$$X^a = \left[\sum_i^{n^a} (S_i^a)^{\beta}\right]^{1/\beta} = \left(n^a\right)^{1/\beta} S^a \tag{12.18}$$

Now again do our standard experiment where we put two identical economies together in trade.

Hold the amount of each *S* good produced constant and the number produced in each country constant Output of *X* in each country is now given by

$$X^* = \left[\sum_i^{n^*} (S_i^a/2)^\beta\right]^{1/\beta} = \left(2n^a\right)^{1/\beta}(S_i^a/2) \qquad (12.19)$$

$$X^* = 2^{\frac{1-\beta}{\beta}} (n^a)^{1/\beta} S_i^a = 2^{\frac{1-\beta}{\beta}} X^a > X^a \qquad (12.20)$$

Allowing trade in intermediates increases productivity in *X* production as X producers now have access to a larger range of specialized intermediates, a greater division of labor. Figure 12.4

Figure 12.3

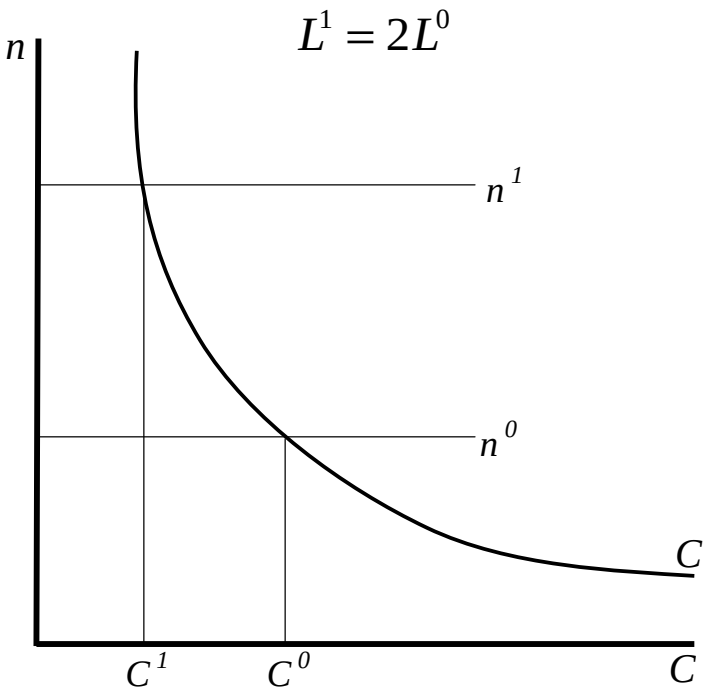
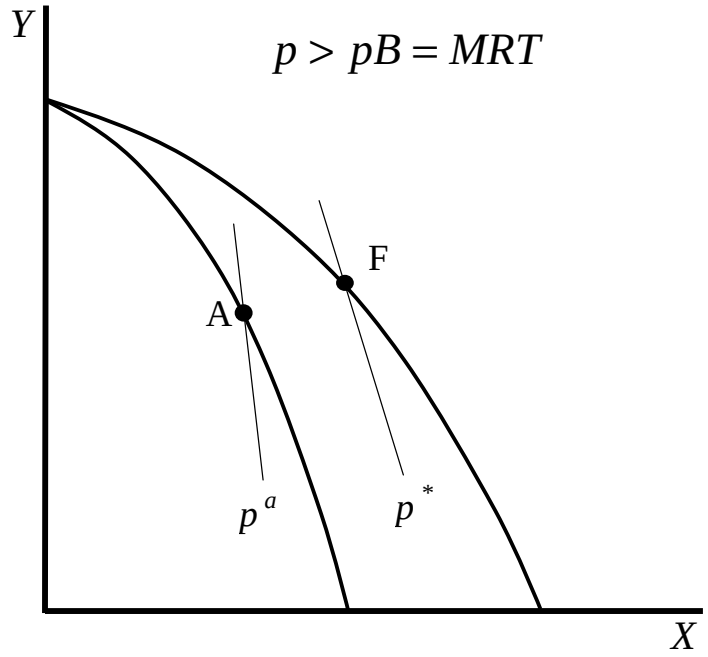


Figure 12.4



Suppose instead that individuals are only going to buy one unit of a good (e.g., an automobile). But individuals differ in their “ideal car”.

