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‘Green’ sunrise or ‘brown’ sunset industry response? The impact of the global economic and financial crisis over developing countries’ automobile industry.

By Peter Wad, June 2010.

Abstract

In the Global South automobile production evolved behind protectionist walls and was promoted by infant industry policies and outright national automotive projects from the 1950s. In recent decades, many developing countries have liberalized their automotive markets and allowed automobile TNCs to take majority control over joint ventures, transforming domestic automotive industries into foreign controlled sectors while leaving a few national automakers in India, Malaysia and China. Decomposing and reorganizing the national value chain into regional and global automobile value chains OEMs and TNC original equipment suppliers (OESs) have off-shored and outsourced component and parts production to developing countries. Again, local auto suppliers have been acquired or relegated to lower 'tier' positions if not forced out of the market. However, with economic growth and development in the Global South during the 1990s and 2000s automobile sales have boomed, and the automobile sectors in Latin America and Asia have become ‘brown sunrise’ industries generating investment, technological upgrading and employment. The present global financial and economic crisis has not profoundly changed this trajectory. The global crisis did not impact automotive markets in developing countries severely, except for automotive exporting countries like Mexico, Thailand and South Africa. Only in 2009 automotive sales and production declined across the board in the Global South, but key markets turned around in the end of the year. Thus, the automobile crisis is a downward business cycle, not a structural crisis of the industry. Companies in the automotive industry responded with traditional crisis management (temporary downsizing, cost reductions, retraining, consolidation, innovation), and governments launched traditional stimuli packages (cash-for-clunkers, tax reductions on smaller and/or cleaner cars etc). Strategic initiatives were taken to improve the competitiveness of the domestic industry (consolidation, liberalization) on the one hand and to transform it from a brown industry to a ‘greener’ industry on the other hand (tightening environmental regulations, fuel efficiency and emission standards, subsidizing purchases of smaller and ‘greener’ cars, investing in appropriate infrastructure and green technology R&D). Thereby, some developing countries and their surviving local automakers and parts makers are leapfrogging into ‘clean’ technology frontiers competing head-to-head with global automakers or partnering with foreign firms in their common endeavor to manufacture green automobiles.

1. Introduction

The standard automobile is a four-wheel vehicle for land-transport of people and goods driven by a fossil fuel based internal combustion engine. It is also build and composed of steel, plastic and other non-renewable materials, and it requires a physical infrastructure that has transformed the natural environment into a landscape of paved highways and feeder roads dangerous to drive on and cross by human beings and animals. As such the automobile industry belongs to the ‘brown’ industries turning out products that are depleting oil and other material resources and simultaneously generating pollution and carbon dioxin emission adding to global warming. However, the automobile has been embraced by people everywhere and whenever economic growth and rising incomes made it affordable to purchase and run, thereby multiplying people's spatial and social mobility and enabling industrial development through more efficient transportation of production factors and goods.

The last 100 years have been a century of motorization with global motor vehicle production passing 70 million units in 2007 and with car ownership reaching around 900 out of 1000 people in the driving age in USA and between 500-600 in Western Europe and Japan (Economist 2008). The automobile industry is therefore also a candidate to be classified as a mature if not outright a ‘sunset’ industry with overcapacity, backward technology, saturated demand, slow or stagnating growth, declining employment, falling market capitalization and rising liability. Yet, the voice of the industry, OICA, contends that the automobile industry is still a growth sector¹. The Economist (2008) points to the doom and gloom of automotive markets of the Global North and the hope for industrial growth is coupled with the emerging markets of the BRICs (Brazil, Russia, India, and China). Thus, the question is whether the automobile industry in general and in developing countries in particular actually fits this characteristic as a ‘brown, sunset’ industry, and whether the global financial and economic crisis 2008-09 has or will change its structure and dynamic towards a ‘green, sunrise’ industry?

The short answer is that the motor vehicle industry in the *Global South* is a ‘*brown sunrise*’ industry and that the emerging ‘green’ automobile technology is opening up new windows of industrial opportunities for industrial players in both developed and developing countries. In the *Global North* green automobile technology provides an option for a technological revolution that can revitalize the industry and turn it into a ‘green sunrise’ industry for the 21st century. In the *Global South* automakers and governments in some countries like Brazil and China, are also embracing these new technologies as an option for ‘fast catching-up’ and technological leapfrogging into the frontiers of automotive manufacturing transforming the industry into an *emerging ‘green sunrise’ industry*.

The long answer is structured in the following way. Section 2 describes and analyzes trends and drivers of the industry in the 21st century (2000s). Section 3 assesses the impact of the global crisis 2008-09 on the industry in the developing countries and the linkages between the global crisis and the performance of the automotive industry in the *Global South*. In section 4, the responses of the

¹ OICA: “The auto industry is a world-class industry, which drives economic growth in every major country in the world. The auto industry remains a growth industry, with a remarkable 30% + growth rate in the past decade (1995-2005). Worldwide, autos generate 60 million jobs and contribute hugely to local economies. Auto manufacturers support many supplier industries such as steel, glass, plastics, computers and more” (<http://www.oica.net/>, accessed 2009-11-15).

key players of firms and governments to the consequences of the global crisis are addressed. The paper is terminated by way of concluding the analysis and outlining a few implications (section 5)².

The paper is delimited to the *automobile industry*, i.e. excluding the motorcycle industry. In most parts the heavy bus and truck segment is also sidelined³. The automotive component and parts industry is an integrated part of the automobile industry cluster and has gained increasing significance in recent decades. Thus, the automotive industry is in a narrow sense composed of the motor vehicle assemblers or ‘original equipment manufacturers’ (‘OEMs’ in the language of the industry) and components and parts suppliers (OESs). A ‘developing country’ is defined as a country with a GNI/capita below USD 10,000 *and* a non-member of the OECD. By implication, Mexico and Singapore is classified as developing countries while South Korea is not, and Taiwan China is considered a developing ‘economy’ (UN terminology). The key stakeholders are government, motor vehicle and parts makers and their business associations, employees and their trade unions, plus civil society organizations (NGOs) of consumers, environmentalist and local communities. Trade unions, professional organizations and NGOs are neglected in the analysis due to limited space although they have been outspoken about the global financial, economic and climate crises⁴.

The analysis presented is first and foremost based on secondary data and data sources that include academic research networks (IMVP, GERPISA, IDS), UN organizations (UNIDO, UNCTAD, ILO) and data bases (WTO International Trade Statistics, UN COMTRADE), government agencies (e.g. MIDA), automotive business associations (OICA, JAMA, SIAM, AIC/FTI) and trade unions (IMFmetal), automotive intelligence agencies and consultancy firms (Just-auto, PWC Automotive Institute, Automotive World, Fourin Automotive Intelligence), academic journals (e.g. Review of International Political Economy, Journal of Economic Geography, European Journal of Development Research) and business magazines (e.g. The Economist). The theoretical framework applied for interpretation and explanation is based on Global Value Chain (GVC) theory (Veloso & Kumar 2002; Humphrey & Memedovic 2003; Memedovic 2004; Gereffi et al. 2005) supplemented with the general automobile business competition theory of the IMVP’s ‘lean production’ thinking⁵ (Womack et al. 1990), and the institutional-economic perspective of Gerpisa’s ‘productive models’⁶. Thereby, the applied perspective is close to the Global Production Network (GPN) approach (Memedovic 2004; Sturgeon et al. 2008; Coe et al. 2008), but the GPN is a conceptual framework rather than an explanatory theory. The approach assumes that the automobile industry in developing countries is more or less integrated in the global economy and that the industry overall is a relatively globalized cum regionalized industry (Freysenet & Lung 2000). The next section discusses whether this is a valid claim.

² Acknowledgement: The paper is a shortened version of a research paper by the author which was commissioned and published by UNIDO as *Impact of the Global Economic and Financial Crisis over the Automotive Industry in Developing Countries*. – Research and Statistical Branch, Working Paper, No. 16, 2009, Vienna 2000.

³ The heavy truck and bus sector in developing countries is relatively under-research. For exceptions, see Ivarsson, I. & Alvstam, C. G. (2005) and related works.

⁴ For autoworkers unions, see IMFmetal 2009. For an international network of engineers on climate problems and solutions, see IDA (2009).

