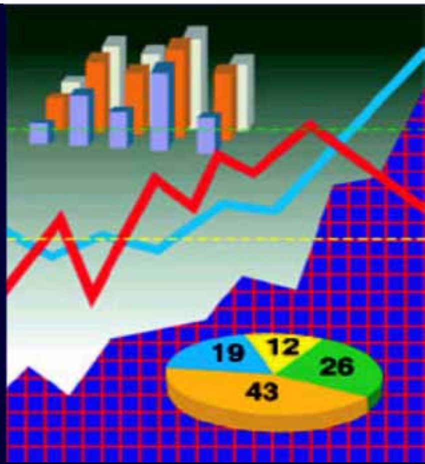


Business Outlook

Global Electronics Industry

(with emphasis on Europe)

Custer Consulting Group
www.custerconsulting.com
February 2017

Business Conditions

2017 Situation

Many <u>global electronic equipment volume markets </u>(except automotive, medical & SEMI equipment) have been stagnant; emerging new volume products are not yet large.

2016 closed optimistically with seasonally strong semiconductor shipments & positive leading indicators. Asia's normal pre holiday upturn has now ended.

Copper foil shortages are impacting PCB growth.

Political uncertainty is strong in the USA and Europe. Populist agenda, Trump's regime, Brexit & France's upcoming presidential election are issues.

Mid East, Russia, N. Korea & China concerns persist

20170127

Industrial Production – World

% Change vs. One Year Earlier

Britain	**+ 1.9 Nov**
Czech Republic	**+ 7.1 Nov**
France	**+ 1.8 Nov**
Germany	**+ 2.1 Nov**
Italy	**+ 3.2 Nov**
Netherlands	**+ 2.9 Nov**
Russia	**+ 2.6 Nov**
Spain	**+ 4.6 Nov**
Euro Area	**+ 3.2 Nov**
Canada	**+ 1.6 Oct**
USA	**+ 0.5 Dec**
China	**+ 6.0 Dec**
India	**+ 5.7 Nov**
Malaysia	**+ 6.2 Nov**
Vietnam	**+ 8.3 Dec**
Singapore	**+11.9 Nov**
S Korea	**+ 4.8 Nov**
Taiwan	**+ 8.8 Nov**
Thailand	**+ 3.8 Nov**
Japan	**+ 4.6 Nov**

www.economist.com + Eurostat

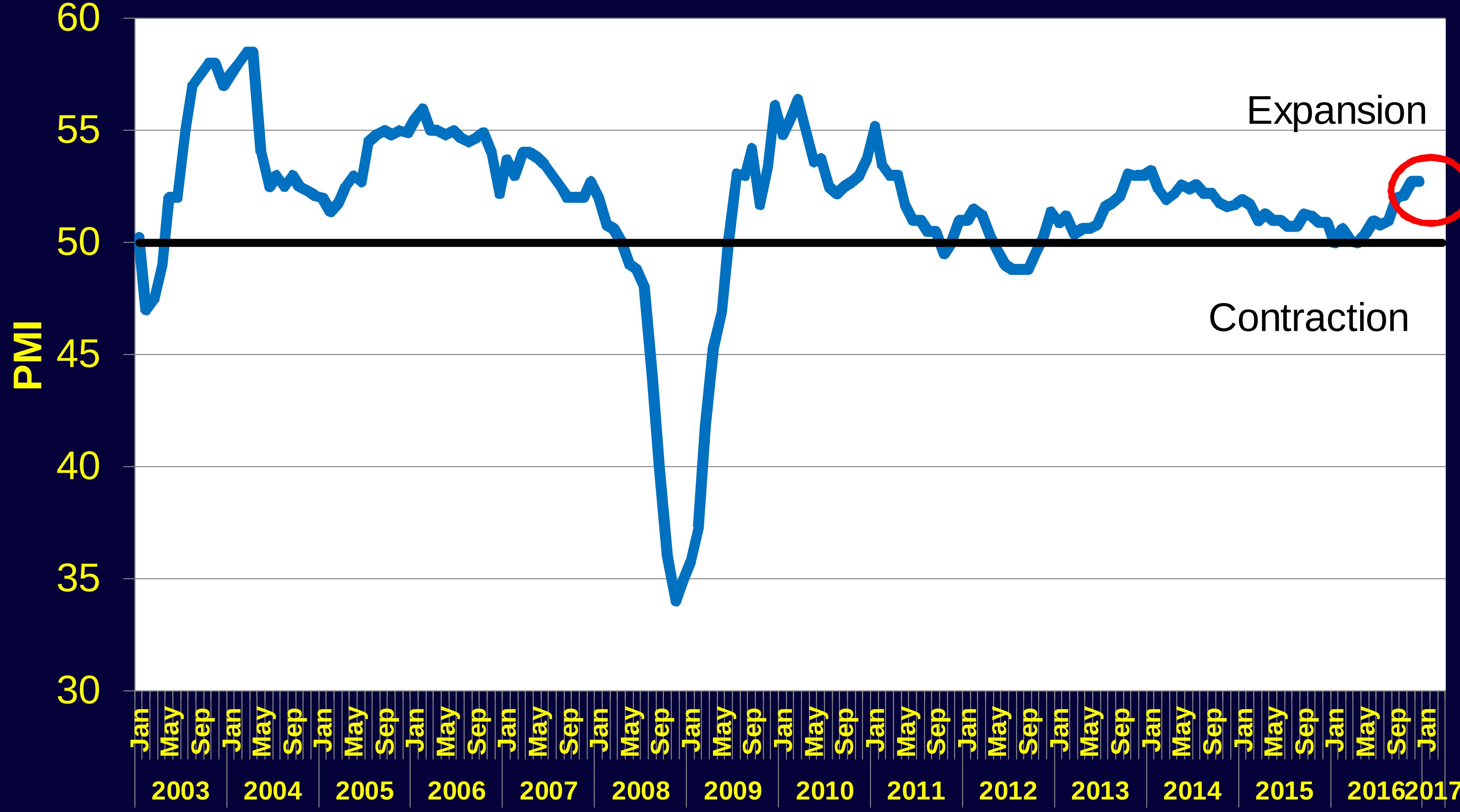
Purchasing Managers Indices

timely measure of manufacturing growth by country

20170201

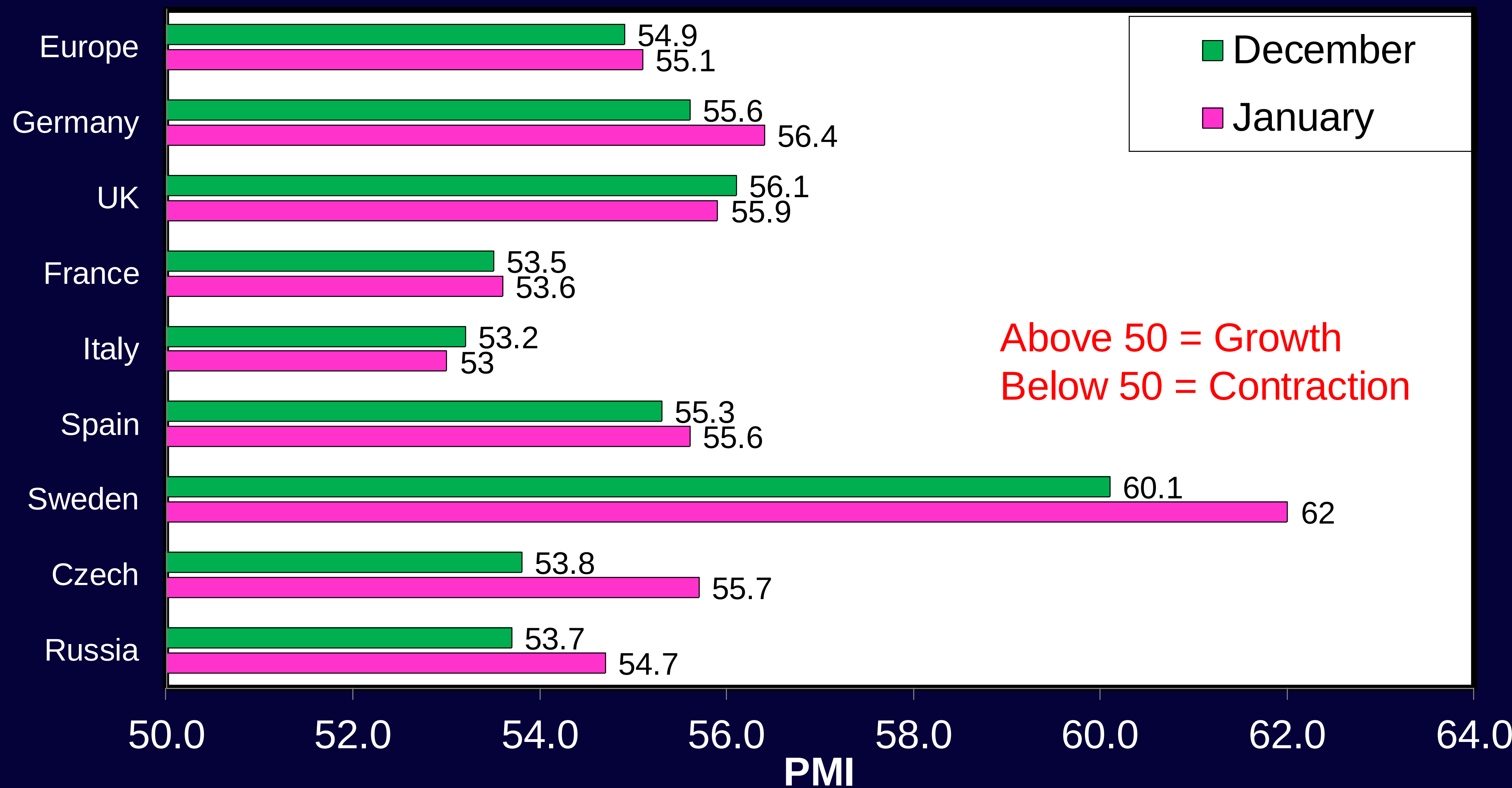
Global "Purchasing Managers" Index

Diffusion Index, >50 = Growth



Markit Economics

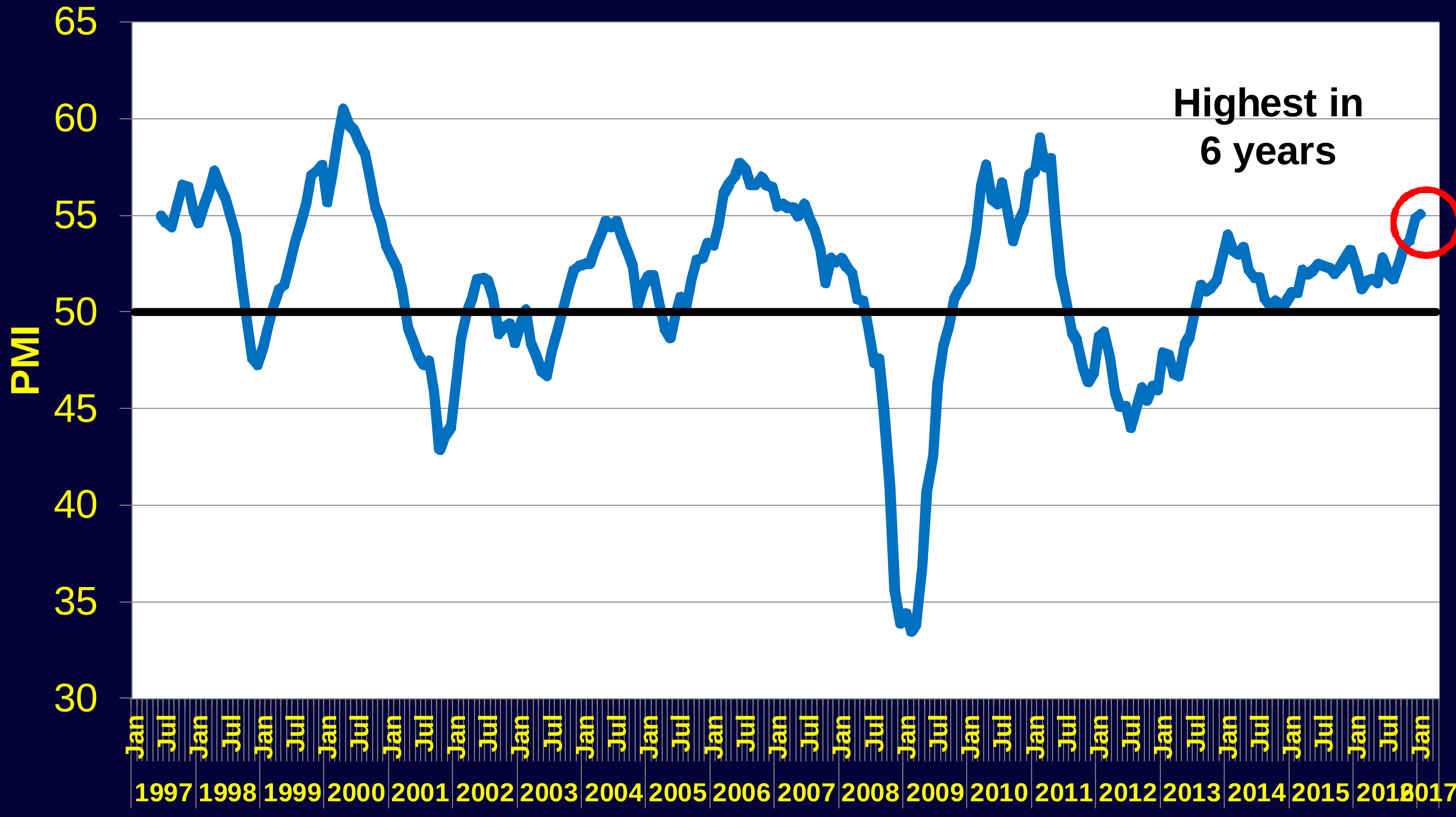
European Purchasing Managers' Indices
20170201
January 2017 vs December 2016



Markit Economics

Eurozone "Purchasing Managers" Index

Diffusion Index, >50 = Growth



Markit Economics

Austria "Purchasing Managers" Index

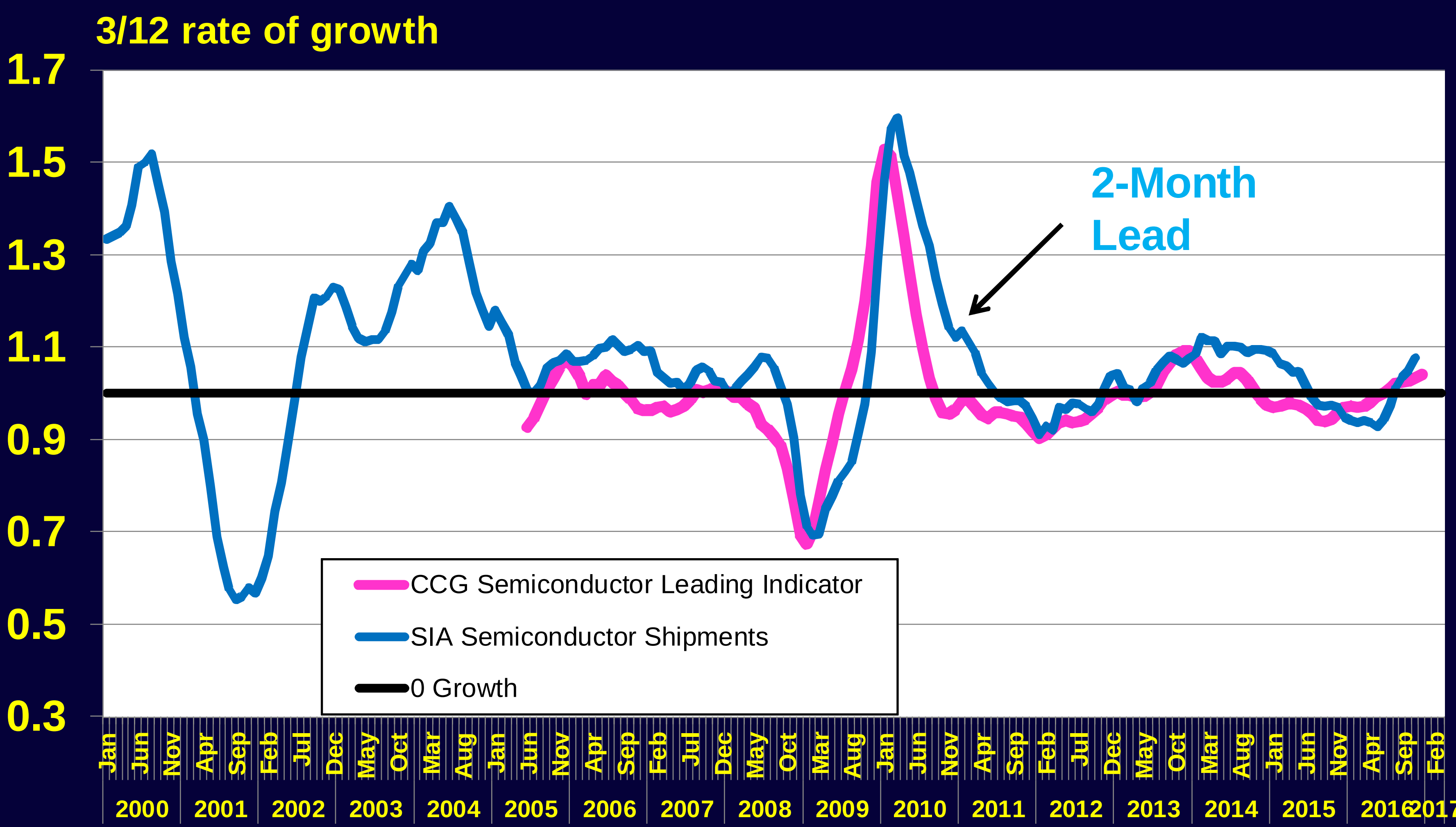
Diffusion Index, >50 = Growth

Markit Economics

Purchasing Managers Indices are a 2-6 month leading indicator of electronics growth