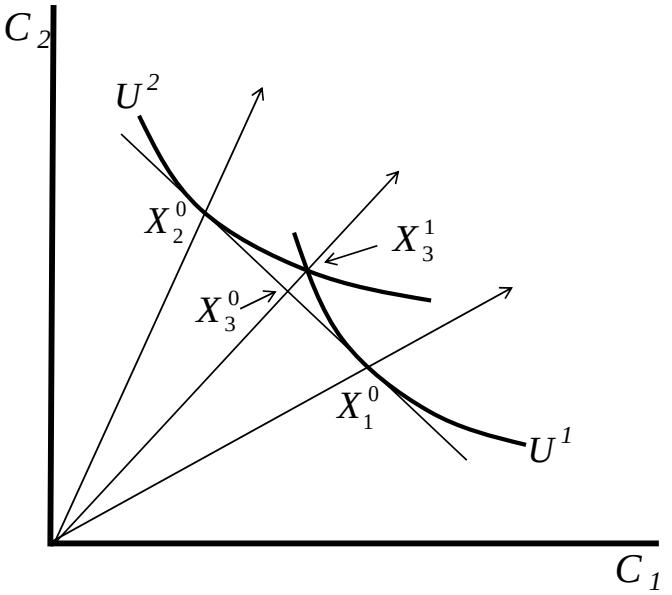
Suppose cars are “bundles of characteristics”. Imagine that there are only two characteristics, size and speed. There are two groups, WASPS and YUPPIES.

WASPS prefer size over speed, and YUPPIES prefer speed over size.

Figure 12.5

The straight line in this figure gives combinations of size and speed that can be produced for a given cost per unit, *for a given total output*. A is the WASPS “ideal” variety while B is the YUPPIES ideal variety.

Figure 12.5



Point C is a "compromise variety" that gives each group as much utility as their ideal varieties. C would cost more for a *given production volume*.

However, with increasing returns to scale, producing 100,000 of variety C might be cheaper than producing 50,000 of A and 50,000 of B.

Thus in the small economy, the compromise variety might be the choice.

But suppose that we put two identical countries together. If scale economies are diminishing (the average cost curve is a hyperbole), then 200,000 of C might not be that much cheaper than 100,000 of A and 100,000 of B.

So with trade, we might switch to each country producing one variety, and each consumer type getting their ideal variety.

How do we want to think of gains from trade in the ideal-variety model?

Suppose consumers' preference line a long a line in "characteristic space", which we index to be of length one. A consumers location on the line is the consumer's ideal variety if all sell for the same price.

Suppose that in the small, closed economy there is only one product available and the producer chooses the middle of the line so as to minimize distance from the average consumer,

"Distance" from a consumer to the central product can be interpreted as how far the available product is from the consumer's ideal variety.

Suppose that consumers are uniformly distributed on a line of length = 1. And there is one good produced, located in the middle.

The average distance between a consumer and the single good is 1/4.

Now suppose we put two countries together and the larger market can support two producers, who space themselves equally, at points 1/3, 2/3 on the line.

Now each consumer is on average a distance of 1/6 from the nearest good.

The welfare improvements and gains from trade in this case is an “on average” concept: consumers are, on average, getting a product closer to their ideal product.

1. Gains from trade may be captured in the form of increased product or input diversity instead of lower average costs for a fixed range of products.

2. The “love of variety” approach views consumers as consuming more types of goods, a more varied basket, through trade.

3. The “ideal variety” approach, views consumers as choosing one product from many. Trade allows consumers, on average, to get a product closer to their ideal product.

Combined with the previous set of notes: increasing returns to scale allow consumers to buy *same range of products at lower costs* (same products in larger quantity), or a *larger range of products at the same costs* through trade.