⁵ “lean production combines the best features of both craft production and mass production – the ability to reduce costs per unit and dramatically improve quality while at the same time providing an ever wider range of products and even more challenging work” (Womack et al. 1990, 277). Lean manufacturing entails e.g. flexible production, just-in-time delivery and a multi-skilled workforce.

⁶ A ‘productive model’ is constituted by the corporate profit strategy of a company, and the strategy’s fit with the national mode of economic growth on the one hand and the ‘corporate governing compromises’ of the corporation on the other hand (Freysenet et al. 1998; Boyer & Freysenet 2002; Freysenet et al. 2003)

2. Trends, drivers and structural characteristics of the industry in the 21st century

Starting with a short summary of the impact of the globalization of the automobile industry in the Global South this section focus on the structural dynamics of the automotive industry in developing countries during the 2000s and is split into two parts: the mezzo level (industry, sector, cluster) and the micro level (firm, corporations, subsidiaries, auto groups and alliances).

Few developing country automakers and 1st tier suppliers survived the globalization of the auto industry in the later part of the 20th century but the emergence of strong local automakers in China and India indicate that indigenous firms and networks may still be able to catch up and withstand intense competitive pressure from global automotive giants. The East Asian financial crisis 1997-98 broke the neck of the South Korean national champions except the Hyundai-Kia Group, and it stalled the emerging Malaysian OEMs leaving Proton as the only independent Malaysian carmaker in the early 2000s. However, the South Korean automobile industry documented that a national auto industry is a vehicle for rapid industrialization, taking South Korea into the ranks of developed countries. Thus, Korea replicated the case of the Japanese automotive industry. Taiwan does also indicate that a viable auto supplier industry can be build without national OEMs (Biggart & Guillén 1999, Rasiah 2007, Li & Sadoi 2008). The present global financial crisis will indicate whether the new national champions of China and India can weather the storm and improved their competitive position on domestic and international markets.

Trends at the mezzo level

The automobile world market in the early 2000s indicate a steady average annual growth above 3.5 percent from 2001 to 2007, and a profound shift of demand and supply from the Global North to the Global South, a trend that is especially pronounced in Asia, and in Eastern Europe (table 1). Western Europe and North America have negative growth in demand and production of cars and the negative sales trend is more pronounced in North America than in Western Europe while both regions face a similar level of production decline. Contrary to the Global North West, developed Asia (Japan, Australia, New Zealand) demonstrates positive growth over the period considered, 5 percent in car sales and 22 percent in car production, indicating a return to growth in the Japanese car market after the stagnating 1990s and a further surge in car export from Japan which has been kept at a high level all the time.

Entering the 21st century the global motor vehicle market of demand and supply also witnessed a increased balanced growth of production to sales at the global level, but large imbalances between North America on the one hand and Asia and Latin America on the other hand endured (table 1).

Table 1: World car sales and production by sub-regions 2001-07 (million units)

Area	2001		2004		2007		2001-07 % change	
	Sales	Production	Sales	Production	Sales	Production	Sales	Production
Europe, West	14.93	15.00	14.65	14.75	14.82	14.24	-0.7%	-5.1%
Europe, East	2.13	2.45	2.83	3.13	4.42	5.07	107.5%	106.9%
North America #)	19.03	13.70	18.51	14.32	17.88	13.10	-6.0%	-4.4%
Latin America #)	2.80	3.71	3.07	3.79	4.28	5.24	52.9%	41.2%
Asia-JO	4.90	8.40	5.46	9.06	5.14	10.24	4.9%	21.9%
Asia-DK	3.58	4.67	6.40	7.81	9.78	11.52	173.2%	146.7%
Middle East	1.00	-	1.85	-	2.18	-	118.0%	-
Africa	0.66	0.23	0.77	0.24	1.08	0.28	63.6%	21.7%
Total	49.03	48.16	53.54	53.10	59.58	59.69	21.5%	23.9%

Source: Automotive Quarterly Review, Q4, 2008 (rounded off; own calculations).

Notes: Western Europe is the old EU-15 + other Western countries. Eastern Europe is the new EU-12 + CIS and Turkey. North America is Canada and USA; Latin America is South America and Mexico. Asia-JO is Japan and Oceania (~Australia and New Zealand). Asia-DK is Asia minus Japan and Oceania, i.e. Developing Asia (incl. Iran) and South Korea.

#) Includes light trucks in both sales and production figures.

Among the developing regions only Africa has a deficit in car production relative to car sales. The development of the global automobile industry during the 2000s until the global financial crisis does not seem to have modified the inter-regional imbalances between the West and the East (Asia), on the contrary. Europe is seeing a slow shift of car production from Western Europe to Eastern Europe, but a balanced growth of car production relative to car sales in East Europe. The increased imbalance seems to be caused by the automobile industry in Japan where outputs increased more than demand from 2001 to 2007. The tremendous growth in automobile production in developing Asia did not impact negatively on the global misfit between demand and supply in as much as sales rose much more than production. The overproduction of cars relative to domestic sales increased slightly in absolute numbers, anyway, from around one million units in 2001 to two millions in 2007.

Overall, the Global North began the decade of the 2000s as the heavyweight in the global automobile market, conducting 79.3 percent of global sales and 77.0 percent of production in 2001. In just six years of a booming global economy, the share of the Global North has declined to 63.5 percent of global sales and 63.0 percent of global production in 2007. The difference between sales and production has even declined, and the huge imbalance is primarily attributed to the difference between the mature markets of Japan and the West. Among developing regions, the production surpluses of developing Asia and Latin America are counterbalanced by the deficit of the Africa, while the rising surplus of the transition economies of East Europe is more than countered by the deficit of the oil-rich Middle East. In short, the overall global automobile market is fairly balanced between the Global North and the Global South and the imbalances are manifested within the two mega-markets of supply and demand.

International trade figures of automotive products (motor vehicles and parts) detail these disproportions (table 2 below). Among the countries in the Global North only USA displayed a consistent trade deficit of more than 100 billion USD during 2001-2007. Canada's trade shifted from a surplus of 13 billion USD in 2001 to a deficit of 11 billion USD in 2007. EU-27, Japan and South Korea generated trade surpluses and even at an increasing scale. However, Japan is outstanding doubling its trade surplus to more than 140 billion USD in 2007 from a surplus of around 70 billion USD in 2001! Japan exported 6.55 million motor vehicles in 2007 of which 5.8 million were passenger cars (JAMA 2008). But South Korea is doing even better tripling its trade surplus from around 14 billion USD in 2001 to more than 40 billion in 2007. Among the key automobile industrial nations of the Global South, only South Africa and Malaysia ran a steady deficit in car trading during 2001-2007. Over the period Malaysia's deficit doubled from around 1.5 billion USD to nearly 3 billion USD, while South Africa's deficit rose five times from 1.3 to 6.8 billion USD! Mexico, Brazil, India and Thailand had continuous surpluses, with Mexico ahead of the other two increasing its trade surplus from 11 billion USD in 2001 to 15 billion USD in 2007. China managed to reduce a deficit of 3 billion USD in 2001 down to 1 billion USD in 2007.

Summing up, Mexico, Brazil, India, China and Thailand have hosted a dynamic evolution of their automobile industries and markets both domestically and in terms of export performance. They

seem to have done the trick of South Korea that made the automotive industry one of its key drivers of industrialization from the 1970s until it graduated as a newly industrialized country and entered OECD in 1996. Mexico's automotive industry is a special case demonstrating huge export capability but at the same time relying on massive imports of components and parts for motor vehicle assembling. In Brazil a new US technology of bi-fuel gasoline-ethanol 'flex' engines was transferred to Brazilian-based automakers in the 2003. This enabled car owners to decide on fuel mix at the tank station instead of making the strategic choice of purchasing an ethanol power or a gasoline powered vehicle. A new upturn for hybrid bio-ethanol and petrol vehicles took off in 2007 when E25 gasohol became mandatory fuel standard after bio-ethanol fueled vehicles nearly disappeared in the 1990s after having dominated the market during the 1980s. China succeeded narrowing its trade deficit in a steady way. Only Malaysia and South Africa faced rising trade deficits which is surprising because they followed two different automotive industry strategies. Overall, automotive trade surplus or deficit does not seem to be a question of development country status. In both camps there are net exporters and net importers, and China seems set for shifting position from a net importer to a net exporter.