CCG Semiconductor Leading Indicator vs. Global Semiconductor Shipments

20170105

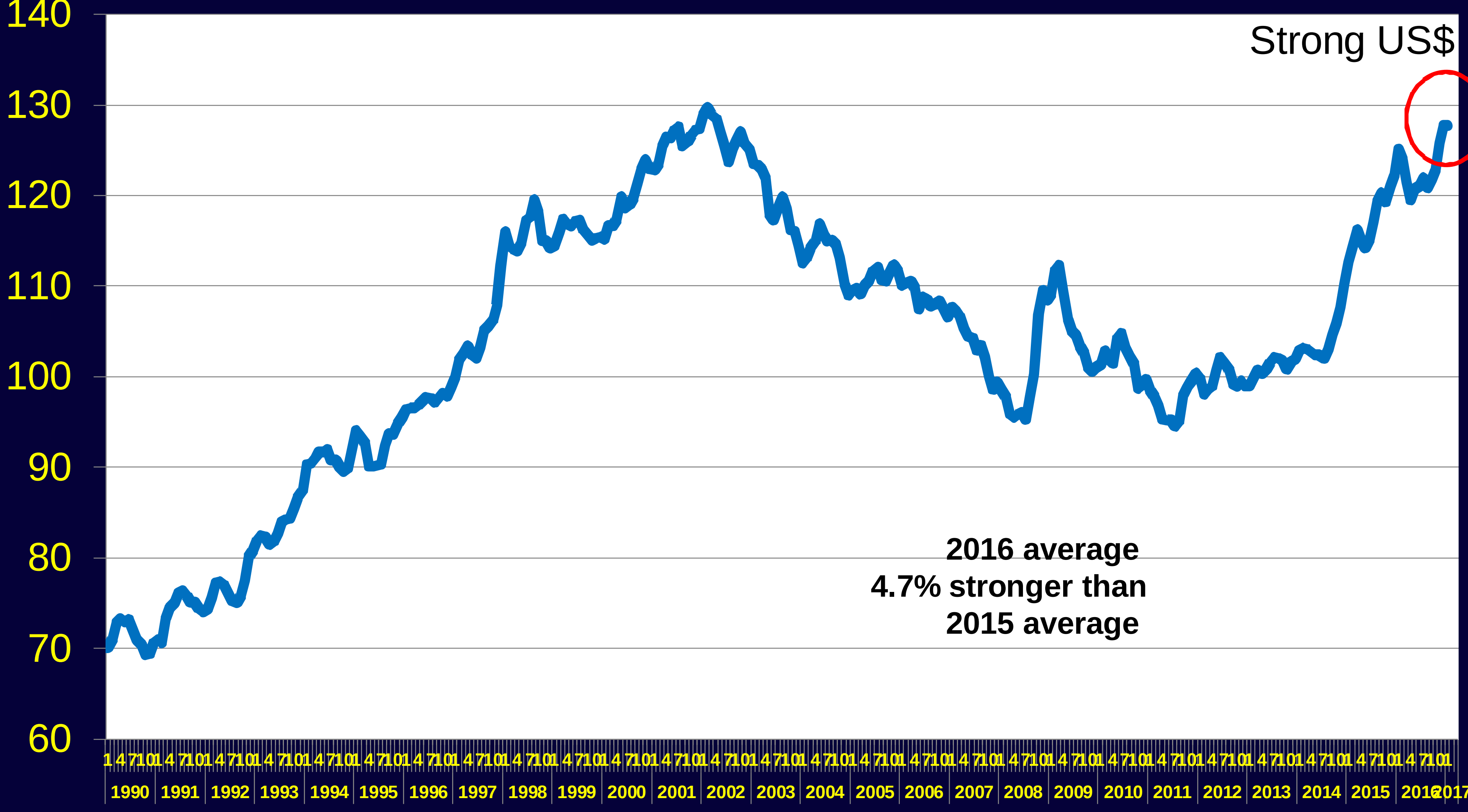


http://www.census.gov/indicator/www/m3/

Exchange Rates
&
Growth calculations

Trade-Weighted Exchange Value of U.S. Dollar Broad

Index (January 1997=100)