WORLD RANKING OF MANUFACTURERS
YEAR 2009

Rank	GROUP	Total	CARS	LCV	HCV	HEAVY BUS
	Total	**60,499,159**	**51,075,480**	**7,817,520**	**1,305,755**	**300,404**
1	TOYOTA	7,234,439	6,148,794	927,206	154,361	4,078
2	G.M.	6,459,053	4,997,824	1,447,625	7,027	6,577
3	VOLKSWAGEN	6,067,208	5,902,583	154,874	7,471	2,280
4	FORD	4,685,394	2,952,026	1,681,151	52,217	
5	HYUNDAI	4,645,776	4,222,532	324,979		98,265
6	PSA	3,042,311	2,769,902	272,409		
7	HONDA	3,012,637	2,984,011	28,626		
8	NISSAN	2,744,562	2,381,260	304,502	58,800	
9	FIAT	2,460,222	1,958,021	397,889	72,291	32,021
10	SUZUKI	2,387,537	2,103,553	283,984		
11	RENAULT	2,296,009	2,044,106	251,903		
12	DAIMLER AG	1,447,953	1,055,169	158,325	183,153	51,306
13	CHANA AUTOMOBILE	1,425,777	1,425,777			
14	B.M.W.	1,258,417	1,258,417			
15	MAZDA	984,520	920,892	62,305	1,323	
16	CHRYSLER	959,070	211,160	744,210	3,700	
17	MITSUBISHI	802,463	715,773	83,319	3,371	
18	BEIJING AUTOMOTIVE	684,534	684,534			
19	TATA	672,045	376,514	172,487	103,665	19,379
20	DONGFENG MOTOR	663,262	663,262			
21	FAW	650,275	650,275			
22	CHERY	508,567	508,567			
23	FUJI	491,352	440,229	51,123		
24	BYD	427,732	427,732			
25	SAIC	347,598	347,598			
26	ANHUI JIANGHUAI	336,979	336,979			
27	GEELY	330,275	330,275			
28	ISUZU	316,335		18,839	295,449	2,047
29	BRILLIANCE	314,189	314,189			
30	AVTOVAZ	294,737	294,737			
31	GREAT WALL	226,560	226,560			
32	MAHINDRA	223,065	145,977	77,088		
33	SHANGDONG KAIMA	169,023	169,023			
34	PROTON	152,965	129,741	23,224		
35	CHINA NATIONAL	120,930		120,930		
36	VOLVO	105,873		10,032	85,036	10,805
37	CHONGQING LIFAN	104,434	104,434			
38	FUJIAN	103,171	103,171			
39	KUOZUI	93,303	88,801	2,624	1,878	
40	SHANNXI AUTO	79,026		79,026		
41	PORSCHE	75,637	75,637			
42	ZIYANG NANJUN	72,470	72,470			

- Renault Pars is a joint venture, 51 percent of which belongs to Renault of France. Forty-nine percent of Renault Pars' shares is jointly held by Iran's Industrial Development and Renovation Organization, IKCO and Saipa. The company was established in 2003.[20]
- MAN SE holds a 17.01% voting stake in Scania.
- Porsche Automobil Holding SE has a 50.74% stake in Volkswagen Group. Due to liquidity problems, Volkswagen Group is now in the process of acquiring Porsche.
- Renault-Nissan Motors have an alliance involving two global companies linked by cross-shareholding, with Renault holding 44.3% of Nissan shares, and Nissan holding 15% of (non-voting) Renault shares. The alliance holds a 3.1% share in Daimler AG.
- Renault holds a 25% stake in AvtoVAZ and 20.5% of the voting stakes in Volvo Group.
- Toyota holds a 51% stake in Daihatsu, and 16.5% in Fuji Heavy Industries, parent company of Subaru.
- Volkswagen Group and FAW have a joint venture.
- Volkswagen Group and Shanghai Automotive Industry Corporation (SAIC) have a joint venture in Shanghai Volkswagen Automotive.
- Volkswagen Group holds a 37.73% stake in Scania (68.6% voting rights), and a 29% stake in MAN SE.
- Volkswagen Group has a 49.9% stake in Porsche AG. Volkswagen is in the process of acquiring Porsche, which will be completed in mid-2011.
- Volkswagen Group has a 19.9% stake in Suzuki, and Suzuki has a 5% stake in Volkswagen.

Top vehicle manufacturing groups (by volume)

The table below shows the world's largest motor vehicle manufacturing groups, along with the marques produced by each one. The table is ranked by 2009 *end of year* production figures from the International Organization of Motor Vehicle Manufacturers (OICA)[21] for the parent group, and then alphabetically by marque. Joint ventures are not reflected in this table. Production figures of joint ventures are typically included in OICA rankings, which can become a source of controversy.[22][23]