Table 2: World trade of automotive products by selected countries 2001-08 (USD billions)

Country	Trade	2001	2002	2003	2004	2005	2006	2007	2008
EU-27	Export	294.31	330.03	403.99	477.79	493.39	538.39	644.88	655.39
	Import	248.70	275.24	341.50	407.47	418.04	459.01	552.89	546.35
USA	Export	63.42	67.09	62.25	76.42	85.99	95.26	109.05	111.53
	Import	165.16	176.63	181.28	197.00	205.45	220.22	220.77	199.23
Canada	Export	54.97	56.33	56.95	63.77	66.86	66.34	65.83	51.67
	Import	41.98	47.69	50.07	54.20	58.82	64.50	68.46	62.64
Japan	Export	80.32	92.51	102.73	115.73	122.90	139.16	158.76	171.01
	Import	9.24	9.89	11.13	12.80	13.17	13.89	15.35	15.86
South Korea	Export	15.43	17.33	23.12	32.32	37.75	43.06	49.48	48.84
	Import	1.77	2.54	3.04	3.47	4.10	5.21	6.68	7.25
Mexico	Export	30.68	30.91	30.11	31.91	35.42	42.63	45.26	46.14
	Import	19.51	21.26	19.81	21.73	25.15	28.39	30.09	30.55
Brazil	Export	4.82	4.91	6.54	8.70	11.98	13.04	13.13	14.75
	Import	4.14	2.99	2.87	3.58	4.73	6.01	8.35	13.19
South Africa	Export	1.49	2.40	3.10	3.70	4.35	4.97	5.37	7.74
	Import #	2.77	3.49	4.92	7.12	9.27	10.62	12.25	11.28
India	Export	0.56	0.68	1.09	1.74	2.62	3.00	3.47	4.87
	Import	0.30	0.44	0.61	0.93	1.23	1.46	2.19	3.59
China	Export	1.89	2.68	3.57	6.27	9.96	14.41	23.03	28.67
	Import	4.91	6.96	12.78	14.43	13.55	18.58	24.03	29.05
Thailand	Export	2.66	2.86	3.97	5.55	7.98	9.89	12.67	16.23
	Import	2.12	2.42	3.32	3.87	4.32	4.23	4.79	5.97
Malaysia	Export	0.25	0.33	0.39	0.55	0.73	0.92	1.12	1.15
	Import	1.81	2.02	2.11	2.82	3.40	3.22	3.22	4.00

Source: WTO Statistics database time series. Accessed by 14.12.2009. Figures are rounded off.

Notes: SITC groups 781, 782, 783, 784, and subgroups 7132, 7783. USD at current prices. #) Estimated value.

Trends at the firm level

The scene was set for American corporate dominance of the automotive industry in the 21st century. The US automobile market was the largest national market in the world, US automobile corporations were number one and two automakers on the top-10 list in 2001, and at global market

control was regained during the 1990s through acquisitions of and alliances with Japanese automakers. Yet, Toyota and Honda stayed independently executing strategies of organic corporate growth, and Toyota moved from number three in global motor vehicle manufacturing in 2001 to number two in the following years before it overtook GM in 2008 when the crisis hit the US market and the US automakers badly (OICA 2001-2008)⁷. However, even Toyota took a dip with its first operating deficit in half a century (IMVP 2009, 1), and the corporation may have lost its superior flexibility (Economist 2009). The only automobile making group from a former developing country to enter the top-10 list is Hyundai-Kia and it managed to jump from a position as number nine in 2001 to a position of number 6 in 2007 overtaking Daimler Chrysler that demerged in 2007 and the two steady going automotive corporations, PSA Peugeot Citroën and Honda.

All global top-10 automakers produced more than two million units in the 2000s. Thereby, they distance themselves from emerging motor vehicle manufacturers from developing countries. In 2001, the highest ranking 'Southern' automaker, Dongfeng of China, produced between 370,000 and 440,000 vehicles (table 3).

Table 3: Global South motor vehicle manufacturers' production (all types) and ranking 2001-07 (million units)

Company	2001		2004		2007	
	Ranking	Production	Ranking	Production	Ranking	Production
Dongfeng (excl. Citroën), China	1	0.37	3	0.44	5	0.44
Changhe & Harbin 2001), Changhe 2004, Jianxi Changhe 2007, China	2	0.26		0.10		0.11
ChangAn (CHANA), China	3	0.23	4	0.42	3	0.54
BAIG (excl. Isuzu), China	4	0.20	2	0.54	4	0.45
Proton, Malaysia	5	0.20	8	0.18		0.14
Tata (Telco), India	6	0.18	5	0.38	2	0.59
SAIC (excl. GM & VW), China	7	0.15	6	0.31	7	0.31
FAW (excl. VW, TMC, Mazda), China	8	0.13	1	0.59	1	0.69
Mahindra & Mahindra, India	9	0.06	7	0.19		0.17
Hindustan, India	10	0.02		n.a.		n.a.
Anhui Jianhuai Auto, China		-	9	0.13		0.21
Jinbai Auto Holding, China		-	10	0.11		n.a.
Nanjing Auto, SAIC from 2008		-		0.09		0.22
Geely, China		-		0.08	10	0.22
Chery, China		-		0.08	6	0.43
Southeast Auto Industrial, Taiwan China		-		0.06		n.a.
Great Wall, China		-		0.05		0.12
Brilliance Auto (Shenyang Auto), China		n.a.		n.a.	8	0.29
Harbin Hafei, China		-		-	9	0.23
BYD, China		-		-		0.10

⁷ Toyota's success is contested and attributed to many factors, but one key aspect is its manufacturing system, the Toyota Production System (TPS) (Fumio 2006). This system requires a workforce that participates actively in the ongoing reduction of cost and innovation of production processes. Harmonious relations between management and unions are a must, and this has been achieved in Japan with Toyota's enterprise unions since the 1950s. Overseas, Toyota has evaded unionization if possible (in the USA), busted more radical unionism (in the Philippines), and recognized moderate enterprise unions while avoiding industrial unions (in Southeast Asia broadly speaking) (Wad 2004).

China National, China		-		-		0.10
Fujian Auto, China		-		-		0.08
Shannxi Auto, China		-		-		0.07
Shangdong Kaima, China		-		-		0.07

Source: OICA statistics. For Proton 2007, Automotive Quarterly Review 2008 Q4, fig. 3.3 p. 229.

In 2007, Dongfeng had slipped down the ladder to number 5 although it increased production with more than 20 percent, and another Chinese automaker, FAW, peaked the ranking, turning out nearly 700,000 units. The ranking of Global South automakers demonstrates much more mobility and volatility than the Global top-10 list, but the trend is anyway that the 'Chinese are coming'. Chinese OEMs already counted 6 top-10 positions in 2001, but 9 out of 10 of the Global South top-10 in 2007. India had three companies on the list in 2001: Tata Motors, Mahindra & Mahindra and Hindustan Motors. In 2007 only Tata Motors was part of the top game by way of increasing its production with around 400,000 units. Being number five in 2001 Malaysia's national automotive champion, Proton, was relegated from the top-10 list in 2007 due to its declining sales performance in its domestic market and its inability to increase export during the 2000s.

These changes among the merging automakers testify to the tremendous growth of the Chinese motor vehicle market and the evolution of national Chinese players in the automotive industry at their home market at least for the time being.

According to UNCTAD's ranking of corporate internationalization, the Transnationality Index, TNI (UNCTAD 2009), there are three motor vehicle makers among the top 100 TNCs from developing countries⁸, and they are less internationalized than the competitors from the Global North indicated by their TNI at 39.3. The average was 54.4 (UNCTAD 2009, 19, table 1.8). Here, the food and beverages industry had the highest TNI score of 60.5 closely followed by electrical and electronic equipment of 59.9. Ranked after foreign assets in 2007 Hyundai Motor Company, Kia Motors and Sinotruck (Hong Kong China) are members of this top-100 group of Third World Multinationals (TWMNCs), leaving only one real automotive TWMNCs among the top-100 corporations from 'developing countries'.