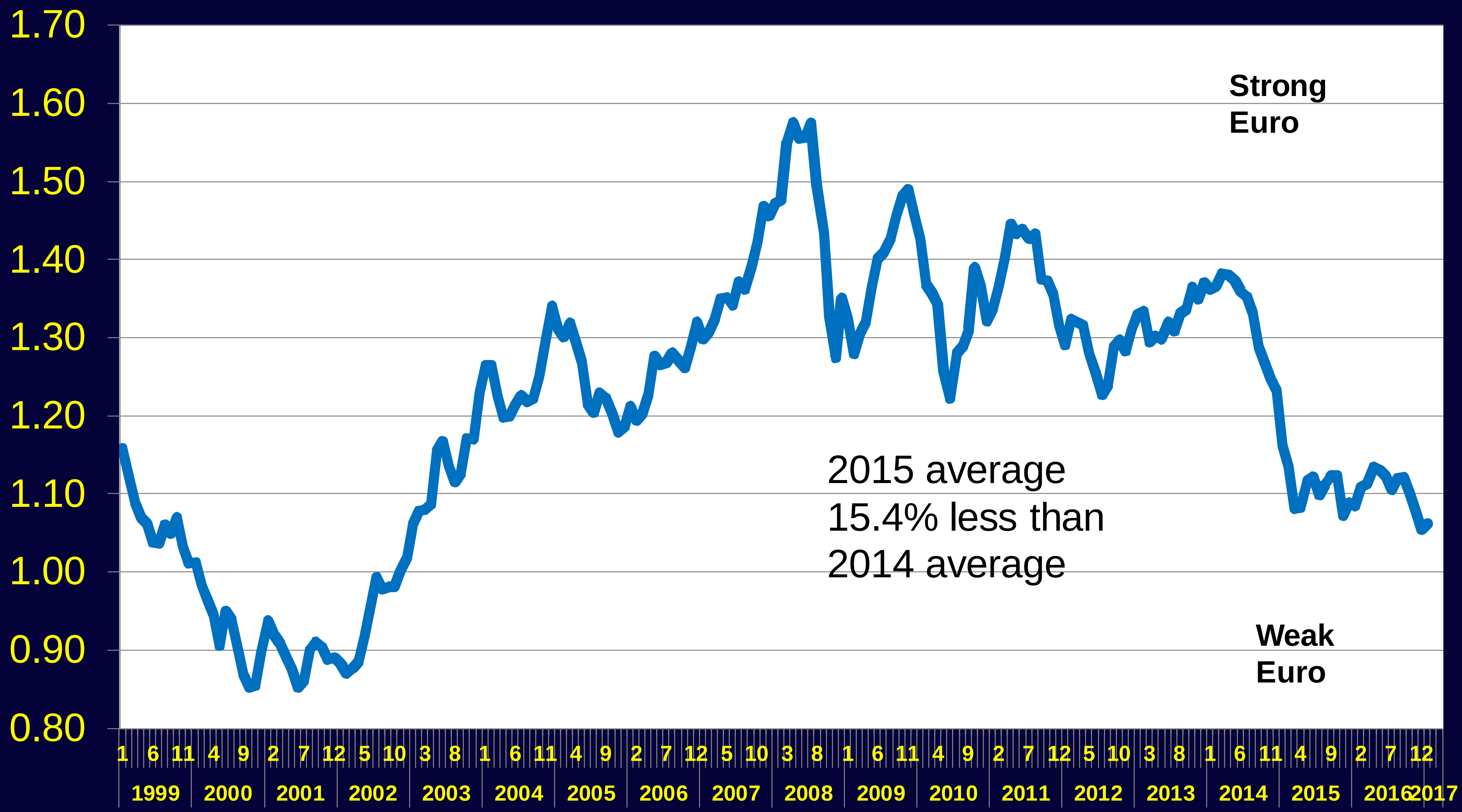


https://research.stlouisfed.org/fred2/series/TWEXBMTH

20170130

Euro vs. U.S. Dollar

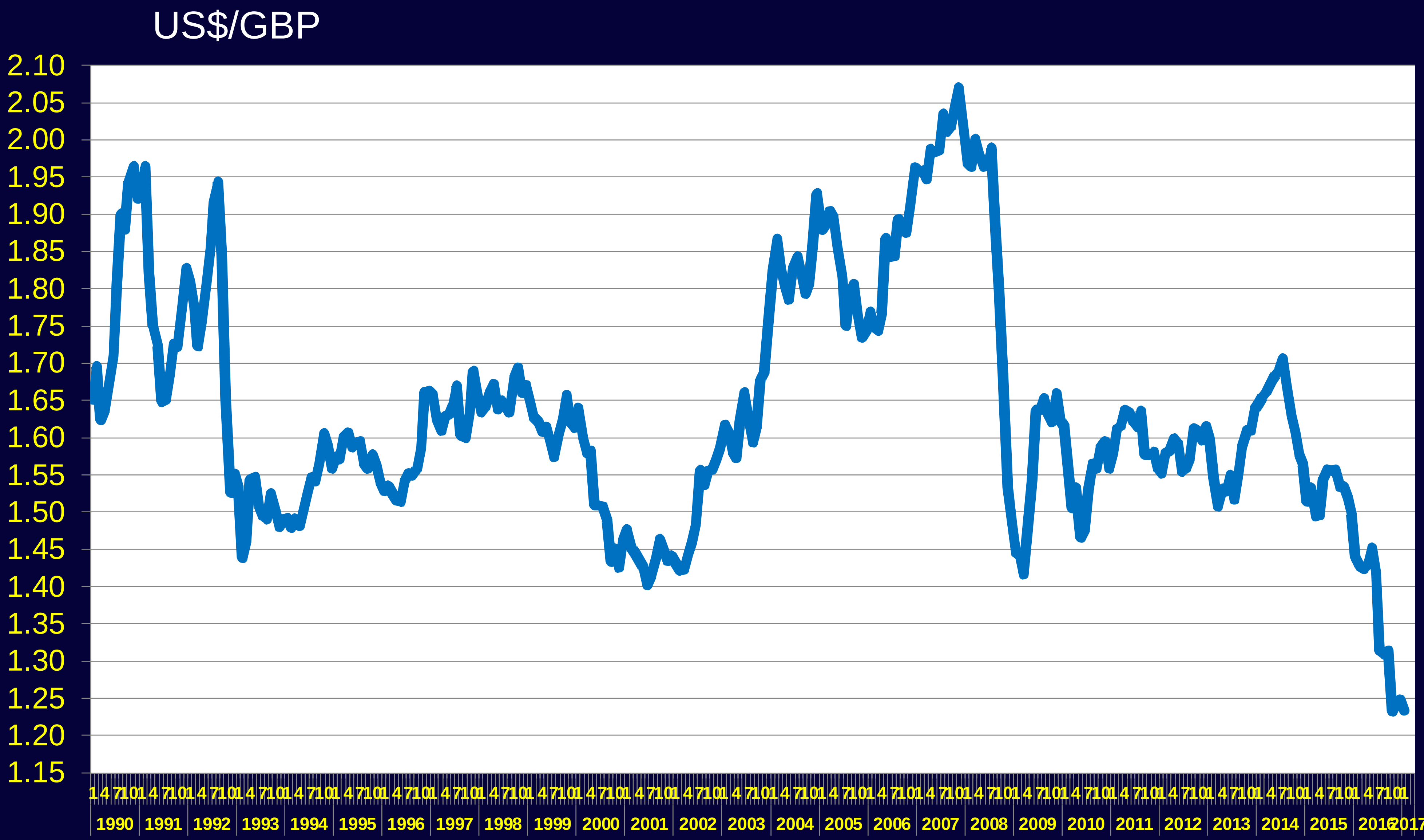
US$/Euro



http://research.stlouisfed.org/fred2/series/TWEXBMTH

20170130

UK Pound vs. U.S. Dollar

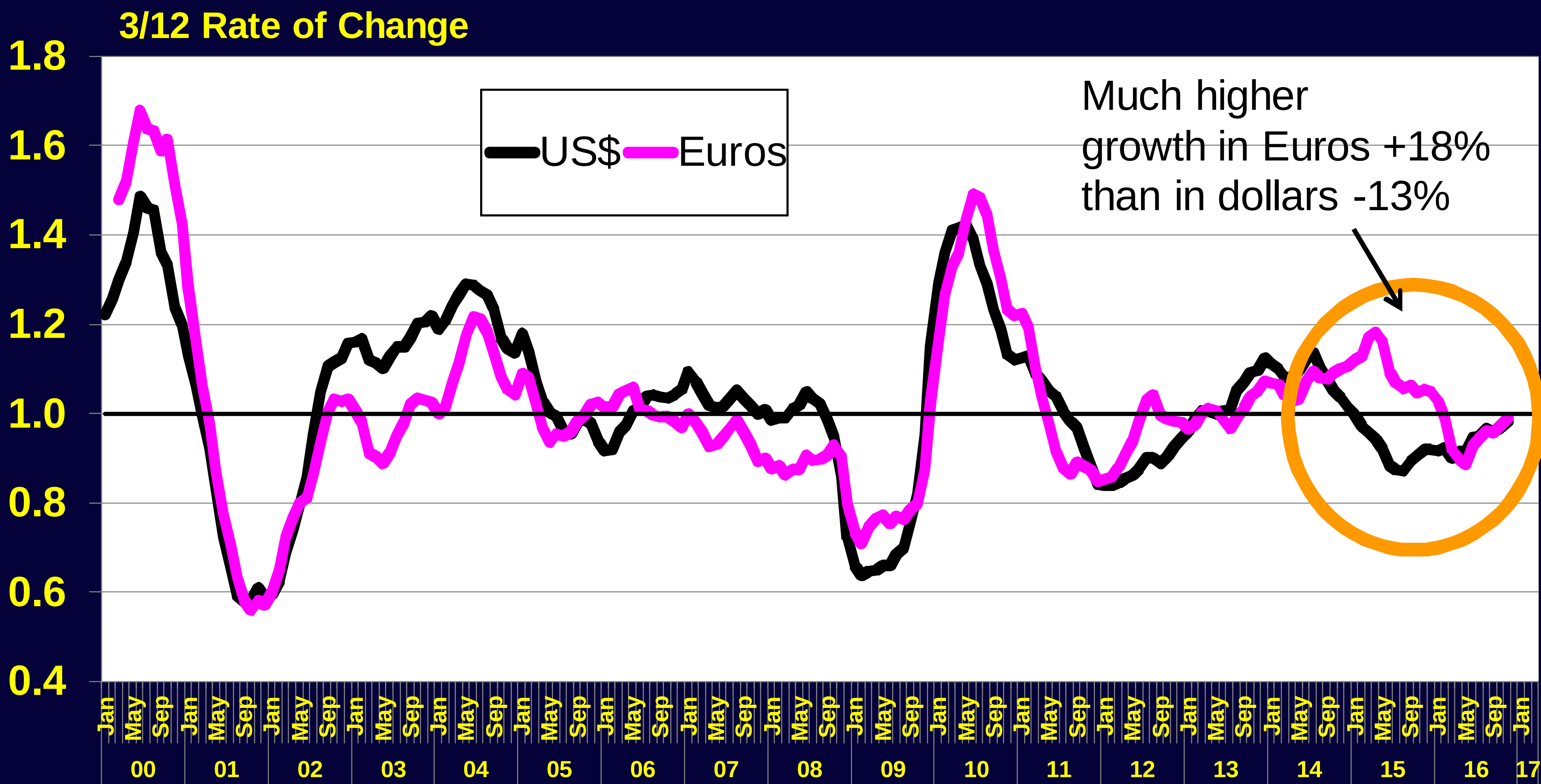


http://research.stlouisfed.org/fred2/series/TWEXBMTH

Growth rates depend on base currency

20170105

Effect of Exchange Rates on Semiconductor Shipment Growth in Europe



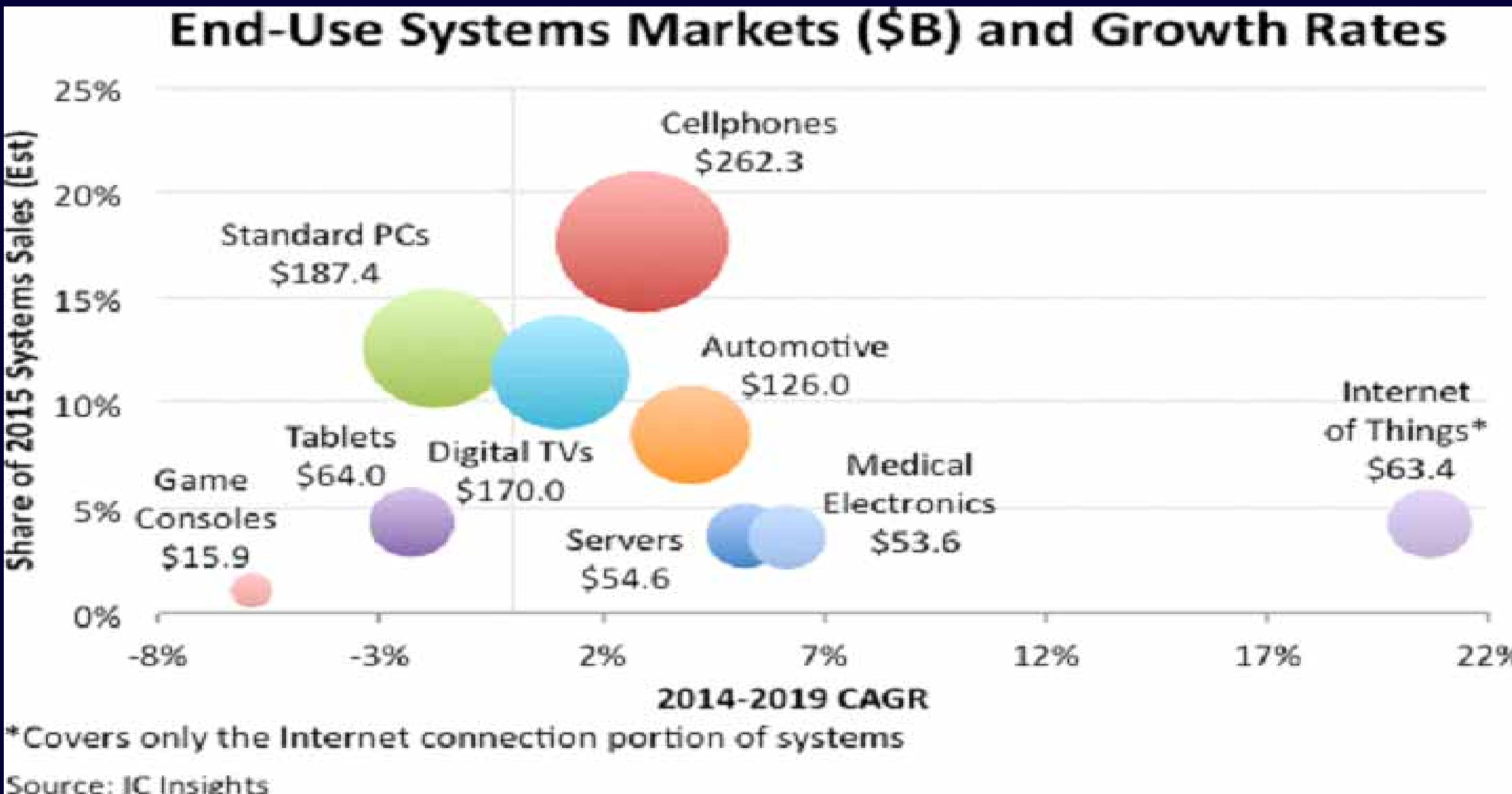
Electronic Equipment

World

20151212

End-Use Markets
Size ($B) & Growth Rates

20150308



Methods to Measure Electronic Industry Growth

Sector composites based upon financial reports of similar companies
- Typically quarterly, semiannually or monthly

Government and trade organization statistics
- Typically monthly

- TIMELY DATA REPORTED ON A CONSISTENT BASIS IS KEY

Sector Composites

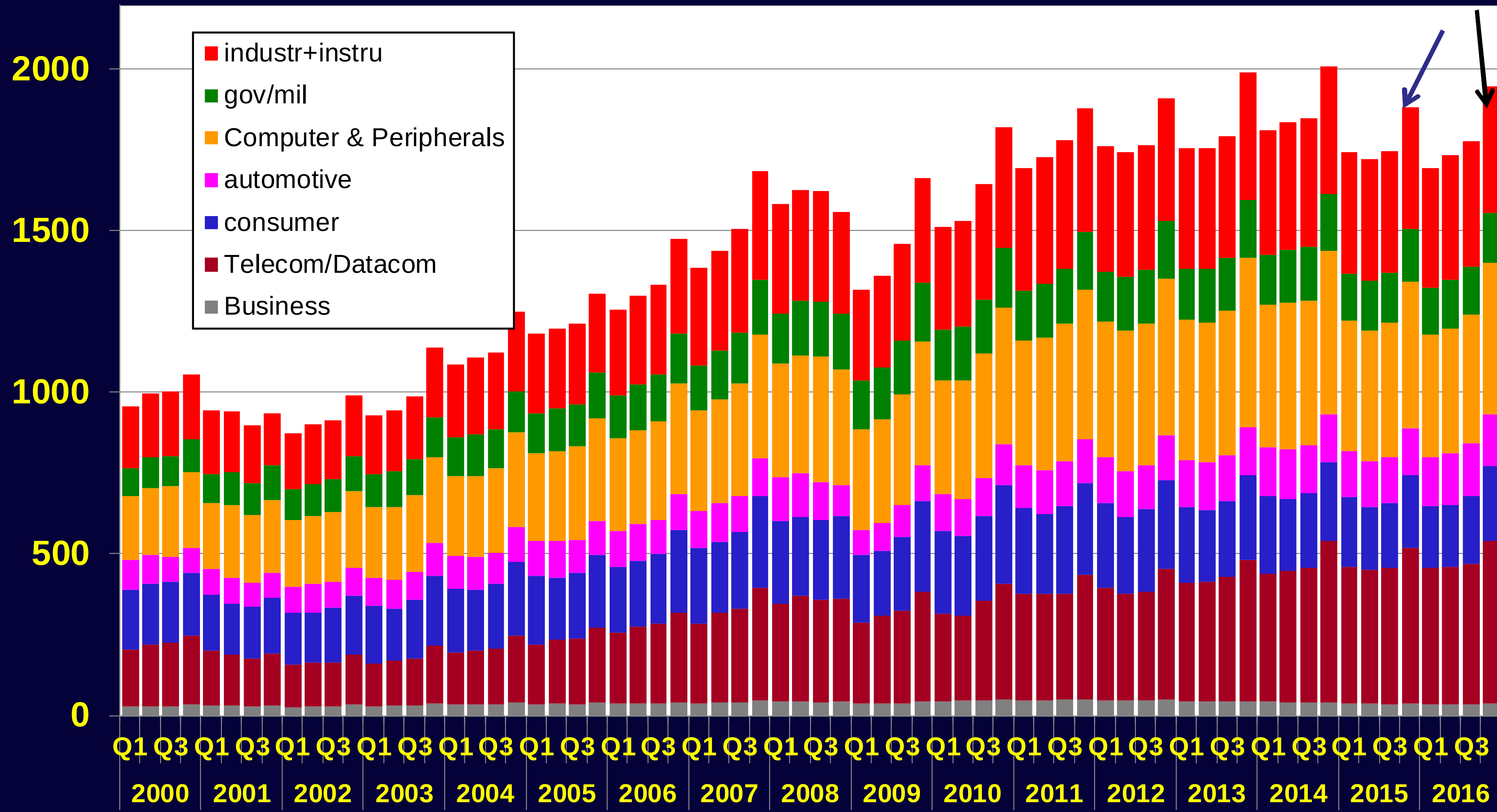
World Electronic Equipment Production By Type

20170204

+3.1%

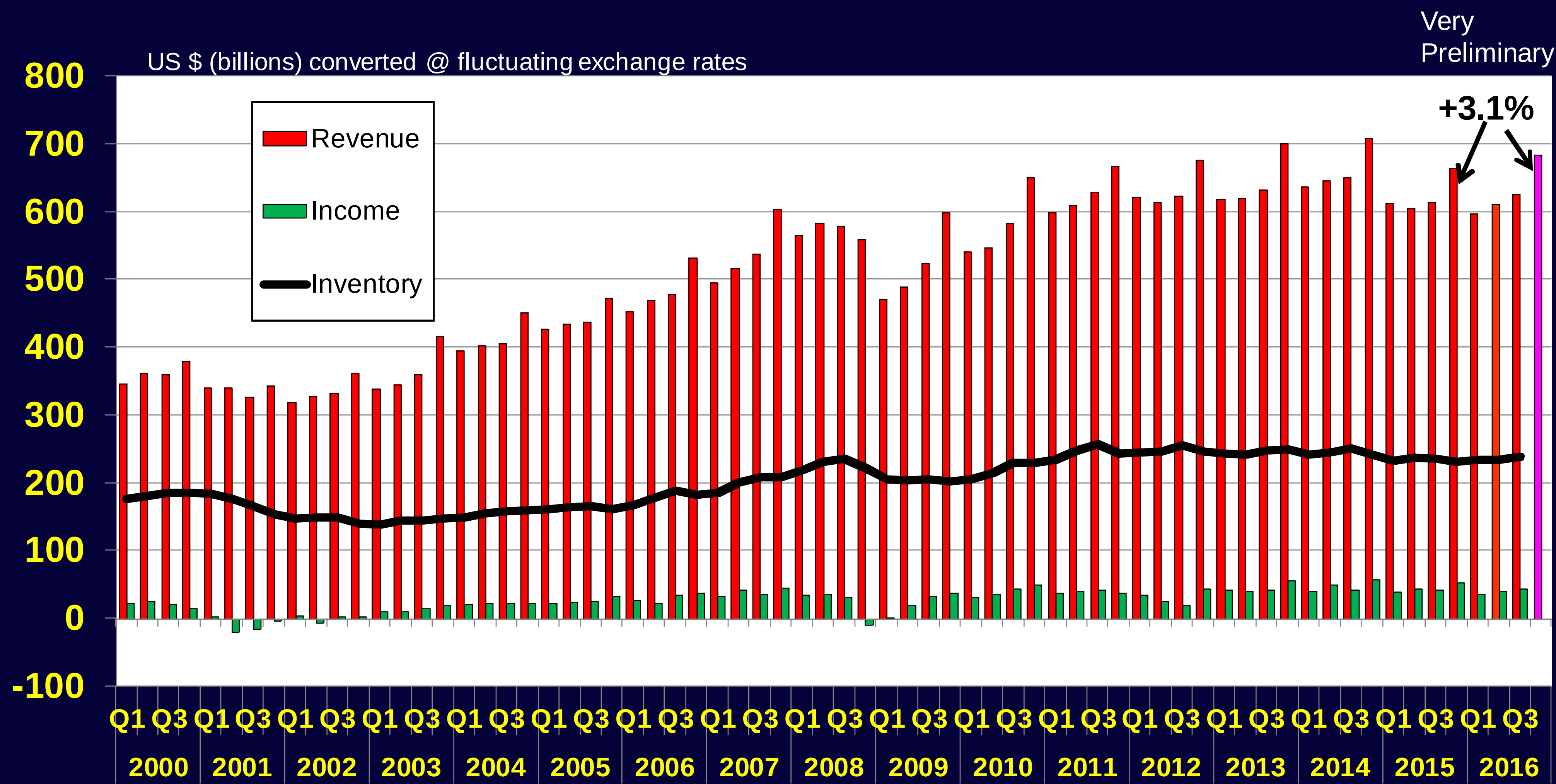
Very preliminary

Annual Rate $B (converted @ fluctuating exchange rates)



20170204

Electronic Equipment Suppliers
Composite of 213 Public Companies
Revenue, Net Income & Inventory

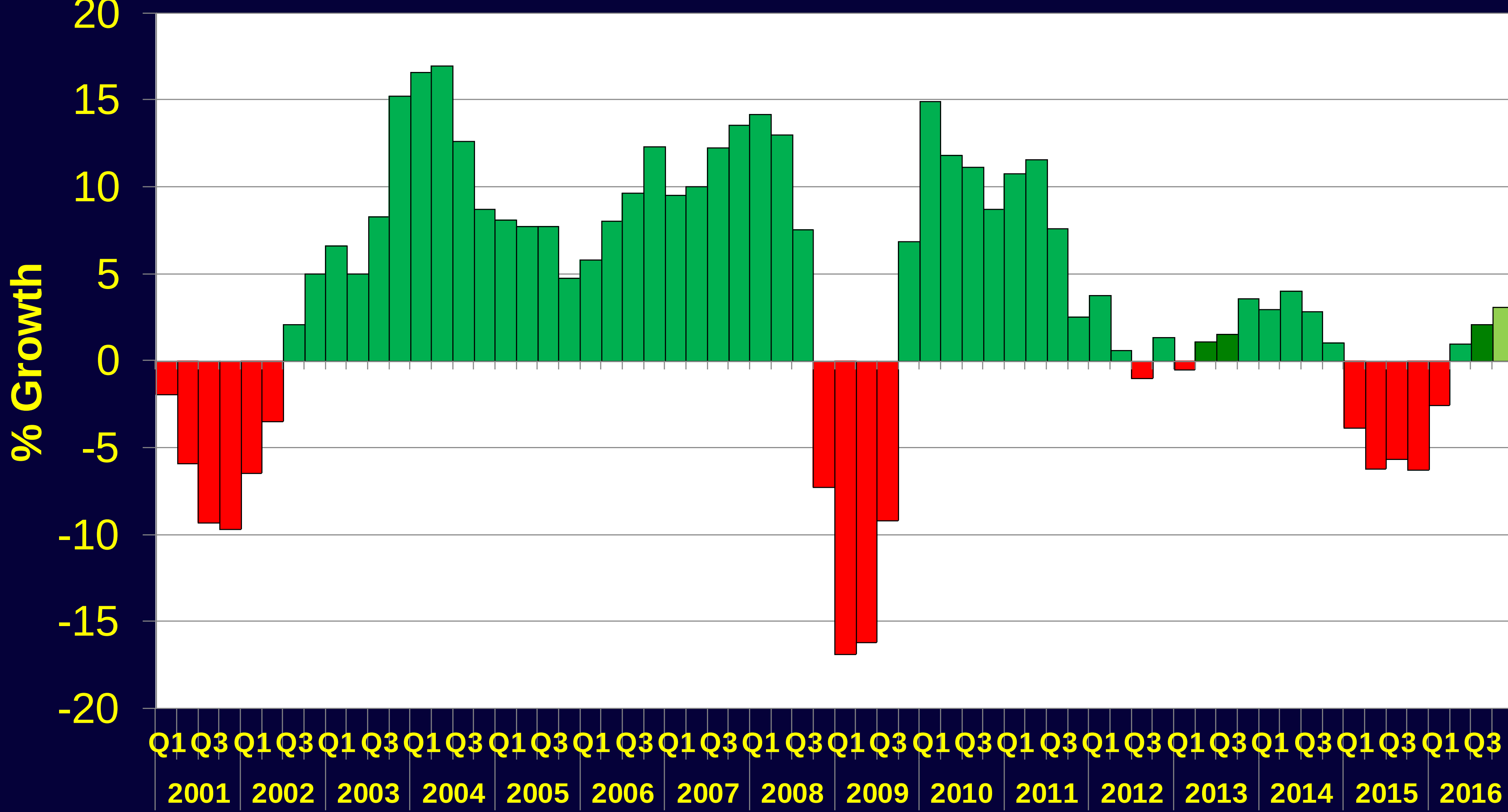


Computer 13, Internet 13, Storage 17, Communication 30, SEMI 40, Medical 21, Instruments 16, Military 21, Business & Office 6, Consumer 21, Automotive 15

20170204

Electronic Equipment Suppliers
Composite of 213 Public Companies
Quarterly Revenue Growth

US$ converted @ fluctuating exchange rate



Regional Data

U.S.