Marque	Country of origin	Ownership	Markets
1. Toyota Motor Corporation (Japan)			
Daihatsu		Subsidiary	Global, except North America and Australia
Hino		Subsidiary	Asia Pacific, North America and South America
Lexus		Division	Global
Scion		Division	North America
Toyota		Division	Global
2. General Motors Company (United States)			
Buick		Division	North America, Middle East, East Asia
Cadillac		Division	Global, except South America, South Asia, South East Asia, Pacific
Chevrolet		Division	Global, except Australia, New Zealand, South Korea
Daewoo		Subsidiary	South Korea
GMC		Division	North America, Middle East
Holden		Subsidiary	Australia, New Zealand, Japan

Opel		Subsidiary	Global, except North America, United Kingdom
Vauxhall		Subsidiary	United Kingdom
3. Volkswagen Group AG (Germany)			
Audi		Subsidiary	Global
Bentley		Subsidiary	Global
Bugatti		Subsidiary	Global
Lamborghini		Subsidiary	Global
Scania		Subsidiary	Global
SEAT		Subsidiary	Europe, South America, North Africa, Middle East
Škoda		Subsidiary	Global, except North America and South Africa
Volkswagen		Subsidiary	Global
Volkswagen Commercial Vehicles		Subsidiary	Global
4. Ford Motor Company (United States)			
Ford		Division	Global
Lincoln		Division	North America, Middle East, South Korea, Japan
Mercury**		Division	North America, Middle East
Troller		Subsidiary	South America and Africa
5. Hyundai Motor Company (South Korea)			
Hyundai		Division	Global
Kia		Division	Global
6. PSA Peugeot Citroën S.A. (France)			
Citroën		Subsidiary	Global, except North America, South Asia
Peugeot		Subsidiary	Global, except North America, South Asia
7. Honda Motor Company (Japan)			
Acura		Division	North America, East Asia, Russia
Honda		Division	Global
8. Nissan Motor Company (Japan)			
Infiniti		Division	Global, except South America and Africa
Nissan		Division	Global
9. Fiat S.p.A. (Italy)			
Abarth		Subsidiary	Global, except North America

Alfa Romeo		Subsidiary	Global
Ferrari		Subsidiary	Global
Fiat		Subsidiary	Global
Fiat Professional		Subsidiary	Global, except North America
Irisbus		Subsidiary	Global, except North America
Iveco		Subsidiary	Global, except North America
Lancia		Subsidiary	Europe
Maserati		Subsidiary	Global
10. Suzuki Motor Corporation (Japan)			
Maruti Suzuki		Subsidiary	India, Middle East, South America
Suzuki		Division	Global
11. Renault S.A. (France)			
Dacia		Subsidiary	Europe, Latin America, Asia, Africa
Renault (cars)		Division	Global, except North America, South Asia
Renault Samsung		Subsidiary	Asia, South America
12. Daimler AG (Germany)			
Freightliner		Subsidiary	North America, South Africa
Master		Subsidiary	Pakistan
Maybach		Division	Global
Mercedes-Benz		Division	Global
Mitsubishi Fuso		Subsidiary	Global
Orion		Subsidiary	North America
Setra		Subsidiary	Europe
Smart		Division	North America, Europe, South East Asia, South Africa
Thomas Built		Subsidiary	North America
Western Star		Subsidiary	North America
13. Chana Automobile Company, Ltd (People's Republic of China)			
Chana		Division	China, South Africa
Hafei		Subsidiary	China
14. BMW AG (Germany)			
BMW		Division	Global

MINI		Division	Global
Rolls-Royce		Subsidiary	Global
15. Mazda Motor Corporation (Japan)			
Mazda		Division	Global
16. Chrysler Group, LLC (United States)			
Chrysler		Division	Global
Dodge		Division	Global
GEM		Division	North America
Jeep		Division	Global
Ram		Division	North America
17. Mitsubishi Motors Corporation (Japan)			
Mitsubishi		Division	Global
18. Beijing Automotive Industry Holding Corporation, Ltd (People's Republic of China)			
BAW		Division	China
Foton		Subsidiary	China
19. Tata Motors, Ltd (India)			
Hispano		Subsidiary	Europe
Jaguar		Subsidiary	Global
Land Rover		Subsidiary	Global
Tata		Division	India, South Africa
Tata Daewoo		Subsidiary	South Korea
20. Dongfeng Motor Corporation (People's Republic of China)			
Dongfeng		Division	China
21. First Automotive Group Corporation (People's Republic of China)			
Besturn		Division	China
Freewind		Subsidiary	China
Haima		Subsidiary	China
Hongqi		Division	China
Jiaxing		Subsidiary	China
Vita		Subsidiary	China
Xiali		Subsidiary	China