The global top-10 auto groups do more or less control the car markets in the key automotive countries of the Global South (table 4).

Table 4: World market share (sales) of cars by top-10 motor vehicle maker groups by selected regions/countries 2007 (units in '000; new car registrations).

⁸ UNCTAD includes South Korea as a developing country

Country	Automobile Groups											
	GM	TMC	Ford(α)	VW	R&N*)	Daiml	PSA	Honda	HMC	Fiat	Top-10	Total#)
W Europe	1,511	920	1,708	2,885	1,491	807	1,943	278	494	1,194	89%	14,820
USA	1,482	1,461	1,031	300	633	176	-	879	482	4	85%	7,562
Canada§)	194	139	135	115	56	15	-	118	69	-	95%	882
Japan	8	1,901	228	68	619	47	11	581	1	6	79%	4,396
S. Korea	127	8	4	9	120	6	3	7	682	-	93%	1,040
Mexico	140	30	56	144	157	5	12	28	12	3	92%	641
Brazil	464	40	170	490	80	2	128	86	3	527	100%	1,998
S. Africa	35	92	32	96	25	29	6	15	-	4	87%	384
India	59	54	39	12	-	2	-	60	200	3	28%	1,509
China	528	455	272	918	285	7	207	465	345	16	66%	5,317
Thailand	8	87	5	0	4	4	0	50	-	-	98%	162
Malaysia*)	1	70	2	1	11	4	0	28	7	-	28%	443

Source: Automotive Quarterly Review, Q4, 2008, various years, rounded-off, e.g. 0=1-499.

Note: α) Ford and Mazda. *) R&N = Renault-Nissan. #) Total includes automakers not listed. §) Own calculation. *) TMC does not include Perodua, de facto controlled by Daihatsu which is part of the TMC group.

India and Malaysia are exceptions, and even in these countries the top automaker are a Japanese controlled joint venture, Maruti-Suzuki and Perodua (Daihatsu) respectively. But especially Chinese automakers are on the run, and the local motor vehicle makers did in fact become the leading category of automakers in China during the global financial crisis (Fourin China Automotive Intelligence). Yet, an important question is, how financially important are automotive markets in developing countries to the Global top-10? Economist (2008-11-06) discloses that Hyundai gained around half of its sales in 'emerging markets' and earned more than a third of its operating profit (probably in 2007 and including Russia and Eastern Europe), Fiat's figures were above 40 percent and 57 percent respectively, VW's also around 40 percent and 22 percent, PSA's below 40 percent and only 7 percent, Toyota's below 30 percent and 21 percent, Nissan's around 25 percent and 10 percent, Porsche between 15-20 percent and 43 percent, Daimler around 15 percent and 28 percent, and BMW above 10 percent and 20 percent; GM and Ford did not disclose profit shares only sales figures, and GM's sales in emerging markets were below 40 percent of total sales and Ford's around 25 percent.

Within the global value chain of the automotive industry, automotive suppliers have increased their share of total value adding. The ongoing reorganization of the supply chain into modular manufacturing increases the power and value position of the 1st-tier suppliers. Therefore, national automobile projects will only be able to succeed in the long term if the local automotive industry also fosters global 1st-tier auto suppliers. However, recent global top-10 and global top-50 auto supplier lists reveal that Northern companies dominate among the auto supplier firms. Shifting ranks only take place among Northern TNC suppliers, with US auto suppliers being relegated and European and Japanese firms being alleviated. In 2007, German Bosch is No. 1, Japanese Denso No. 2, and Canadian-Austrian Magna No. 3 (Automotive News, June 1, 2009).

Among the top-100 OEM parts suppliers ranked on automotive sales in 2008 (Automotive News, June 1, 2009), only Nemak, Mexico, qualifies as a supplier from a developing countries, excluding Hyundai Mobis and Mando Corp. from South Korea because they cannot be considered companies from a developing country any more. In Malaysia the government deliberately aimed for the establishment of competitive local parts manufacturers, but the national champion, Proton, has over time abandoned its single-and-local supplier policy and shifted to dual or multiple suppliers

including foreign 1st-tier suppliers (Rosli & Kari 2008). Developing country auto suppliers may play significant roles as 2nd-tier and 3rd-tier suppliers in the key automotive markets of the Global South, e.g. in Brazil, Mexico, South Africa, India, China, and Southeast Asia (for China, Sadoi 2008). Foreign automotive parts firms do also often perform better than local firms in terms of labor productivity, wages, export, skills and technological capabilities as demonstrated in India (Rasiah & Kumar 2008).

In sum, global automakers from the North continued their domination in motor vehicle and auto component and parts manufacturing before the outbreak of the global financial crisis in 2008. The problem of low capacity utility continued to mar automobile profitability although automobile sales grew worldwide and grew rapidly in many developing countries. Creative destruction of idle capital in the North was not undertaken, and automotive FDI flowed into e.g. Mexico, Brazil, China and India adding new capacity at a pace sustaining low capacity under the ‘break-even’ point of 85 percent⁹. This combined underutilized capacity stressed the profitability of global OEMs which again tried to pass it down its global supply chain pushing several OESs to the brink (Barnes & Morris 2008). Consolidations, receiverships and liquidation followed. Only three Japanese automakers (Toyota, Honda, Nissan allied with French Renault) managed to run a profitable business, while most other Western automakers were ‘value destructors’ with declining market capitalization (Maxton & Wormald 2004, Ch. 7). German Porsche was the exception, but an attempted hostile acquisition by Porsche of VW backfired under the global financial crisis, and Porsche was merged into VW instead!

3. The 2008 financial and economic crisis and its effects over the automotive industry in developing countries

The global financial crisis broke out in 2008 and hit the international automobile markets in October 2008 when automobile sales plummeted in USA and Europe (Automotive World 2009 Passenger Car OEM Q2 figure 1.). Yet, signs of global economic decline started already in 2007, and the Japanese and US motor vehicle sales fell from 2006 to 2007. However, although global vehicle production fell by 3.7% from 2007 to 2008 a differentiated view on Global North areas¹⁰ and Global South areas¹¹ motor vehicle sales are declining in all developed areas while sales are increasing in all developing areas (OICA 2009)! From 2009, finally, they all face negative growth rates in sales and production for 2009 (table 5).

Table 5: World car sales and production by sub-regions 2007-09 (year on year change in percent)

Area	2007		2008		2009 (forecast)	
	Sales	Production	Sales	Production	Sales	Production
Europe, West	0.2	2.1	-8.4	-9.6	-7.4	-20.0
Europe, East	26.2	20.0	12.8	5.5	-30.2	-17.4
North America(NAFTA)#)	-2.5	-1.3	-15.3	-16.4	-22.3	-37.4
South America #)	25.8	13.9	3.2	8.4	-29.6	-18.7
Japan	-5.3	1.9	-4.0	-0.3	-15.5	-32.5
Asia-Pacific, rest	16.7	14.1	3.8	2.5	-11.4	-0.3
Africa & Middle East	6.7	-10.5	2.7	4.9	-7.8	-20.0
Total	4.6	5.2	-5.3	-5.1	-16.4	-21.5

⁹ ILO (2009) contends that the break-even’ point lies at 75 percent capacity utility, while Maxton & Wormald (2004) set it on 85 percent including a view on market capitalization.

¹⁰ North America, Europe-27 (enlarged EU) and industrialized Asia (Japan, South Korea, Australia and New Zealand.

¹¹ Non-EU Europe including Turkey, Developing Asia, Latin America including Mexico, and Africa.

Source: Automotive World Automotive Passenger Car OEM Quarterly Data Book, Q2, 2009. Reclassified data calculated from rounded off data.

Note: #) NAFTA and South America figures include light trucks.

The global financial crisis boiled over in 2008 in the Global North and spread to the Global South in 2009. Moreover, global production is expected to fall more than sales in 2009 (-21.5% and -16.4% respectively). In 2009 everybody was in the same rocking boat but East Europe, NAFTA and South America were most badly hit in light vehicle sales while NAFTA and Japan were more severely affected downwards in production. This relates to the export surplus that Japan has been running for the NAFTA area. The least affected areas in terms of car sales are Western Europe and Africa/Middle East, while Asia-Pacific excluding Japan is expected to see a minor decline in vehicle manufacturing.