Europe (Eurostat)

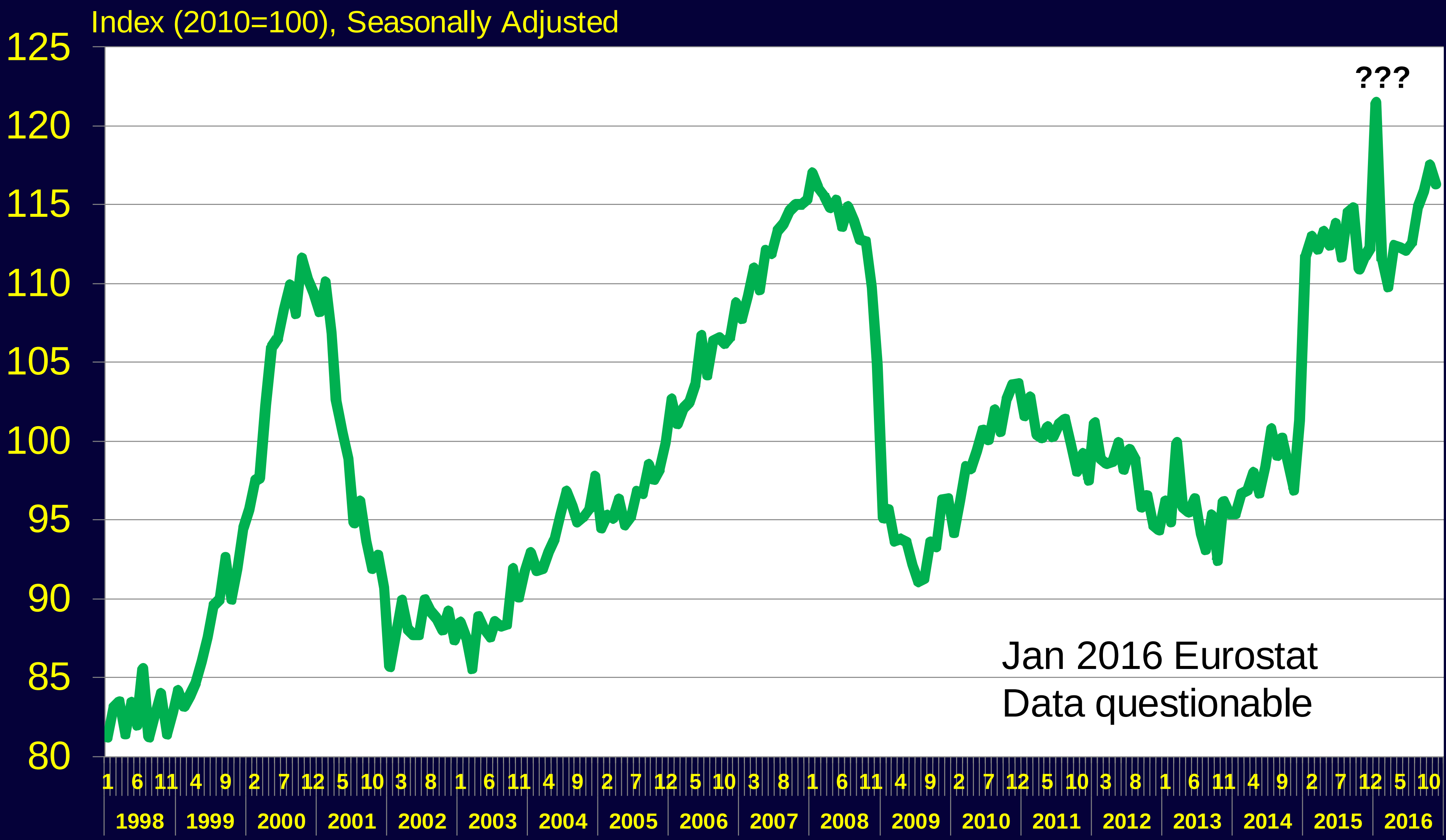
Japan

China/Taiwan

S Korea

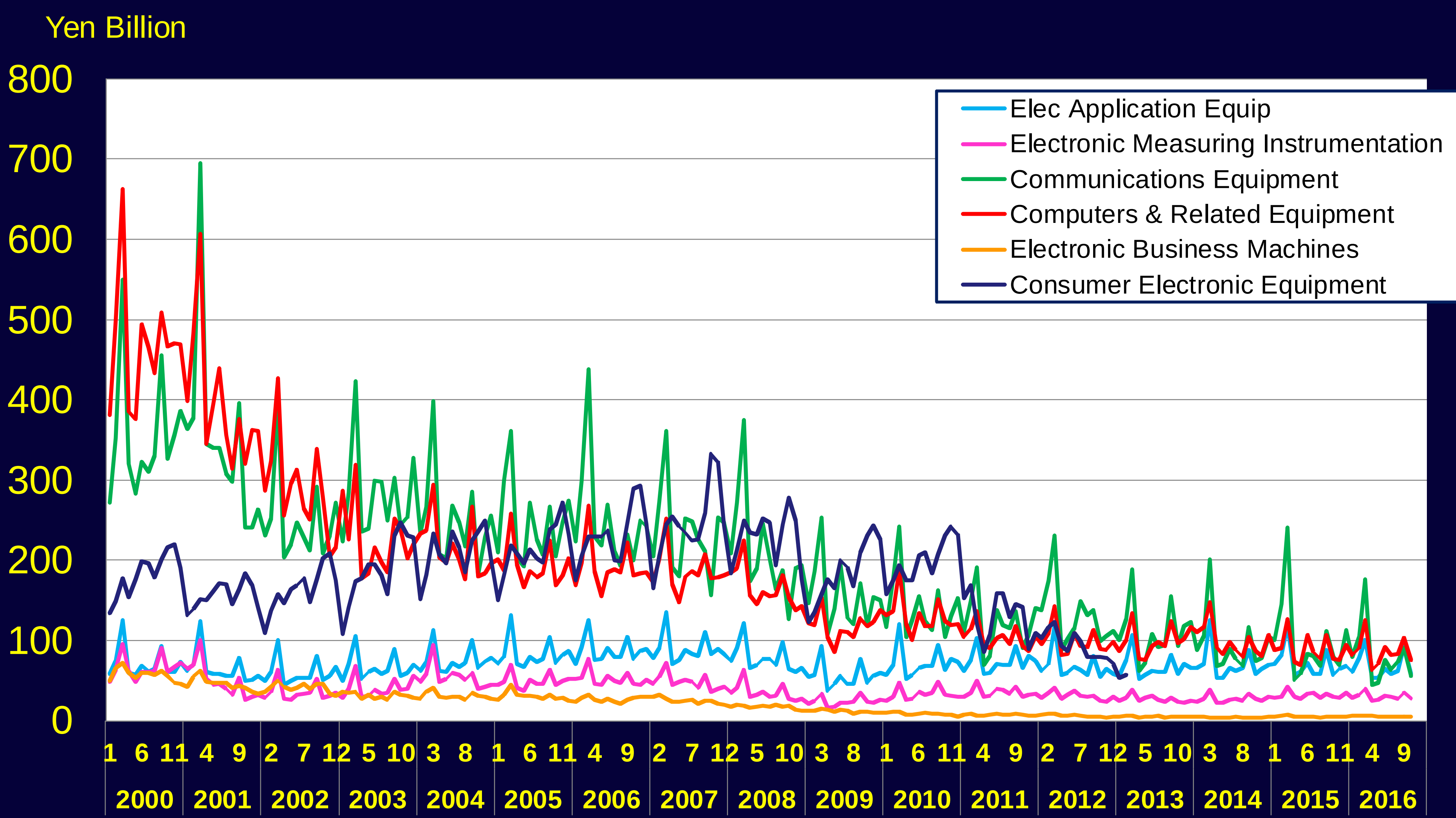
20170112

European Computer, Electronic & Optical Products Production



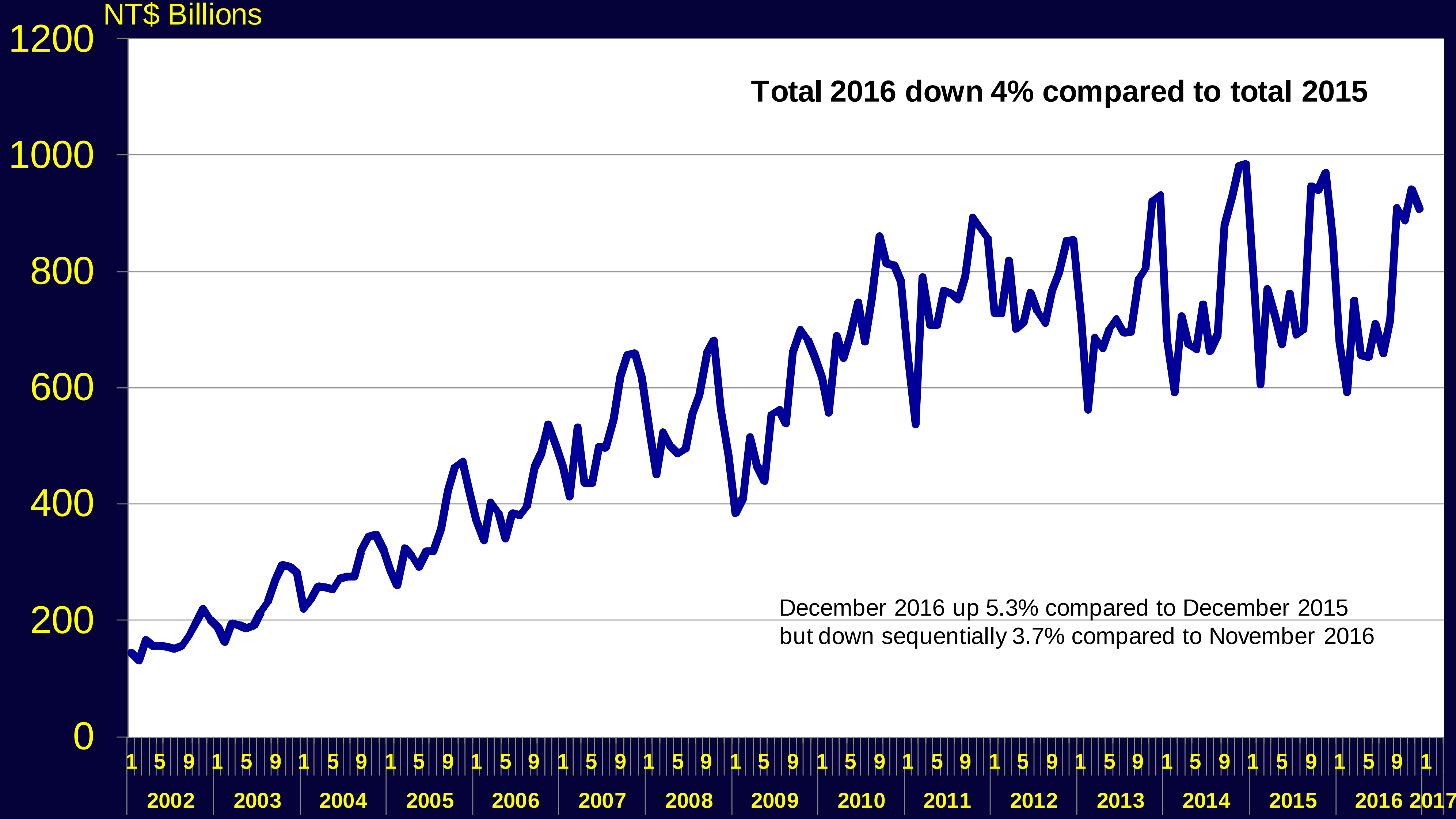
Eurostat, C26 category, EU 28 countries

Japan Electronic Equipment Production by Month 2000 to Present



JEITA www.jeita.or.jp/

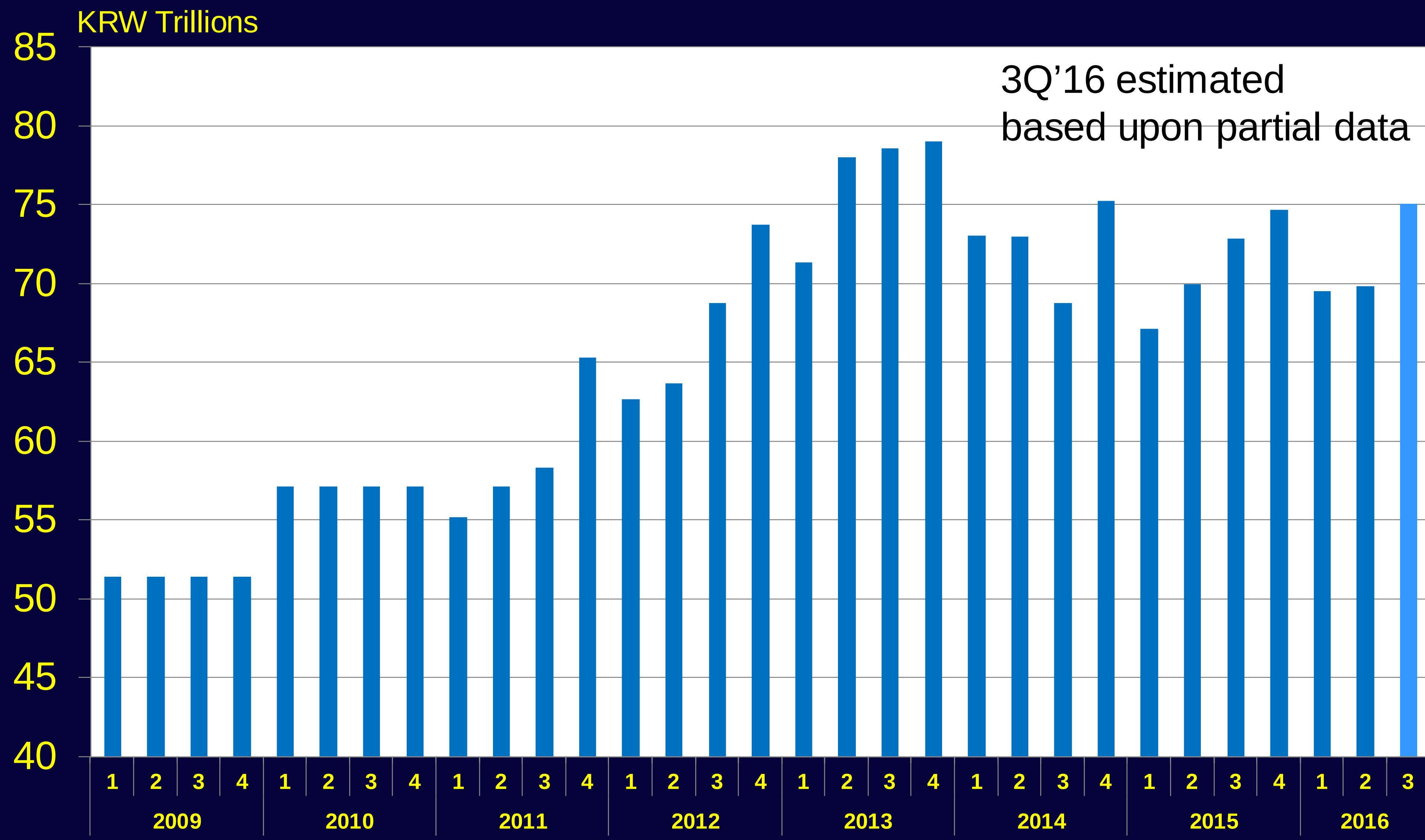
Taiwan/China Electronic Equipment Producers Composite of 101 Manufacturers Consolidated Revenue



Taiwan listed companies, often with significant manufacturing in China

20161212

S Korea Electronic Equipment Producers
Composite of 7 Manufacturers

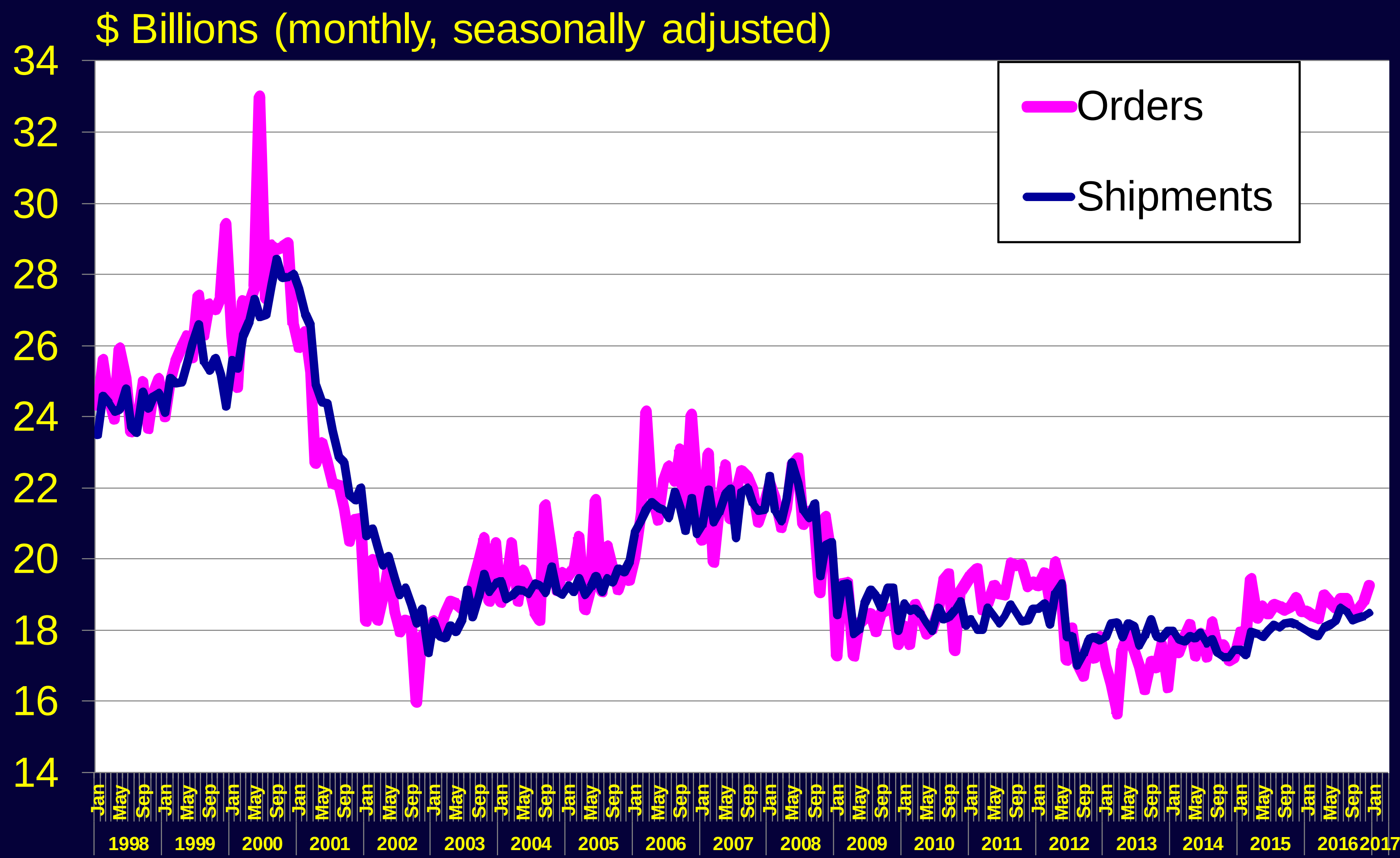


Samsung Electronics, LG Electronics, Daewoo Electronic Components, Samsung SDI, Dongbu Hitek, SK Hynix, KEC Corp