22. Chery Automobile Company, Ltd (People's Republic of China)			
Chery		Division	China, Africa, South East Asia, Russia
Riich		Division	China
Rely		Division	China
23. Fuji Heavy Industries, Ltd (Japan)			
Subaru		Division	Global
24. BYD Auto (People's Republic of China)			
BYD		Division	China, Russia
25. Shanghai Automotive Industry Corporation (People's Republic of China)			
MG		Subsidiary	United Kingdom, Chile, Argentina
SsangYong***		Subsidiary	Global
Roewe		Division	China
Soyat		Division	China
Yuejin		Division	China
26. Anhui Jianghuai Automobile Company, Ltd (People's Republic of China)			
JAC		Division	China
27. Geely Automobile (People's Republic of China)			
Geely		Division	China, Russia, North Africa
Maple		Division	China
Volvo (Cars)		Subsidiary	Global
28. Isuzu Motors, Ltd (Japan)			
Isuzu		Division	Global, except North America
29. Brilliance China Automotive Holding, Ltd (People's Republic of China)			
Brilliance		Division	China, North Africa
Jinbei		Subsidiary	China
30. OAO AvtoVAZ (Russia)			
Lada		Division	Russia, Europe, North Africa
VAZ		Division	Russia, Europe
31. Great Wall Motor Company, Ltd (People's Republic of China)			
Great Wall		Division	China, South Africa, Russia, North Africa, Australia

32. Mahindra & Mahindra, Ltd (India)			
Mahindra		Division	India, South East Asia, Europe, North Africa, North America
33. Shandong Kaima (China)			
Kaima		Division	China
Jubao		Division	China
Aofeng		Division	China
34. Proton Holdings, Bhd (Malaysia)			
Proton		Division	Asia Pacific, South Africa, United Kingdom, Middle East
Lotus		Subsidiary	Global
35. China National Heavy Duty Truck Company, Ltd (People's Republic of China)			
Sinotruk		Division	China
36. AB Volvo (Sweden)			
Mack		Subsidiary	Global
Nissan Diesel		Subsidiary	Global
NovaBus		Subsidiary	North America
Prevost		Subsidiary	North America
Renault (trucks)		Subsidiary	Global
Volvo (trucks)		Division	Global
37. Chongqing Lifan Automobile Company, Ltd (People's Republic of China)			
Lifan		Division	China
38. Fujian Motor Industry Group Company (People's Republic of China)			
Soueast		Division	China
39. Kuozui Motors, Ltd (Taiwan)			
Kuozui		Subsidiary	Taiwan
40. Shaanxi Automobile Group Company, Ltd (People's Republic of China)			
Shaanxi		Division	China
41. Porsche (Germany)			
Porsche		Subsidiary	Global
42. Ziyang Nanjun Automobile Co., Ltd. (People's Republic of China)			
Nanjun		Division	China

43. GAZ Group (Russia)			
GAZ		Subsidiary	Russia
KAvz		Subsidiary	Russia
LiAZ		Subsidiary	Russia
Ural		Division	Russia
44. Navistar International Corporation (United States)			
IC		Subsidiary	North America
International		Division	North America, South Asia
45. Guangzhou Automobile Group (China)			
Changfeng		Division	China
46. Paccar, Inc (United States)			
DAF		Subsidiary	Global, except North America
Kenworth		Division	North America
Leyland		Subsidiary	Europe
Peterbilt		Division	North America
47. Chenzhou Ji'ao (China)			
Ji'ao		Division	China
48. Qingling Motors Company Ltd. (China)			
Qingling		Division	China
49. Hebei ZXAUTO (China)			
Zhongxing		Division	China
50. Ashok Leyland (India)			
Ashok Leyland		Division	India

Notes

* Porsche Automobil Holding SE has a 50.7 percent share in the Volkswagen Group.[24] However, Volkswagen Group will acquire Porsche AG, the automotive manufacturer under a new "Integrated Automotive Group". This merger/acquisition is expected to be fully completed in mid-2011.[25][26]

** Ford Motor Company has announced that the production of Mercury Automobiles will cease in 2010.[27]

*** Shanghai Automotive Industry Corporation is in the process of selling SsangYong Motor Company to Mahindra & Mahindra.