Considering the differential impact of the global crisis on automobile sales and production in different parts of the Global North and Global South the structure of the global market is expected to change slightly from 2007 to 2009 in favor of the Global South and especially developing Asia (table 6).

Table 6: World car sales and production by sub-regions 2007-09 (million units)

Area	2007				2008				2009 forecast			
	Sales	%	Production	%	Sales	%	Production	%	Sales	%	Production	%
Europe, West	14.82	25	14.24	24	13.58	24	12.86	23	12.57	27	10.30	23
Europe, East (α)	4.42	7	5.07	8	4.99	9	5.35	10	3.48	7	4.42	10
North America(NAFTA)#)	18.82	32	15.13	25	15.94	28	12.65	22	12.39	26	7.92	18
South America #)	3.34	6	3.21	5	3.45	6	3.48	6	2.43	5	2.82	6
Japan	4.40	7	9.95	17	4.22	7	9.92	18	3.57	8	6.70	15
Asia-Pac/Oceania §)	10.51	18	11.81	20	10.90	19	12.10	21	9.66	20	12.06	27
Africa & Middle East	3.25	5	0.28	0	3.34	6	0.29	1	3.08	7	0.24	1
Total	59.55	100	59.69	99	56.42	99	56.65	101	47.18	100	44.46	100

Source: Automotive World Automotive Passenger Car OEM Quarterly Data Book, Q2, 2009 (slightly reclassified, figures rounded off).

Notes: α) East Europe includes Turkey, #) NAFTA and South America numbers include cars & light trucks, §) Oceania includes Australia and Japan.

South America has not seen any steady rise in its global market shares of sales and production which lie around 5-6 percent. Japan captured around 7-8 percent of global car sales and 17-18 percent of global car manufacturing for 2007-08 but Japan's production share is set to plunge to 15 percent in 2009 (forecast). Africa and the Middle East is buying an increasing share of global car production but the area is manufacturing a barely one percent of car production worldwide. Asia-Pacific is the only area to significantly raise its stake in the global market, forecast to plus 2 percent points in market share and 7 percent points in production – over two years! To underscore the trend of change towards developing Asia, US automobile market has been overtaken by the Chinese market as the largest national market in the world in 2009, and vehicles from local Chinese automakers have become the best selling makes in China, too (Fourin, China Automotive Intelligence, 2009).

The performance of automotive industries in developing countries and in particular developing Asia calls for an explanation. Basically, the automobile industry is very responsive to economic cycles of boom and bust because buying a motor vehicle is a relatively expensive, enduring and credit based transaction for individual customers at least in the Global North (PWC Analyst Note, February

2009). Thus, the mechanisms through which the present global financial and economic crisis could be transmitted into the automotive industry in the Global South are primarily 1) the global financial system of corporate and private credit and 2) employment conditions affected again by international trade in motor vehicles and automotive components and parts, flows and stocks of foreign direct investments, and corporate linkages through global and regional value chains. The question is why these mechanisms have not been activated, or if they have been triggered, why they have not worked as expected and created a deep automotive industry crisis?

First, the financial systems in Asia (excluding Japan), Africa and Latin America were less integrated into the global financial system and did not participate that much in transactions of advanced financial services like subprime loans in the USA (James et al. 2008). East Asian financial institutions and policies have also weeded out many bad practices during the post-crisis years. Therefore, consumer credit for automobile purchases was not in general withheld or reduced in developing countries as it happened in the Global North. Moreover, while 80 percent of vehicle purchases are credit-based in the USA and the UK and 75 percent in India the reverse is the case in China where 80 percent of the car purchases are traded in cash (IMVP 2009, 4; PCW Automotive Institute 2009, 4).

Secondly, consumer confidence and spending capacity is highly sensitive to economic cycles affecting employment prospects, incomes and household property (e.g. real estate). While neither a financial crisis does cause an economic crisis immediately and nor does an economic crisis immediately translate into higher unemployment, the crises do affect consumers' expectations about the future impacting e.g. larger purchases that can be postponed. Buying a new car will probably be postponed under these circumstances. In addition, a financial crisis that is related to a crisis in the estate sector affects the fortune of many households badly due to the declining value of real property.

The interaction of dwindling buying power and fallen customer confidence translates into declining vehicle sales which sooner or later force OEM managements to adjust production levels to the lower market expectations and accumulated stocks. During the present global crisis it seems that production and employment have been reduced proportionally more than downward sales invited for in Western Europe and NAFTA 2008-2009, while this adjustment was postponed to 2009 in Japan (table 1). In Eastern Europe, South America and Asia outside Japan production and thereby employment probably have been reduced less than vehicle sales, which may also be related to the fact that vehicle export have not been hit proportionately negatively either because of the competitiveness of automotive industries in developing countries or because of South-South automotive trade. The dramatic cuts in production and employment by Northern OEMs may also be conditioned by the dire financial straits of many OEMS and in particular the 'Big Three' US automakers: GM, Chrysler and Ford.

The automotive industry crisis of the late 2008 reduced cash flows and profitability fell to new lows in the USA bringing about bankruptcies and bankruptcy protection claims under the US Chapter 11 clause for GM and Chrysler and several key auto suppliers while Ford managed to stay independent due to a previous debt restructuring process. Capital restructuring in a situation of high indebtedness, external government intervention, supplier defaults and shaken customer confidence will also affect the OEMS in the mid- to long term through reduced R&D investments, diminished capacity and capability of the organization which again translates into falling competitiveness and further decline and eventual closure. But overall, and similar to many large US and UK banks, US and European automakers were considered 'too big to fail' by policymakers in the same way as it

happened with the South Korean 'Chaebols' (conglomerates) during the emerging East Asian financial crisis in 1997 (Wad 2002).

A similar dynamic of international trade and FDI has been played out in the automotive components and parts business. US Delphi, a supplier spin-offs from GM and formerly the No. 1 auto supplier worldwide (Wad 2008), has been badly affected by the ongoing financial duress of the world's largest OEM. Delphi entered bankruptcy protection (Chapter 11) in 2005 only to return as a restructured company in 2009. Another big auto US supplier, Dana, went bankrupt in 2006 and was reorganized by 2008. Such defaults causes disruption in the global supply chain and may further force OEMs to reduce production or decline on timely product delivery. The vicious circle is enforced. And if these challenges were not enough the global automobile industry also had to deal with price increases or volatility on fuel, energy and materials like steel, reduced or stalled business credit, and currency changes or turbulence. These troubles spilled over into the automotive industries in developing countries, but the impact was minimized by the brighter business environment in the Global South in general except in export-dependending automotive sectors.

In sum, OESs have been under financial stress during the pre-crisis years of the 2000s triggering bankruptcies and consolidations, and with the reduction of orders to automotive suppliers (OESs) and increased pressure for cost reduction, quality improvements and more timely deliveries additional bankruptcies and restructuring under bankruptcy protection are taking place if not structural adjustments are conducted as quiet sell-offs and liquidations.

4. Key automotive industry actors' responses to the global crisis

The key players in the automotive industries in developing countries are auto TNCs and central governments plus a few national OEM champions and the under-wood of auto components and parts suppliers. As developing countries were less affected by the global financial crisis in 2008 and managed to sustain industrial automotive growth the responses of governments were less pronounced and comprehensive before 2009, and initiatives were forthcoming primarily in countries with considerable automotive production, export and national auto champions.

Automotive firms

In general standard crisis management has been practiced by automakers and auto parts suppliers in the Global North and Global South. This counter-cyclical business management includes reduction of output (vehicles, parts) and cost-cutting, internally by way of eliminating shifts, overtime, performance based bonuses, temporary layoffs and retrenchment of temporary and contract employees, and externally by way of trimming the value chain upstream (suppliers, business services) and downstream (logistics, transport, vehicle financing and insurance, dealers, after-sale services, recycling). Alliances, consolidations, mergers and acquisitions will also be up for consideration as well as renegotiation of contracts, loans and credit lines, before e bankruptcy protection and company restructuring or liquidation will take place.