20170127

U.S. Electronic Equipment Orders & Shipments

Computer, Communications, Measurement & Control and Military

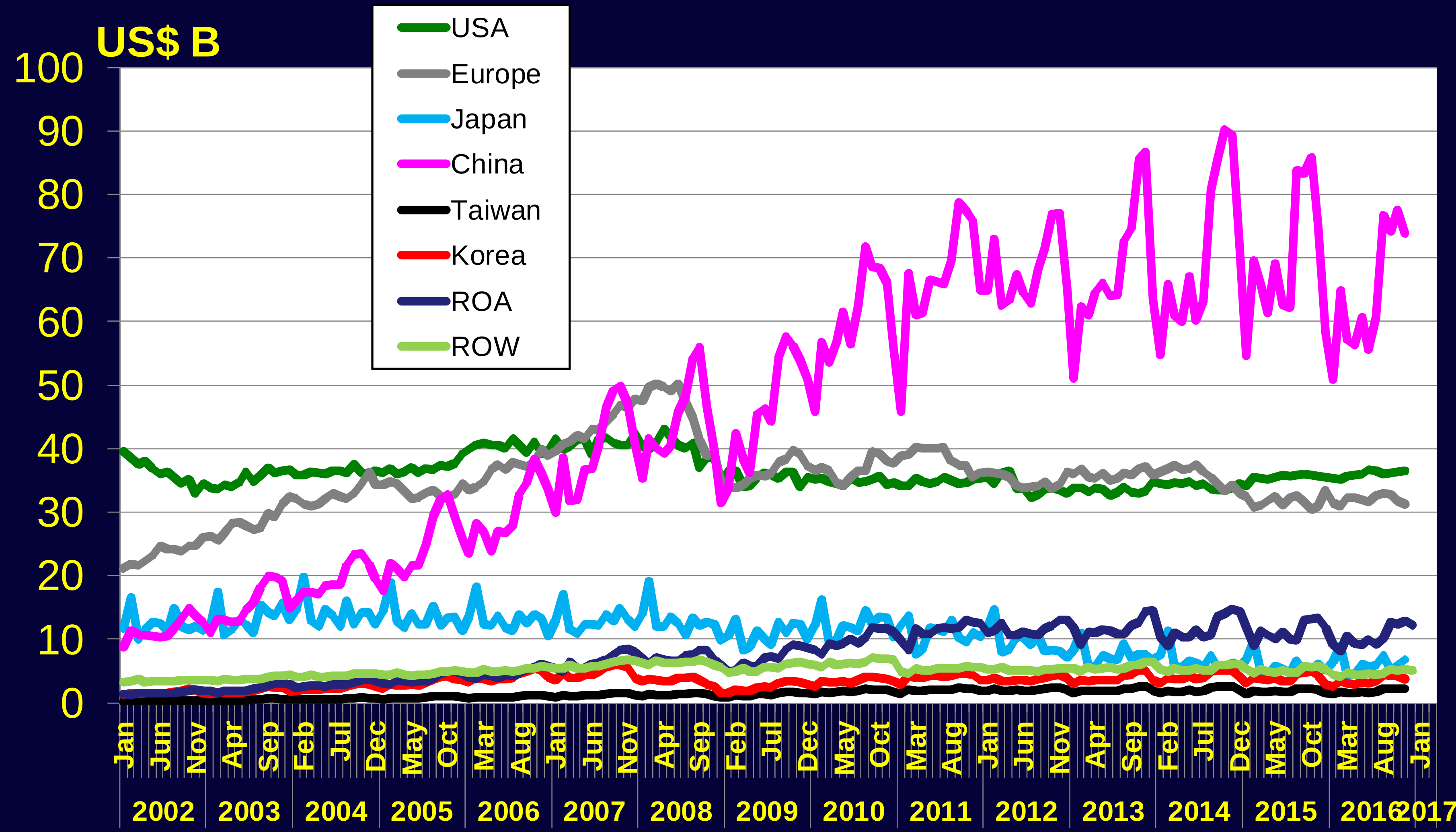


www.census.gov/indicator/www/m3/

20170127

World Electronic Equipment Monthly Shipments

Converted @ Fluctuating Exchange Rates

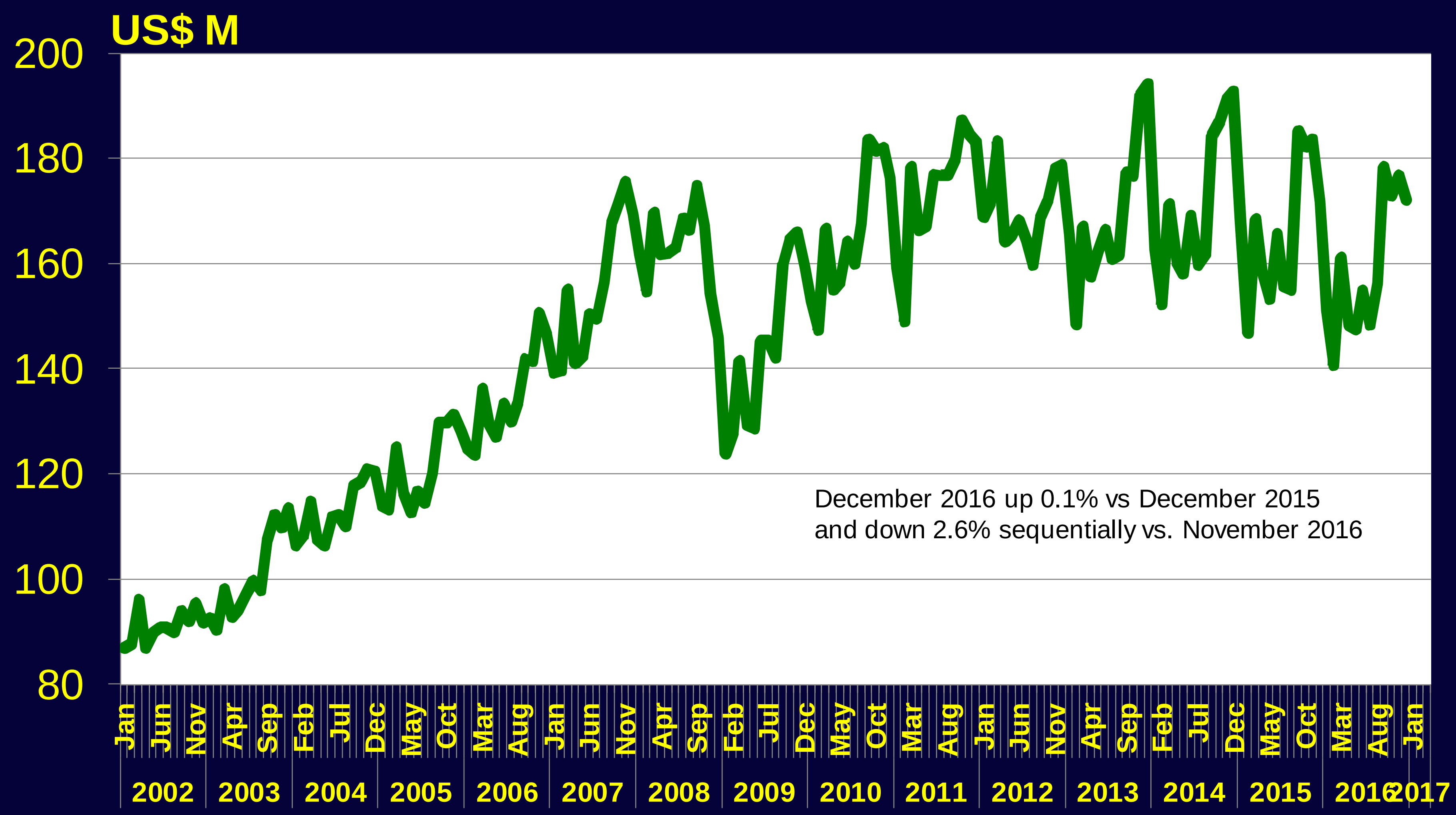


Source: Custer Consulting Group

20170127

World Electronic Equipment Monthly Shipments

Converted @ Fluctuating Exchange Rates

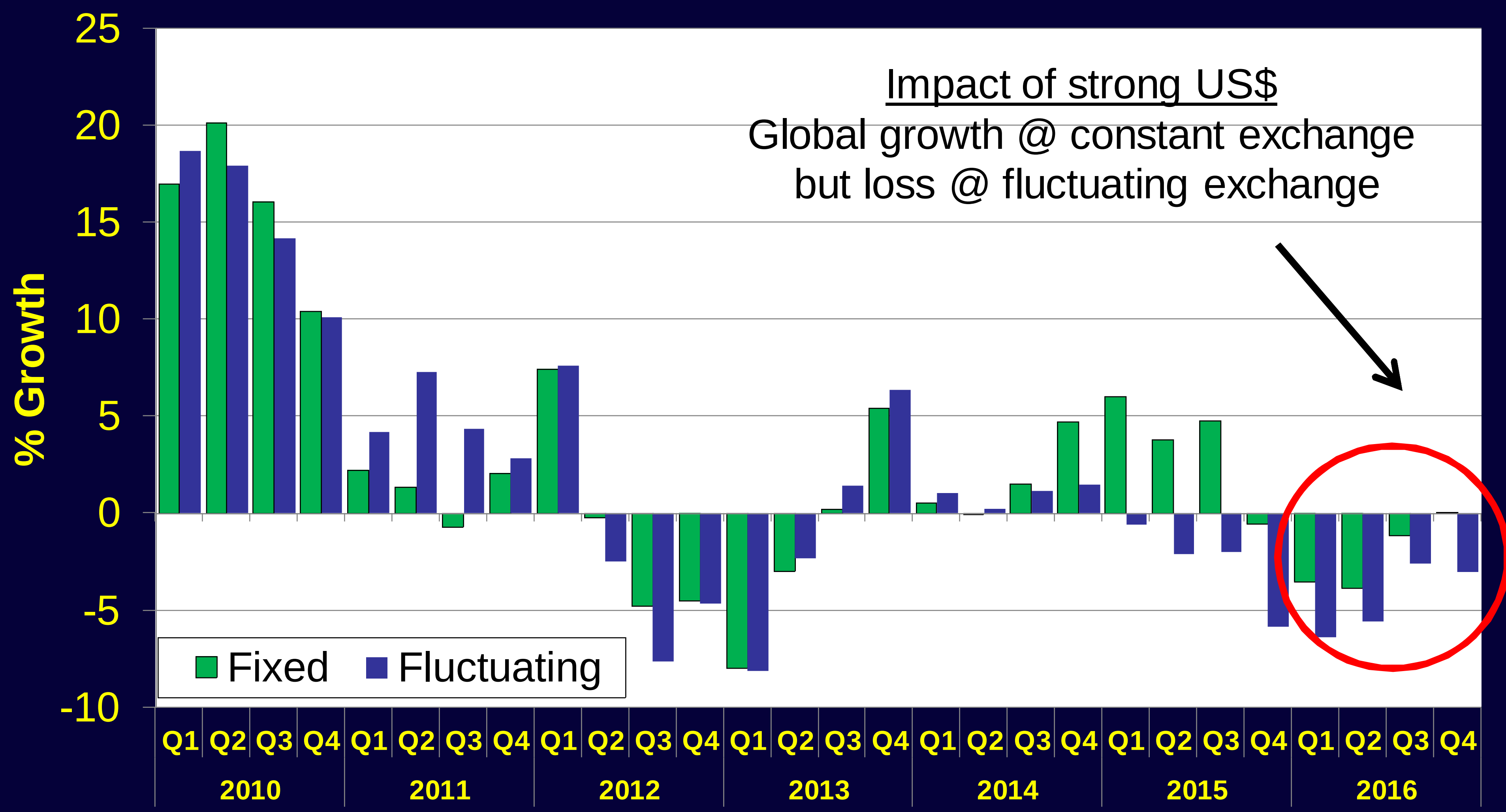


Source: Custer Consulting Group

20170127

Exchange Rate Impact on
US$ Denominated Consolidated World Electronic Equipment Sales