Due to the dire straits of US automakers in the 2000s several consolidations among the Global top-10 through mergers and acquisitions during the 1990s were reversed in the 2000s into (plans for) demergers and divestments. DaimlerChrysler disbanded, GM abandoned Suzuki and Fiat as potential acquisitions, and Ford reduced its engagement in Mazda. Yet, these changes opened up for new formations. Fiat allied with Chrysler, VW and Suzuki are becoming allies acquiring equity from each other, and PSA is linking up with Mitsubishi Motor Corporation. The new trend is that automakers from the Global South undertake asset seeking foreign direct investments of automotive

capital in the Global North with mixed experiences. Chinese SAIC acquired South Korean Ssangyong in 2004 but withdrew from the bankrupt Korean company in 2009. Indian Tata Motors acquired Jaguar Land Rover from Ford Motor in 2008. Chinese Sichuan Tengzhong Heavy Industrial Machinery Company bought Hummer from GM in 2009. Ford is negotiating with Chinese Geely about selling its subsidiary, Volvo (car company), Beijing Auto (BAIC) has bought auto models and production equipment from Swedish SAAB while the SAAB brand is likely to disappear. Consolidations through mergers of existing competitors as seen recently in China are orchestrated by the government and state and not up for discussions (see below).

Besides these horizontal consolidations among automakers, a spectacular attempt was made by a global auto parts supplier to jump the global value chain hierarchy and acquire a defaulted auto company. GM negotiated for a long time with the European governments for credit and loans to stay in business while bargaining with various buyers about the takeover of GM's European subsidiary, Opel, acquired in 1948. The potential purchase of Opel by the Canadian automotive parts supplier, Magna International, was protested by Magna's OEM customers, BMW and VW, threatening to expel Magna as a key supplier. Russian financial capital (Sberbank) and automotive capital (Gaz) were also playing a role behind the curtain (Just-auto, September 18, 2009).

Acquisitions from 'below' the supply chain are highly controversial underlining the significance of positions within the global value chain. Moreover, they will rarely have the financial strength to acquire automobile brands because auto components suppliers are at least as troubled as their customers, the OEMs. In the worst hit Northern automobile market, the US market, there are too many suppliers even if sales stabilize around 10-12 million units. Suppliers are expected to lose nearly USD 25 billion in 2009, and 200 supplier firms are undergoing 'quiet' liquidation selling assets to competitors and private equity firms (Just-auto 2009-11-05). Small and medium sized part suppliers are probably the most vulnerable category of automobile firms operating in the lower end of the global value chain with small margins. But they have often been left on their own especially if there is a case of surplus capacity. Even the US United Auto Workers Union acknowledged that it does not make sense to push for government intervention when there is too much capacity in the market (Just-auto op.cit.). The exception is if the suppliers have been trusted companies and received training, technology transfer and even financial or equity support from their customers higher up in the hierarchy. But close long term relationships will normally involve OEMs and core 1st tier suppliers, and not SMEs in the lower end, except where there are national automotive programs in place to build national automotive champions, clusters or hubs (see below). Overall, many businessmen and automotive business associations in the South have expected that the domestic automobile crisis is cyclical and will be short lived (with South Africa as a exception). In such circumstances the most important thing has been to keep the capacity and capability in shape and be ready to exploit the upturn aggressively and constructively, assuming that the automotive industry is a sunrise industry!

The Chinese auto industry has been dominated by foreign automakers with GM and VW well ahead of the North Asians, Toyota, Hyundai and Honda, and with Renault-Nissan and Ford in the rear wheel. The foreign firms are chased by larger Chinese players like Chana, Chery, FAW, Dongfeng, Geely and Brilliance. Although Chinese makers as a category did capture the highest market share among national automakers in 2009, the corporate hierarchy is not expected to be shaken profound by Chinese automakers because GM and VW are supposed to increase capacity with 900,000 units contingent on consolidation policies of firms and government (PWC op.cit.). Automotive export has mainly been conducted by new and small Chinese automakers but with the capacity utility as low as 60 percent on average both local and foreign firms will increase automotive export aiming to

exploit idle capacity and the low-cost advantages of China. If Chinese-based export succeeds and is obstructed by import restraints in the Global North, automotive FDI from Chinese automotive champions may try to overcome resistance by way of relocating production to USA, Europe, Japan and South Korea. This process is already under way in Southeast Asia and Latin America. Yet, some lessons have to be learned from SAIC's inroad into South Korea's auto market that failed miserably with the default of acquired Korean automaker, Ssangyong.

Suzuki and Hyundai are the two big foreign players on the Indian market assembling around 760,000 units and 475,000 units of motor vehicles respectively in 2008 (OICA). But Tata is number two in its domestic market with a production around 5250,000 motor vehicles. Suzuki is well positioned with majority control of the joint venture, Maruti-Suzuki, and its strong capacity and capabilities in sub-compact motor vehicle manufacturing. Hyundai is using India as an export platform for subcompact cars, while Renault-Nissan is lining up with Indian Bajaj for the production of a low cost car. Tata is currently introducing the micro-car, Nano, after having faced local rural resistance to its plant construction in East India forcing the management to relocate the plant to West India¹². Tata acquired Jaguar Land Rover but seems to face tremendous problems turning these brands into viable business¹³ (Economist 2009-03-28, D'Costa 2009).

Finally, the emerging green automotive technology revolution is also acted upon by automakers in the Global North and the Global South. As mentioned before, bio-fuel has a long and turbulent history in Brazil, and the use of bio-ethanol as automotive fuel only succeeded when flex-fuel engine technology was developed in the US and transferred to Brazil for mass production and finally made mandatory in the domestic auto market by 2007. Lead by Toyota Northern automakers embarked on hybrid automotive technology combining combustion engine with an electric engine. Toyota launched its 'Prius' as the first commercial hybrid electrical vehicle (HEV) ever in 1997. TMC had produced one million units in 2007 and two million units in 2009. Only Honda followed Toyota launching their HEV in 1999. Other auto TNCs downplayed the potential sales volume of HEVs in a time of cheap gasoline.

However, fossil fuel prices escalated during the 2000s and the whole pack of automakers began trying to catch-up with the two independent Japanese auto manufacturers. In addition to the hybrid electrical vehicles (HEVs), new technologies included plug-in hybrid electrical vehicles (PHEVs), electrical vehicles (EVs) with battery-based electrical propulsion (BEVs) and with plug-in mechanism (PEVs), and finally fuel cell electrical vehicles (FCEVs) based on hydrogen (Chanaron 2009). The first group of followers producing HEVs or EVs includes among Northern automakers, US Ford, GM, Chrysler (with GEM) and Tesla (allied with Daimler) and Japanese Nissan, and among Southern automakers only Chinese BYD (Wang 2009). The second group of followers that does not yet manufacture clean-tech motor vehicles comprises Northern companies like VW, Audi, Porsche, BMW (including Mini), Miles Electric Vehicles, Daimler, Smart, French PSA and Renault, and Japanese Mitsubishi and Subura, plus partsmaker Magna International, and from the South, Indian Tata. The technological revolution is evolving from hybrid electrical vehicles to electrical vehicles and eventual hydrogen fuel cell technology. Yet, industry actors caution that it will take 20 years to mature EV technology and infrastructure, and therefore many automakers pursue improving fuel efficiency and reducing emission of existing 'brown' internal combustion

¹² Protests against motor vehicles are also known in e.g. USA in the past (Maxton & Wormald 2004, 31).

¹³ Tata may have to acknowledge the wisdom of a British joke about BMW's unsuccessful acquisition of Rover in the 1990s: 'The Germans thought that Rover was a car, but they realized that it was a dog!'

engine (ICE) technology based on fossil fuel¹⁴ (Just-auto 2009-09-22, PWC 2009). But the production of HEVs by Japanese companies in Japan is part of the explanation why Japan is able to sustain its trade surplus in motor vehicles in spite of the very high wage and salary levels of the industry.

Governments

Complying with WTO agreements several developing countries have liberalized their automotive markets even under the global crisis. China, for example, reduced import tariffs on automobiles and auto parts to 25 percent and 10 percent respectively in July 2009 exposing the domestic automakers to higher external competition (Just-auto October 2009). But only in export-intensive automotive industries and segments did the global crisis impact severely in developing countries. In these countries e.g. Mexico the automakers were owned and controlled by foreign corporations, and central governments were inclined to abstain from massive rescue operations. Here, local governments provided some industry support but without many resources they try to use existing means and institutions, e.g. improving collaboration between firms, R&D institutions and the authorities.

The autonomous peripheral markets (China, India) and the emerging peripheral markets (Mercosur, AFTA) were relatively less impacted by the global financial and economic crisis sustaining positive, but lower growth rates or facing short negative business recessions. In China government actions to spur economic growth through massive infrastructure investments especially in rural areas and selective assistance to the automotive industry spilled over into a comparatively high performing auto industry were combined with a policy of industrial rationalization and consolidation. In India, the strong electoral victory of the Congress Party in parliamentary election in April-May 2009 and the general political stability of India garnered economic prospects and confidence by foreign automakers among others although the Indian state is financially weak and highly leveraged. India's automobile market turned around for the better in the early 2009 against forecast anticipating a declining motor vehicle demand due to reduced macro-economic growth, unaffordable financing and negative impact of the global downturn on the India software industry. Motor vehicle capacity in India is also underutilized like in China, and export is becoming an increasingly important way of improving auto manufacturing efficiency. In general, conventional measures like tax reductions on vehicle purchases and cash-for-clunkers and strategic interventions like investment support for green automotive technology have been considered and sometimes enacted and implemented.

In the emerging peripheral market of ASEAN's AFTA Thailand pursued a regional-oriented FDI based automotive development strategy from the early 1990s, while Malaysia aimed for an autonomous and national automotive industry from the early 1980s based on joint ventures with Japanese automakers (Mitsubishi Motor Co., Daihatsu, Suzuki). The Malaysian national automotive policy evolved to the point where national champion, Proton, became independent of foreign interests (MMC, Mitsui) and could assemble, design and make cars and engines on its own, but Proton has been unable to compete on international markets. After year 2000 Japanese JV partners have gained majority control of the other significant national automakers (Perodua, MTB), and it has recently liberalized the automotive market once again targeting a common AFTA market by 2010. During the global financial crisis the Malaysian government launched an 'old for new' auto purchasing scheme but only for the 'national' automakers sticking to its 'automotive nationalism'.

¹⁴ Internal combustion vehicles can also be powered by bio-fuels, natural gas or hydrogen (Chanaron 2009).

Overall, governments in developing countries and in particular China have focused interventions on providing credit facilities and guarantees to auto businesses, incentive programs to scrap old motor vehicles and purchase new ones with cleaner technology, reducing vehicle taxes, renewing public sector vehicle fleets, and funding R&D in green technology. In general, governments have refrained from interventions in the automakers supply chains leaving rescue operation of key suppliers to their business customers, the OEMs, like it has been the case in the Global North. Yet, interventions targeting automotive unemployment directly have been less pronounced in the Global South. Unemployment benefits, short-term work schemes and expanded training funds for autoworkers have primarily been instigated in Global North and partly in Russia and Turkey (IMFmetal 2009). This difference between North and South is rather surprising because in developing countries with considerable automotive industries saving jobs take first priority during a crisis. Downsizing plants and retrenching employees are no easy deal in labor markets with high under-employment and unemployment. Regular jobs in auto assembling companies will often be part of the better paid segment of the labor market while jobs among auto suppliers will often be less advantageous. Regular jobs will also be protected by labor law and also often by collective agreements between employers and trade unions. The automobile industry has been relatively well unionized across the world including developing countries like Brazil, South Africa and Malaysia. Temporary, immigrant and 'flexible' employment has increased during the 1990s and 2000s in line with neo-liberal globalization. This 'flexibilization' of labor markets provides employers with leeway for rapid employment adjustment while enabling the firm to preserve the core workforce and hence the company's core skills and competences. 'Voluntary' separation schemes will often be the preferred option of employers dealing with redundant regular workers, but in many cases companies will try all other options to avoid retrenchments like eliminating overtime and shift work, relocating employees, forcing workers on vacation, selecting more employees for training and education and temporary lay-offs with wage compensation (for India, D'Costa 2009; for Malaysia, Wad 2009).

Governments in developing countries have also formulated and instigated proactive, strategic initiatives that should enable a transition from brown to green automotive industries by way of furthering green energy technologies and green energy supplies in general and clean automotive technologies in particular. Bio-fuel in Brazil had a long history before it succeeded around the 2008 global financial crisis. Chinese government has also before the global crisis decided to prioritize green technologies and renewable energy generation in order to cope with rising fuel prices and consumption, increasing pollution of the environment, international fuel and commodity dependence and security and opportunities for 'rapid upgrading' and technological leapfrogging with the opportunities provided by the emerging green revolution in automobile manufacturing. China began an Eco Mark program in 2003 for automotive, furniture, home appliances and food industries, and the central government initiated experimental support for public service agencies in selected cities to acquire greener hybrid cars (Just-auto, October 2009). Several larger cities have tightened their auto emission regulations, and high emission vehicles might be highly taxed in the future. Although the Chinese government will not increase fuel taxation the fuel price level is still 30 percent higher than in USA. The government did also launch an 'Old for New' scheme in mid-2009 promoting scrapping old fuel inefficient vehicles with new more efficient vehicles. And the Chinese state does only support green automotive technology development in collaboration with public and private automakers like BYD. Finally, the Indian government faces the generic problems of developing countries, that is, mass poverty and fraud, and these problems impede higher automotive sustainability in many ways.

Summing up

Auto industries in developing countries have not been as severely hit by the global financial and economic crisis as the automotive industries in the Global North, with the exception of the heavily export-based industries of Mexico, Thailand and South Africa. In all three cases the automotive assembling industry has been foreign controlled by auto TNCs from USA, Japan and Europe respectively. Automotive parts suppliers have also been severely hit by declining OEM sales and production as seen in the South Africa auto component segment of catalytic converters. Facing plummeting sales auto TNCs have responded in the classical defensive ways (IMVP 2009, 5): Downsizing capacity to reduce fixed costs; cutting current expenses (e.g. advertising, wage bill) to reduce variable costs, and launching new products and eventually increase prices which VW in fact did this in Mexico. These measures impact negatively on lower tiers of local auto parts suppliers. They will be the local business victims of the debacle, and the most negatively impacted sections of society is the unskilled employees and their families together with the local communities of which the automotive industrial clusters form a significant part in Mexico as well as in Thailand and South Africa. Among the least affected automotive industries are the Chinese one, but the evasion of the crisis has been orchestrated by the Chinese government's economic growth package and the stimulus package targeting the automotive sector. Besides the Chinese case, automotive 'host' governments in developing countries have taking modest initiatives to counteract the impact of the Northern crisis on automotive exports.

Apart from short term crisis management, medium to long term policies have been part of the political interventions in acknowledgement of the automotive industry's energy and emission problems. During the 2000s developing countries in Asia, Africa and Latin America increasingly realized the triple constraints on automotive transport in the 21st century: Mismatches between oils supply and demand; energy security contra energy supply vulnerability; and healthy environments versus pollution and climate change (PWC Automotive Institute 2009, 35). These challenges point to the importance of increased fuel efficiency of automotive vehicles in the short and medium term which can be improved through policies like cash-for-clunkers, tax reductions on smaller cars and on vehicle purchases and tax increases on miles driven; support for direct inject technology; and better driving routines through information campaigns and teaching of drivers. In the longer term, governments will have to engage themselves actively in the promotion of cleaner technologies like bio-fuels, hybrid and electric motor vehicles and the accompanying infrastructure plus smarter transport systems like public and private transport linkages and non-automotive carriers. Fuels efficiency measures have been underlined and supported by governments all around the world increasing the competitiveness of subcompact manufacturers among Japanese, European, South Korean and Indian automakers and also auto manufacturers with advanced diesel engine technology. The Chinese government has taken this green technological transformation as a window of opportunity and has decided to invest tremendously in this option. Moreover, China's manufacturing industry already possesses core competences in battery technology and manufacturing illustrated by the global private-owned Chinese battery maker, BYD.