Quarterly Revenue Growth Converted to US$
@ Fixed 2015 vs Fluctuating Exchange

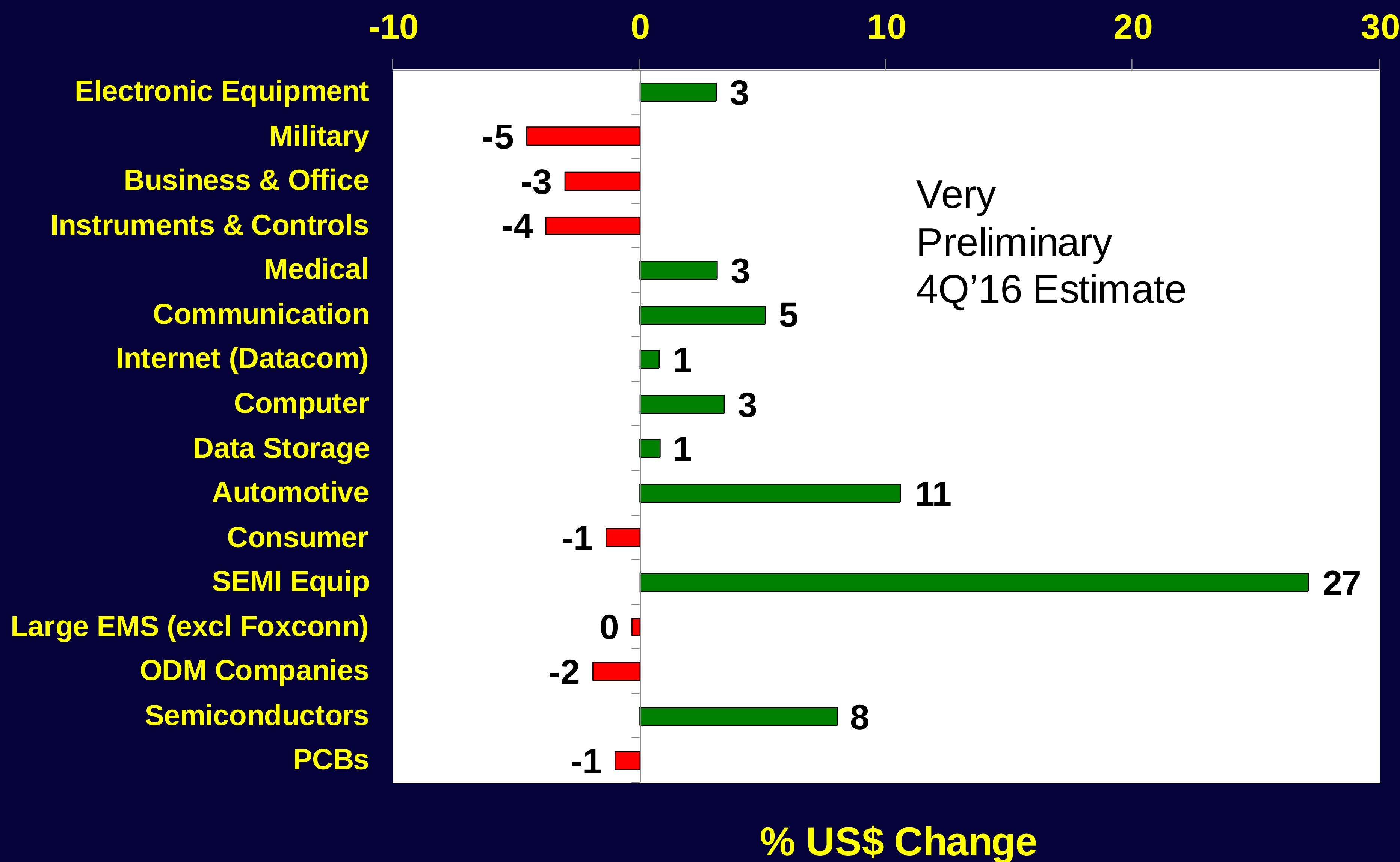


Global model based on regional shipment indices

Electronic Equipment Growth

Europe & World

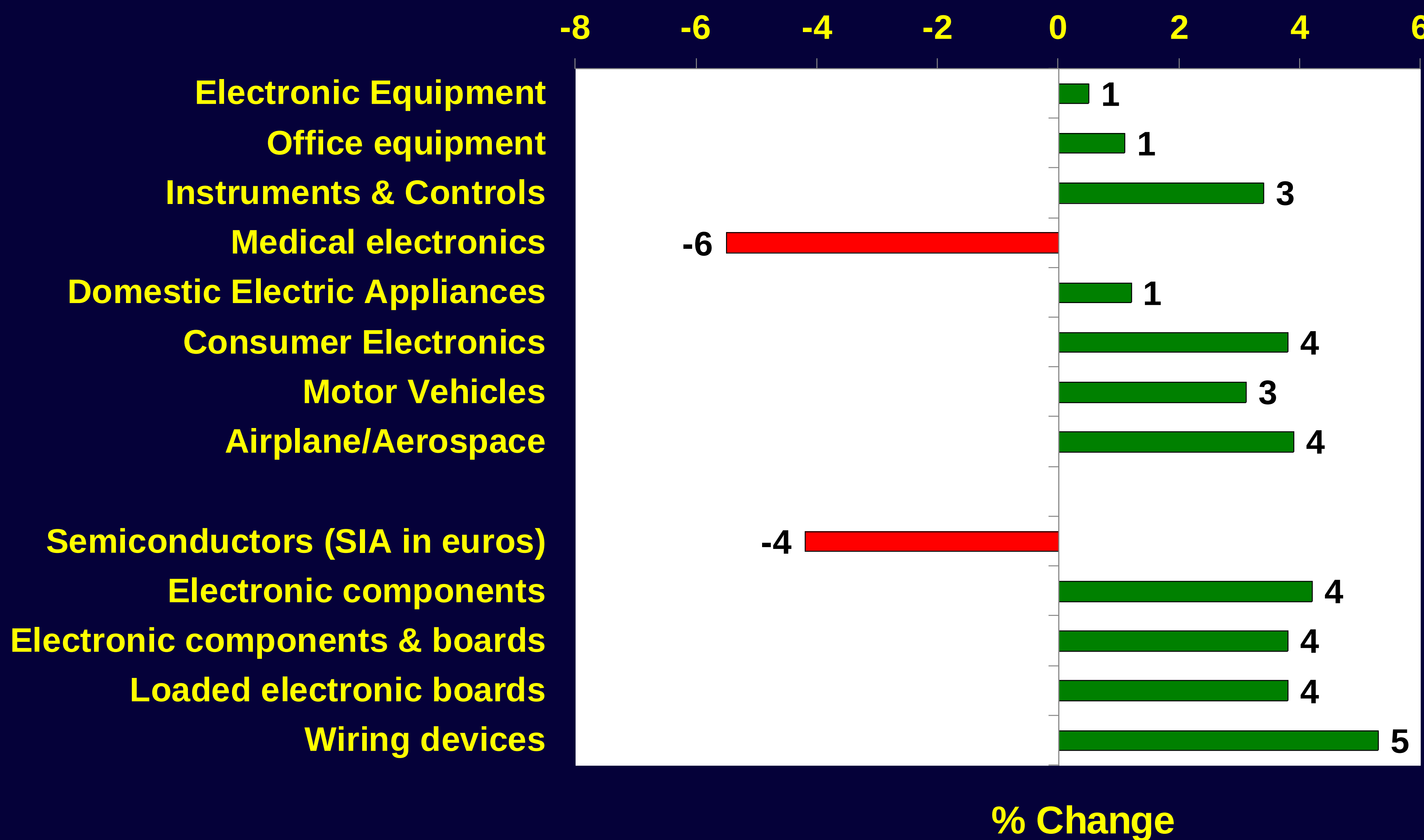
Global Electronic Supply Chain Growth
4Q'16 vs. 4Q'15



US$ equivalent at fluctuating exchange; based upon industry composites including acquisitions

20161114

European Electronic Supply Chain Growth
3Q'16 vs 3Q'15

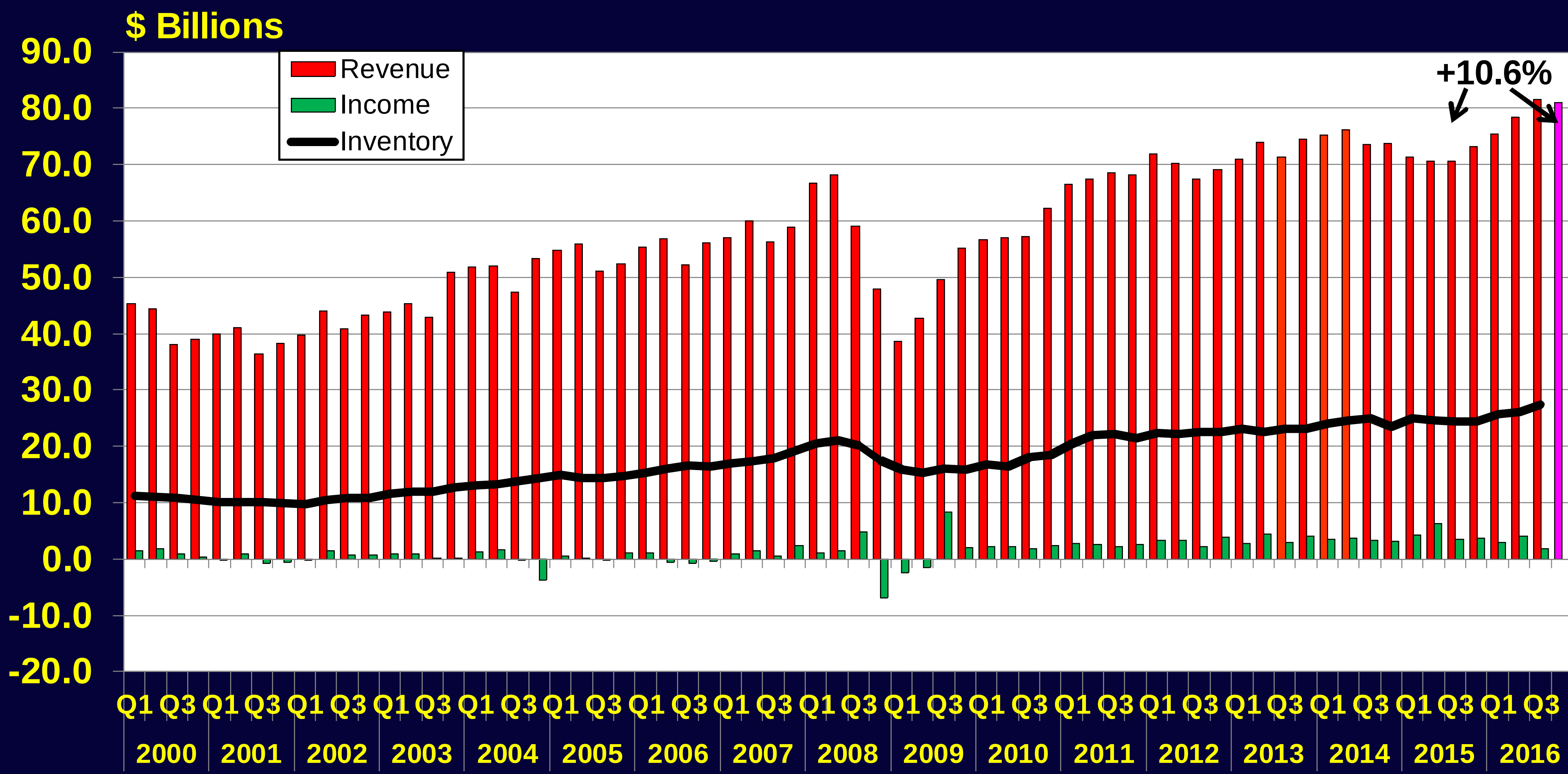


Euro denominated growth rates; Eurostat, SIA & Custer Consulting Group

Markets of European Focus

Automotive Equipment Suppliers
Composite of 15 Public Companies
Revenue, Net Income & Inventory

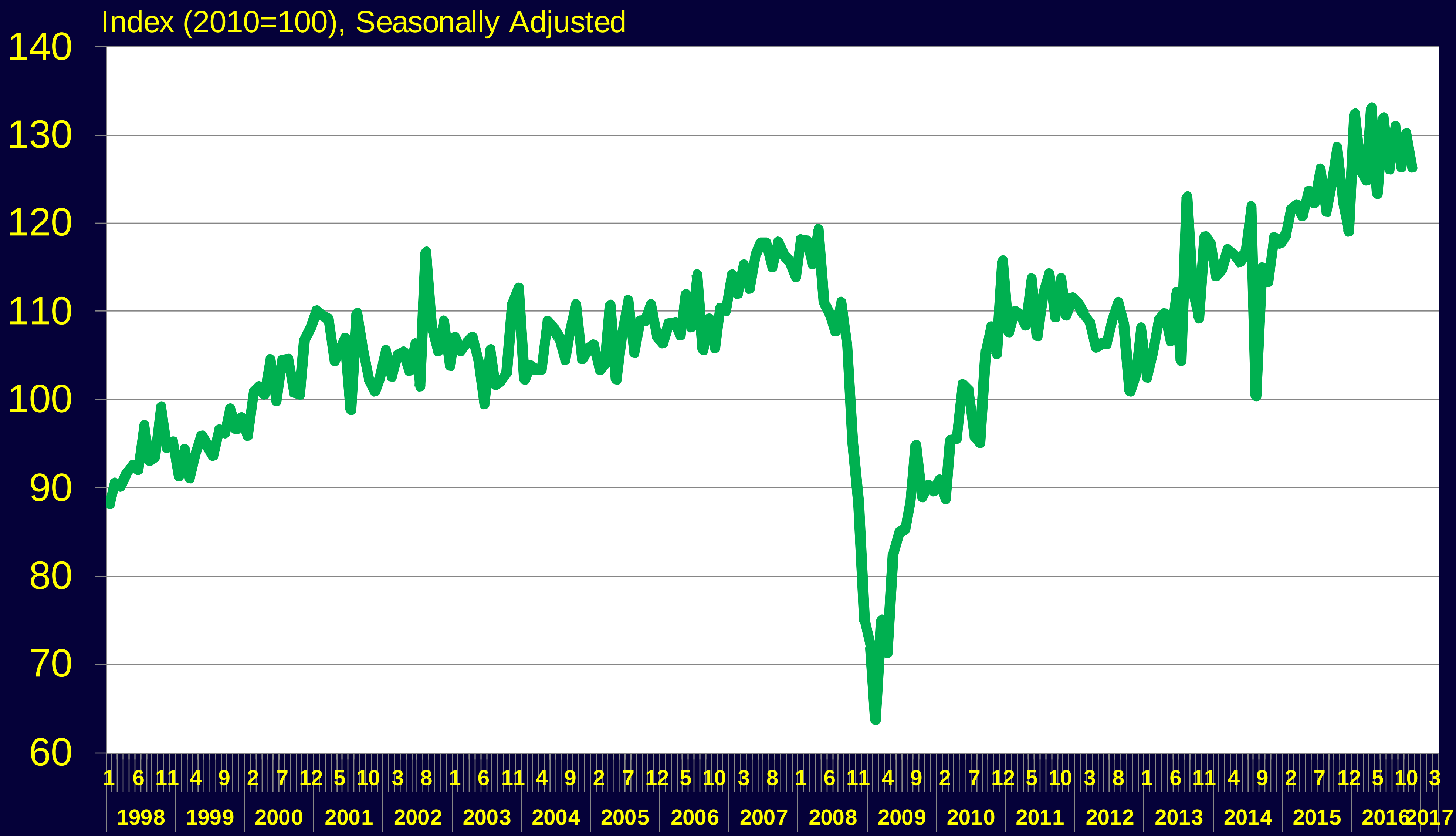
20170204



Autoliv, Borg Warner, Continental AG, Delphi, Denso, Federal Mogul, Gentex, Hella, Johnson Controls, Lear, Magna, TRW Automotive, Valeo, Visteon, ZF Friedrichshafen

20170112

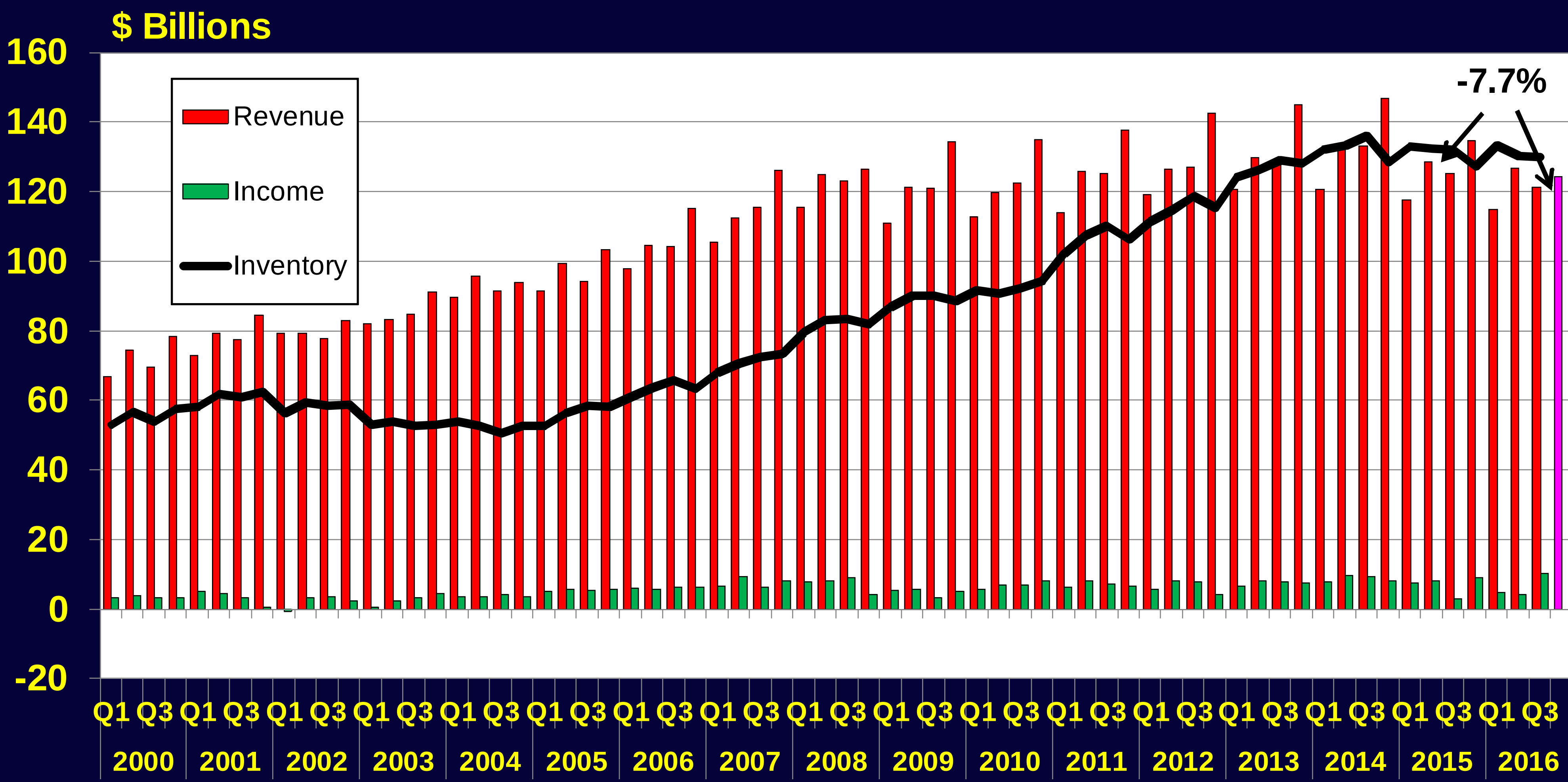
European Motor Vehicle Production



Eurostat, C291 category, EU 27 countries

20170131

Military & Aerospace
Composite of 22 Public Companies
Revenue, Net Income & Inventory

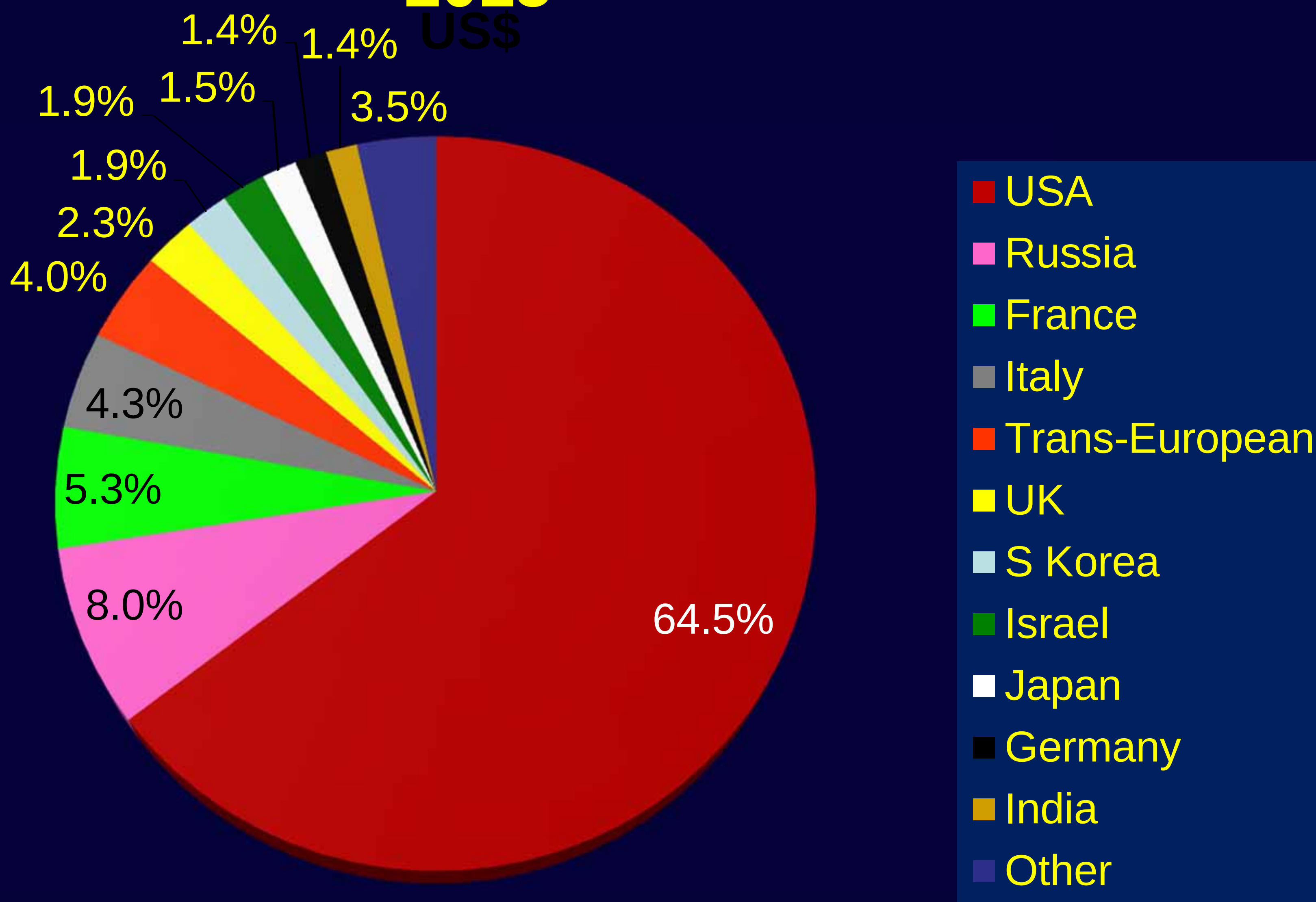


Boeing, Bombadier, EADS (Airbus), Finmeccinica,General Dynamics, Halliburton, Harris, Honeywell (military portion), L-3 Communications, Lockheed, Moog, Northrop Grumman, Raytheon, Rockwell Collins, Textron, Thales, United Technology

SIPRI Top 100 Arms & Military Services Sales 2015

20161027

US$

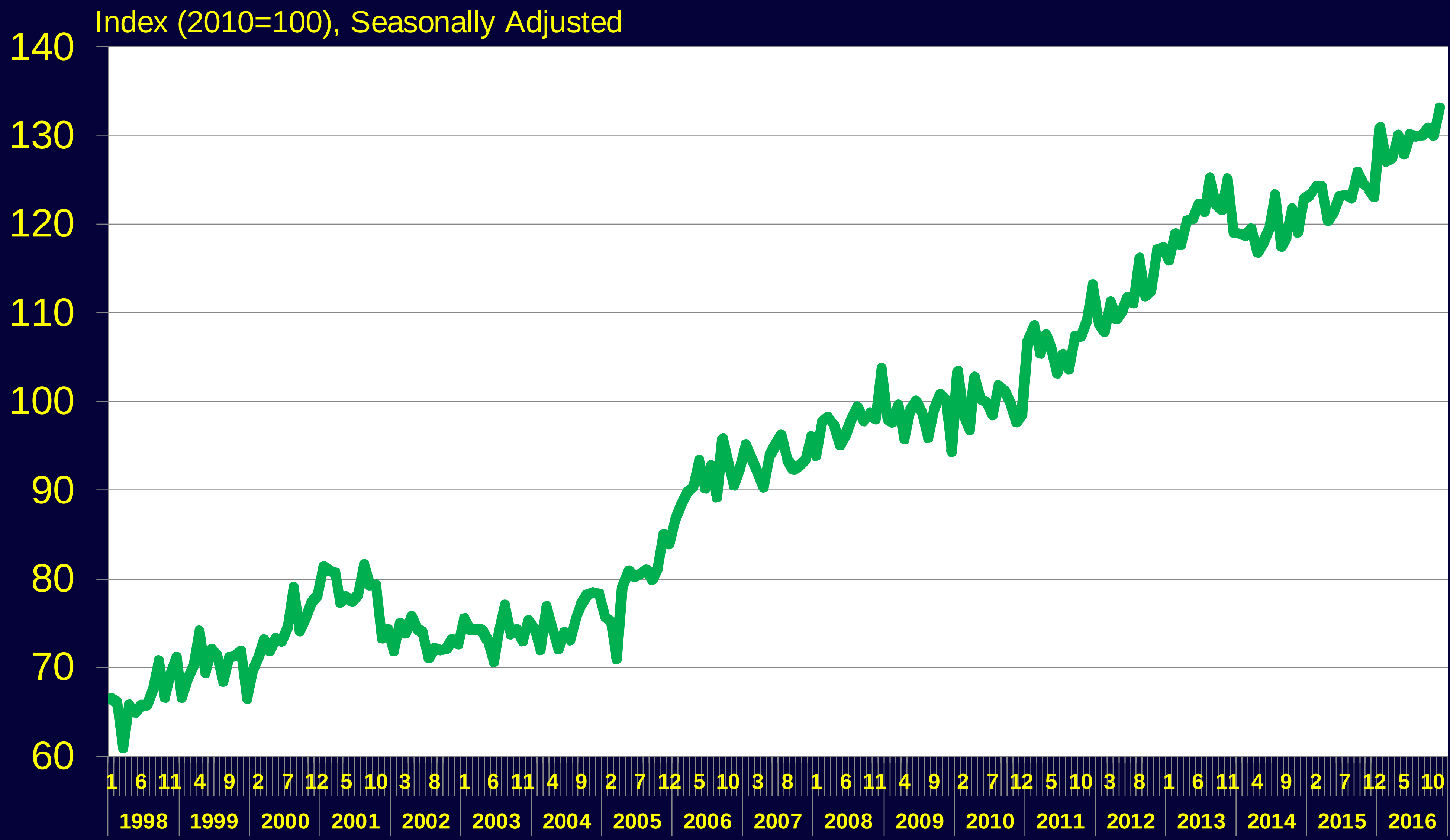


2015 Total: US$ 401 Billion (excluding China)

www.sipr.org

20170112

European Production - Aircraft, Spacecraft & Related Equipment

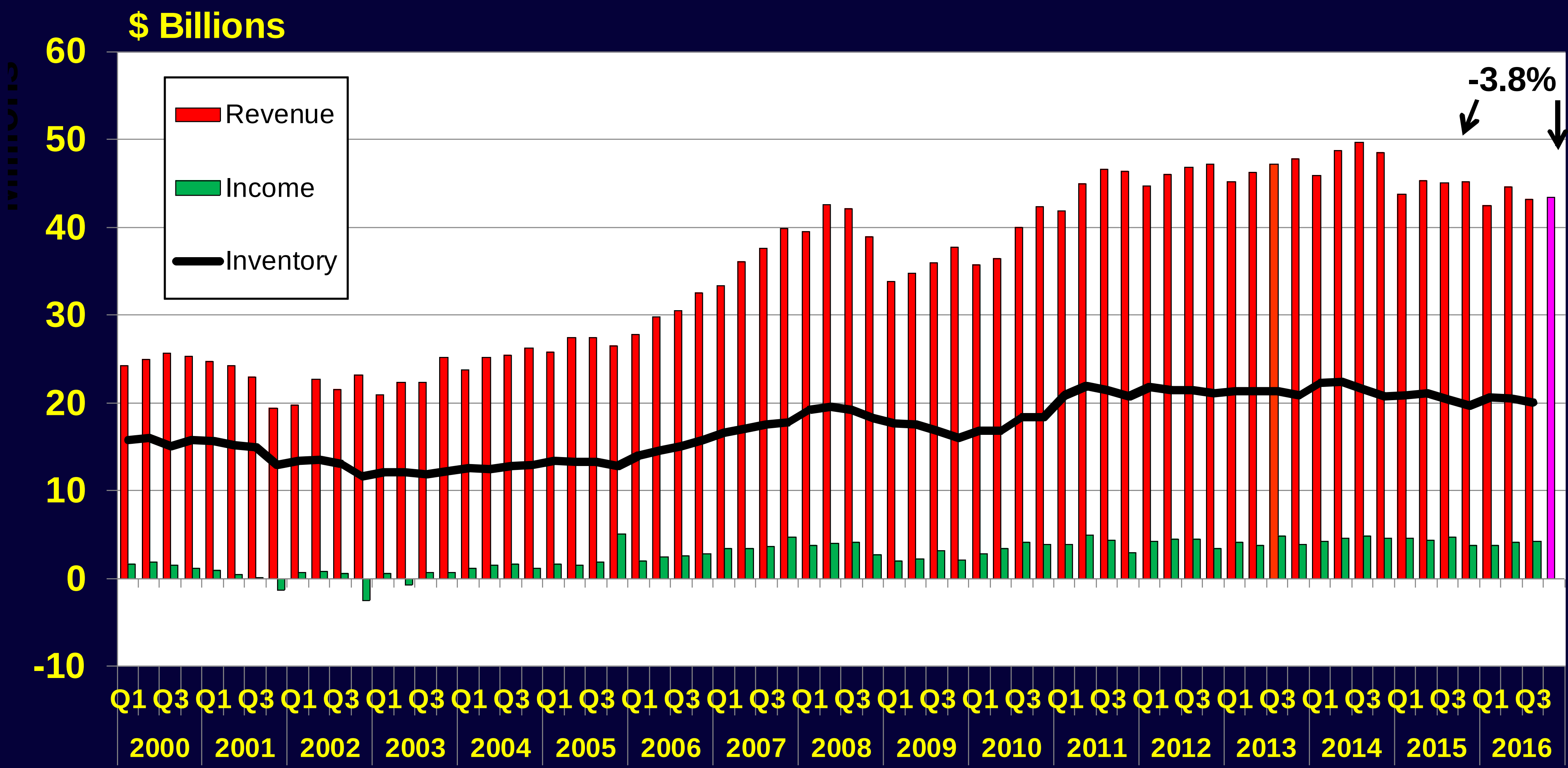


Eurostat, C303 category, EU 27 countries

20170204

Instruments & Control Equipment Composite of 16 Public Companies

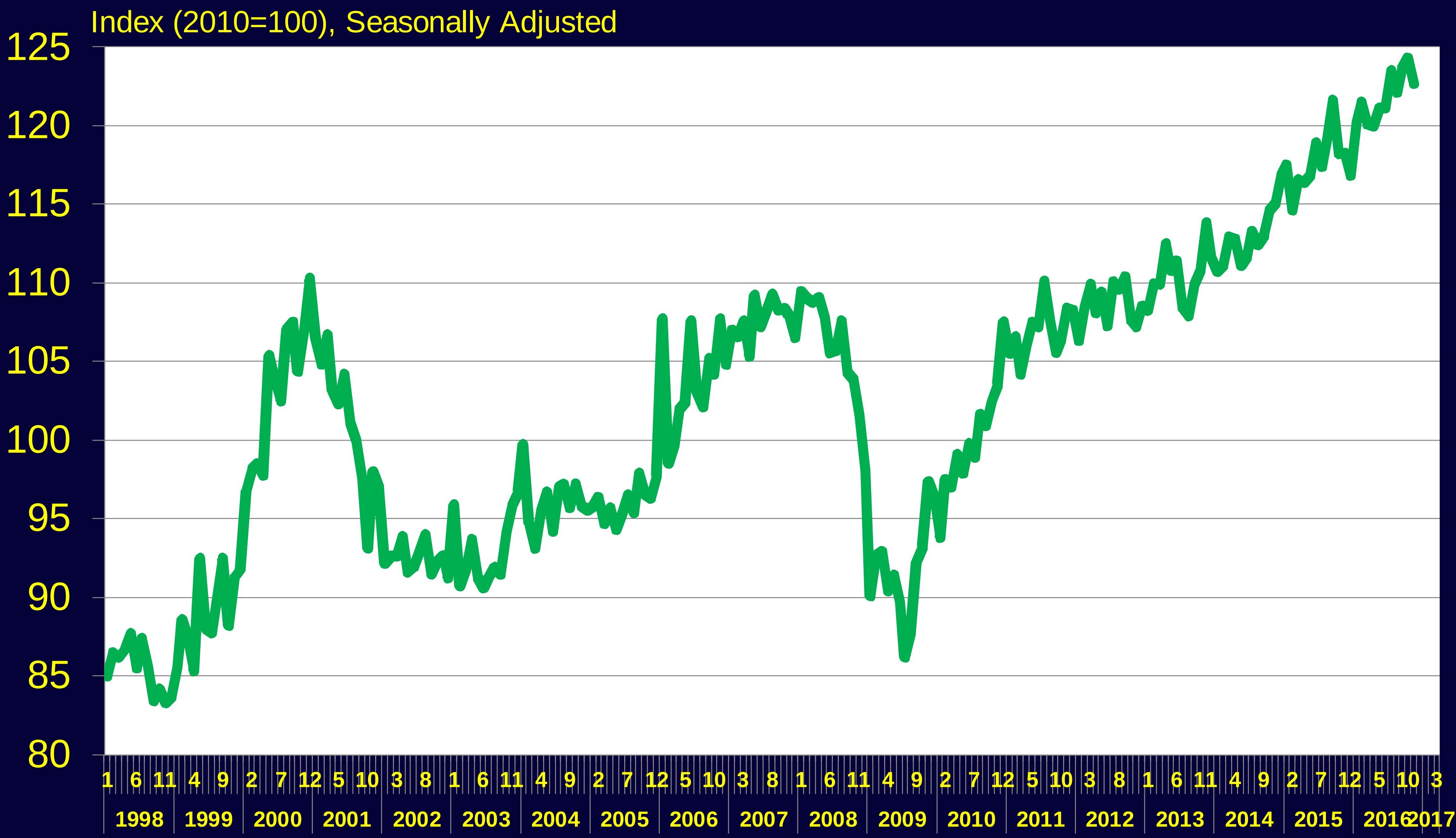
Revenue, Net Income & Inventory



ABB, Agilent, Ametek, Emerson, Itron, Keysight, National Instruments, PerkinElmer, Rockwell Automation, Rotork, Teledyne, ThermoFisher, Woodward Govenor

20170112

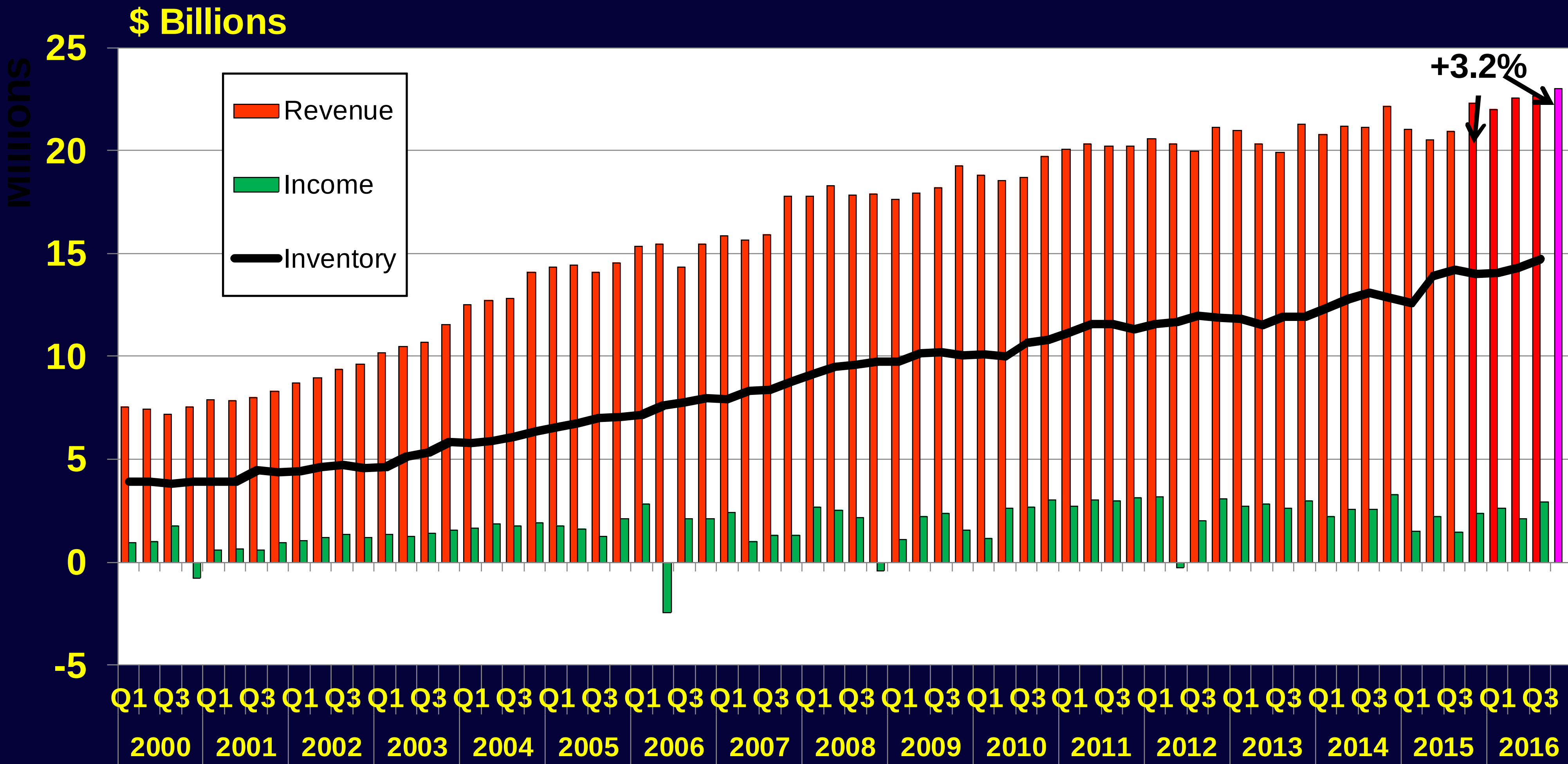
European Production - Instruments & Appliances for Measuring, Testing & Navigation