In this way, the Chinese automobile market illustrates the emergence of a brown and green sunrise automobile industry. The potential of such an industry is indicated by the decision of Volkswagen, the largest automaker in Europe, to line up with Chinese BYD in order to stay competitive in the new-energy vehicle sector. BYD, a so-called Third World multinational corporation, is not only making batteries but has concentrated on production of electrical cars, including plug-in hybrid electrical cars. Table 7 (see next page) depicts the situation in 2009 in a very simplified manner.

5. Conclusions and implications

The paper has addressed the contemporary problem area of the automobile industry in developing countries within its global industrial context, the 2008-09 global financial and economic crisis and the long term growth (sunrise) or decline (sunset) scenario and the emerging technological transition from a brown industry to a green industry. The conclusions are the following:

In the early 21st century the automobile industry in the Global South is in general a ‘brown sunrise’ industry with above average global growth rates in sales, production and employment and some emerging export hubs. This contrasts with a ‘brown sunset’ automobile industry in the Global North that is slow growing, job-losing and value destructing on the one hand and consolidating, outsourcing and innovating on the other hand aiming to counterbalance raising costs and higher standards for fuel efficiency and emission, safety and recycling of scrapped vehicles. Being invented more than 100 years ago and developed by Northern firms into a capital- and technology intensive industry it has been governed by Northern automakers (OEMs) translating into alliances of OEMs and 1st tier suppliers (OESs) headquartered in the Global North. Joint ventures or local automotive firms among automakers and parts producers have been taken over by Northern auto TNCs or relegated to 2nd tier and 3rd tier positions of the automobile supply chain hierarchy.

Table 7: Automotive industries by nations and OEM firms distributed after long-term growth (sunset, sunrise) and automotive technology (brown/green), 2009 and past history.

Automotive industry		Automotive technology		
		Brown	Hybrid/mixed	Green
Sunset	Macro	Global North		Bio-ethanol: Brazil
	Micro	US OEMs		Fiat (bio-ethanol, Brazil)
Uncertain	Macro			Hydrogen fuel cell: USA. Bio-fuel: Brazil, USA, EU.
	Micro	EU OEMs		Hydrogen car: GM. Battery recharging infrastructure & carmaker: 'Better Place', Renault-Nissan.
Sunrise	Macro	Global South	Japan (HEV), Brazil (flex-fuel)	EV: China, Germany, USA
	Micro	Japanese OEMs; German BMW, Daimler, VW/Porsche. Energy-saving engine (especially diesel) & transmission technology.	Toyota (HEV, PHEV). Honda (HEV). BYD-VW (PHEV). Fiat, VW (flex-fuel cars).	PEV: BYD-VW.

The ‘death of the local firm’ – local OEMs and 1st tier suppliers - has been corroborated, with a few potential exceptions to be found in the new Asian economic giants, China and India. This trend is an effect of the business logic of the global automobile industry where auto firms are aiming for economies of scale, scope and speed targeting customer demands that are sensitive to price, quality and delivery time and reliability. The solution to these problems have been a variety of business strategies that have sought a trade-off between scale, scope and speed and automobile

manufacturing has increasingly been organized into modular supply chains and made use of common automobile platforms across models and brands. But the automotive dynamic requires expanding markets both in terms of increasing auto intensity and larger populations in driving ages. Only large economies and populations (India and China) can afford a national market, and countries with smaller economies and populations must combine into regional markets or be linked to the global North automobile market directly. Then, automakers will choose to 'build-where-you-sell', that is, they will relocate and produce the automobiles and parts in the local market, other things being equal. Due to the industry's oligopolistic structure global automakers and parts suppliers may also locate in adverse markets if their core competitors do so. In emerging markets with fast growing economies and rising incomes automobile markets will expand, and these qualities have made developing countries the new and interesting automobile markets and production sites for global automakers both in terms of sales and productive investments.

The global financial and economic crisis started in the USA and spread to Europe and Japan through the global integration of their financial systems and participation in high-risk financial segments (subprime loans etc.). Developing countries had not in general been included in this risky and profitable financial market because their financial systems underwent stabilization and reforms after the East Asian financial crisis in the late 1990s which also spread to Russia, Latin America, and South Africa. The effect of the global crisis came immediately with the stop for consumer credit and rapidly declining consumer confidence hitting in particular durable and expensive purchases like automobiles. The automobile market and industry are very sensitive and vulnerable to business cycles in the same way as the construction industry but contrary to e.g. the pharmaceutical industry and the automobile industry plummeted impacting export of motor vehicles and parts from developing countries like Mexico, South Africa and Thailand. When the economic crisis spread to other industries and markets additional export industries in the Global South were hit like the textiles and garments, furniture, steel, chemicals, IT hardware and software export, tourism etc. When the export sectors and the general economy declined in the Global South, too, consumer confidence began withering and automobile sales went down followed by downsizing of production and worsening employment conditions.

In the Global North financial institutions like banks as well as big automakers showed up to be 'too big to fail', and they were saved by government intervention. Thereby, the market mechanisms were not allowed to work and generate 'creative destruction' freeing the sector for inefficient firms and providing more business for efficient firms. The prestige of lead firms in the economically important automotive industry ('the industry of industries'), the oligopolistic dynamic of the industry plus strong business associations and employee organizations like trade unions and works councils have always called upon state regulation and support around the world. The global auto makers responded to the crisis with traditional measures of crisis management e.g. downsizing, cost reductions upstream and downstream, and product and process innovation, but for some, especially in USA, it was too little too late having overlooked the upcoming burst of the bubble economy. Auto components and parts suppliers were the first to be squeezed and fall victim, but they were seldom part of rescue operations. Parts suppliers have always and everywhere been less protected and more exposed to competition than the OEMs. Only if they were part of selective government programs to alleviate poverty and lift particular communities e.g. majority ethnic populations in Malaysia and South Africa, these small and medium-sized firms could benefit. Financial support mechanisms, vendor programs and global linkage programs have been designed and executed including training, market intelligence, export support and credit lines, and sometimes they have been assisted by international organizations like UNIDO. But if assisted by new national OEM

champions, these programs run the risk of being a failure because the champions may not have the capacity and capabilities to upgrade its vendors to international standards, as it seems to be the case in e.g. Malaysia. Automotive SMEs have primarily been able to survive supplying the aftermarket with spare parts or participate in the lower (value) end of the global value chain.

The machine that changed the world of the Global North will also change the world of the Global South in the future. The industry will continue as a brown sunrise industry, and the rapid evolution of mass motorization will negatively impact local and global resource endowments, environments and the world climate. Therefore, increased motor vehicle density and use will necessitate a fourth and 'green' revolution of automotive manufacturing in the Global South. In the long run such a clean technology revolution may transform the industry from a 'brown' industry to a 'green' industry and add a fourth 's' (sustainability) to the existing three 's-drivers' of scale, scope and speed. At the same time, the new emerging technological revolution, which is already on in the Global North aiming to transform a brown sunset industry into a green sunrise industry, provides catching-up opportunities for automobile and other firms in developing countries. New incursions are possible into the existing global and oligopolistic corporate structure and even options to surpass this structure by genuine 'value chain' upgrading as illustrated by Chinese BYD. North-South automotive alliances are already formed about clean-tech projects e.g. VW and BYD, but options are tremendous within the whole panoply of green automotive technologies including bio-fuel and biotechnology, electric power chains and chemical and electronic engineering, renewable materials and nanotechnology. If automotive industries in developing countries shall harvest this opportunity and leapfrog technologically, strong local and regional coalitions must be formed not only between automotive foreign and local firms but also between governments, universities, related business and labor organizations together with civil society NGOs (consumer groups, environmental groups).

Seizing the opportunity of the 21st century to transform brown sunrise automotive industries in developing countries into green sunrise industries, the later-comer automotive industry can once again achieve the status of 'the industry of industries' but now playing the role as a vehicle for 'green' industrialization. This option has not been changed with the global financial and economic crisis of 2008-09. On the contrary, the global crisis has underscored the point that export-oriented automotive growth is a vulnerable path of automotive development, and that domestic motorization in the Global South must be balanced with an adequate and 'greening' automotive market, industry and infrastructure within a wider political economy of sustainable development.

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