Eurostat, C2651 category, EU 27 countries

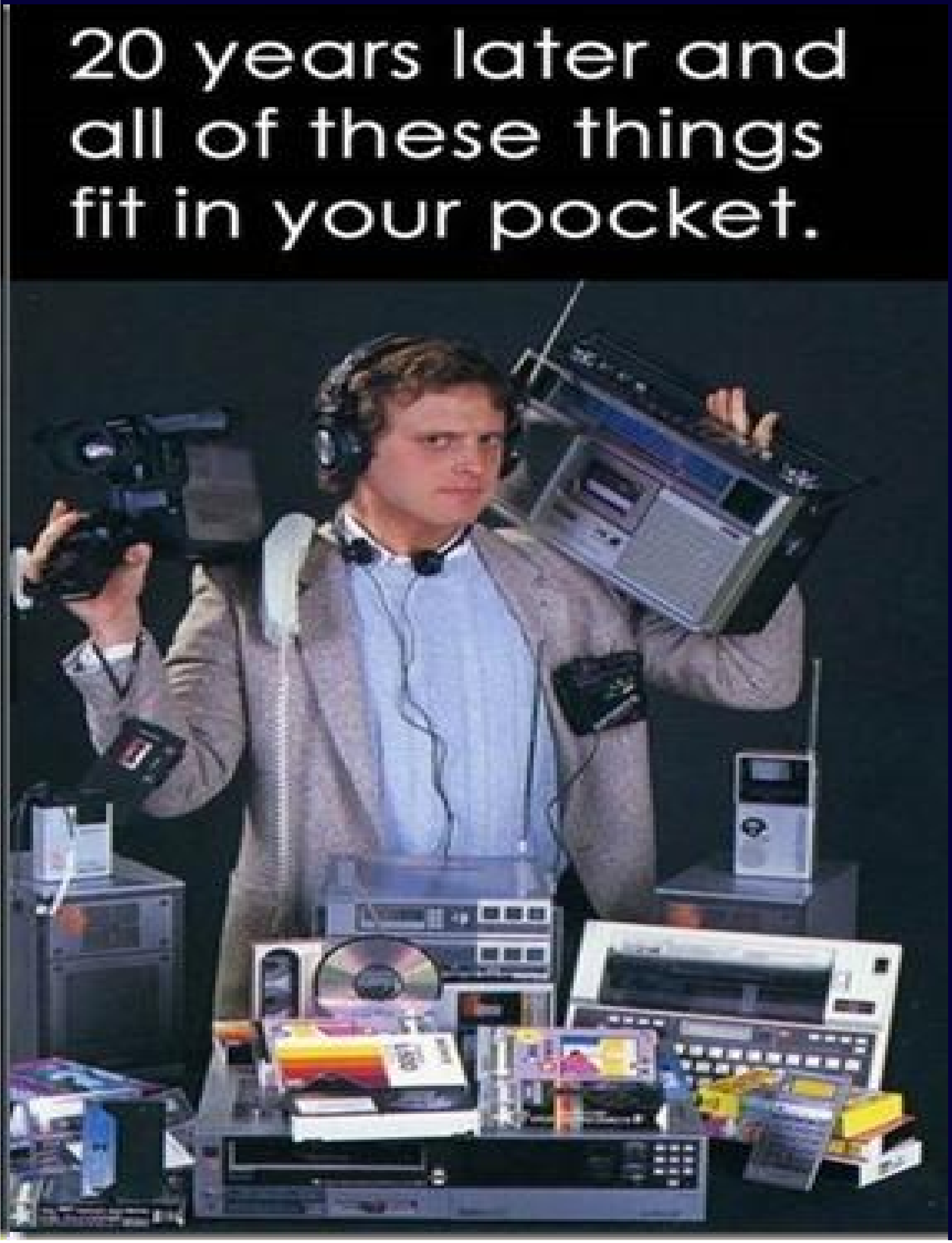
Medical Equipment
Composite of 21 Public Companies

Revenue, Net Income & Inventory



Analogic, Bio-Rad Laboratories, Boston Scientific, Bruker, CareFusion, Covidien, Draeger, Guidant, Hill-Rom, Intuitive Surgical, Invacare, Medtronic, ResMed, St Jude Medical, Smith & Nephew, STERIS, Stryker, Varian Medical, Waters, Zimmer

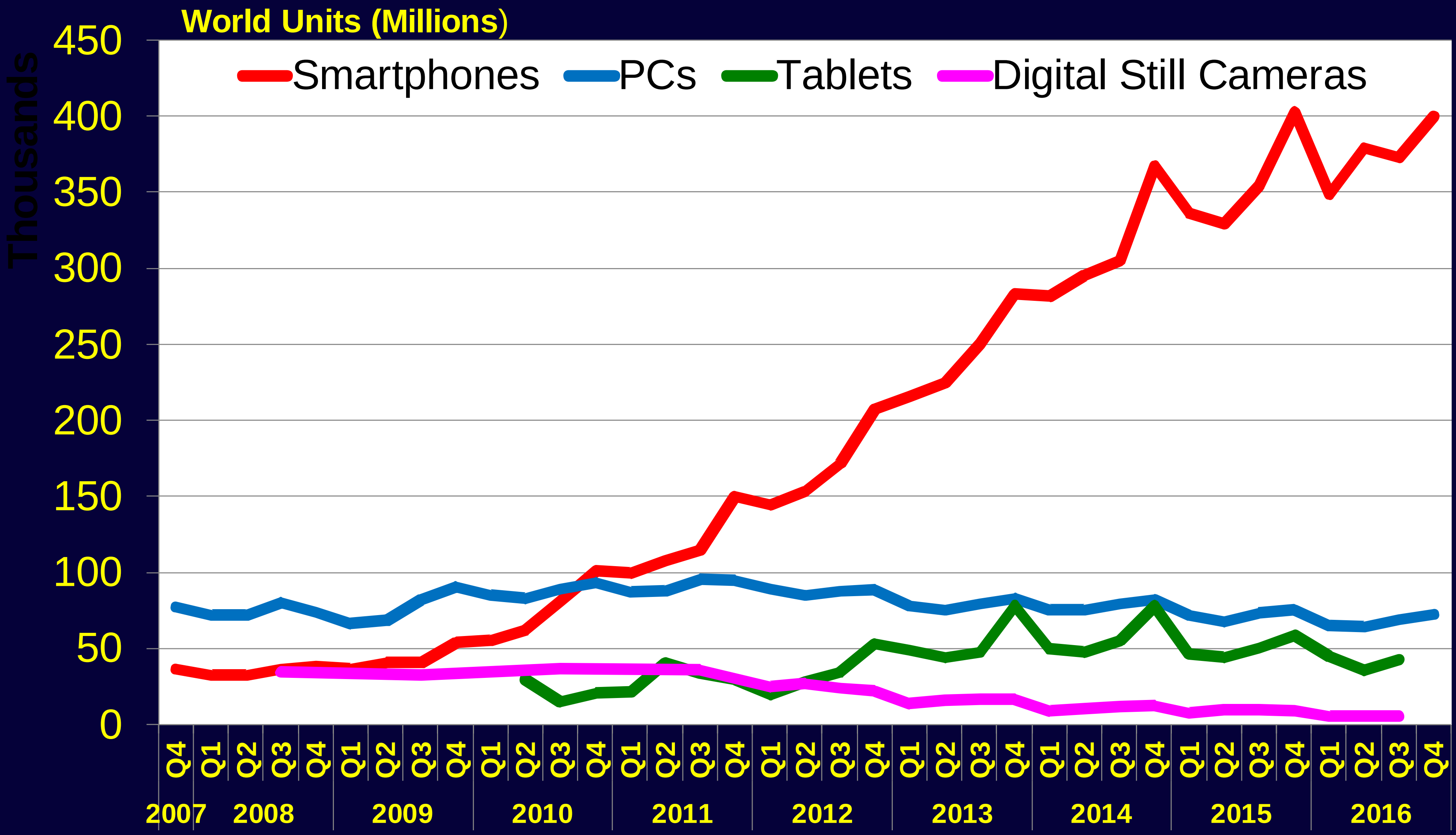
Volume Consumer-driven Products



Changing Electronic Equipment Markets

20170131

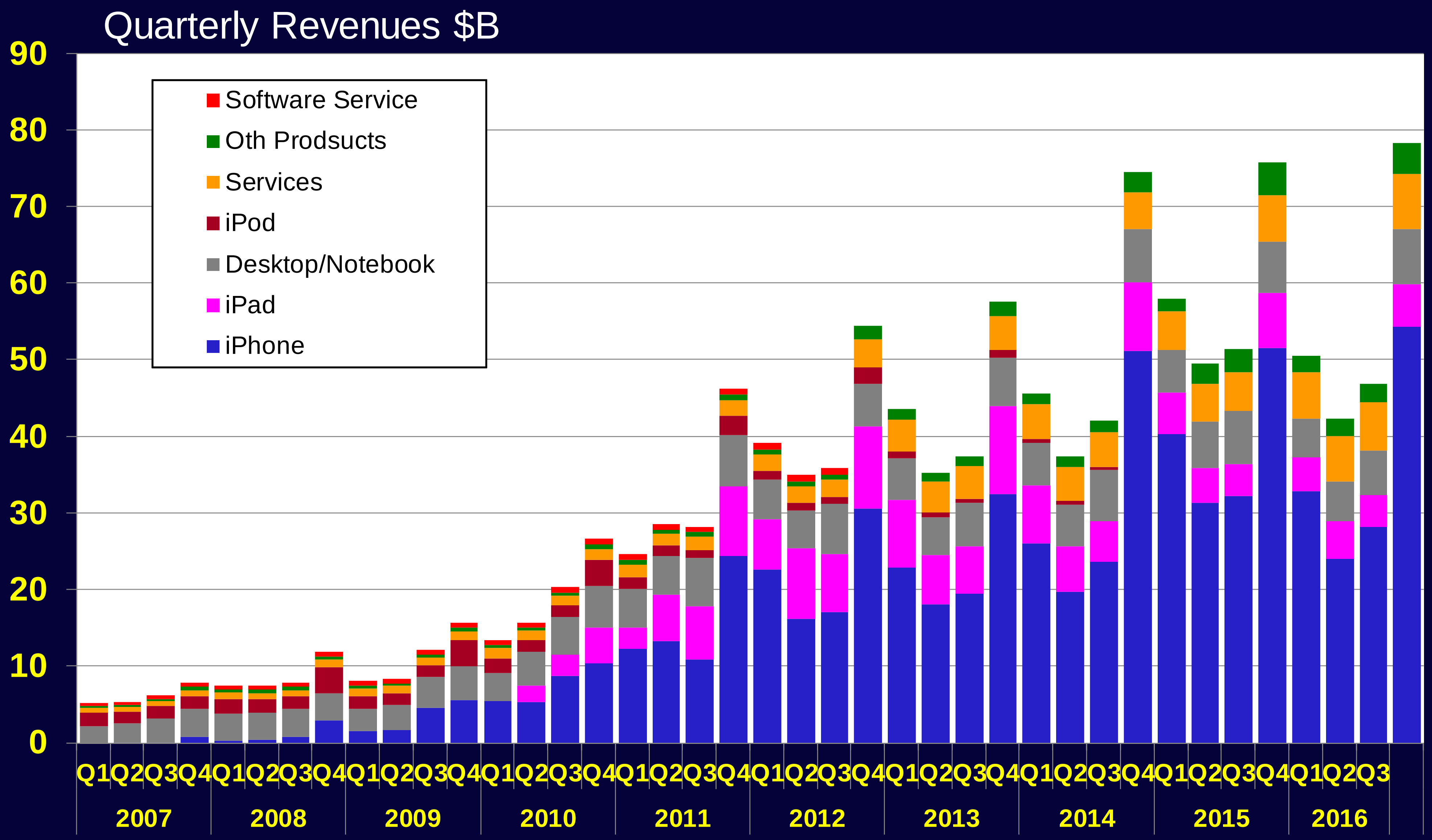
Smartphones Cannibalize PCs, Tablets & Digital Cameras



www.gartner.com; www.cipa.jp/; www.icinsights.com; www.idc.com; www.digitimes.com

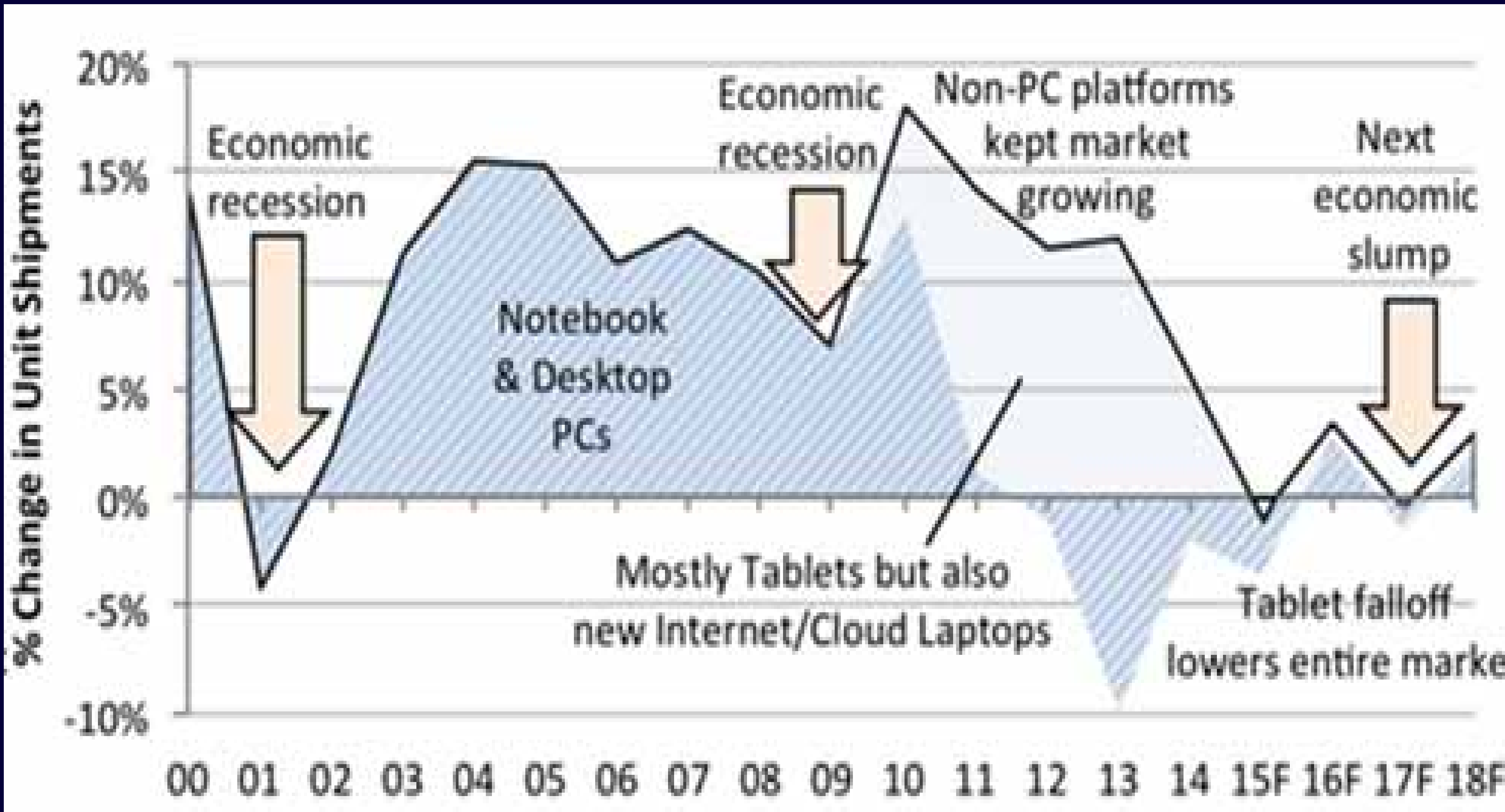
20170131

Apple Product Mix



20150904

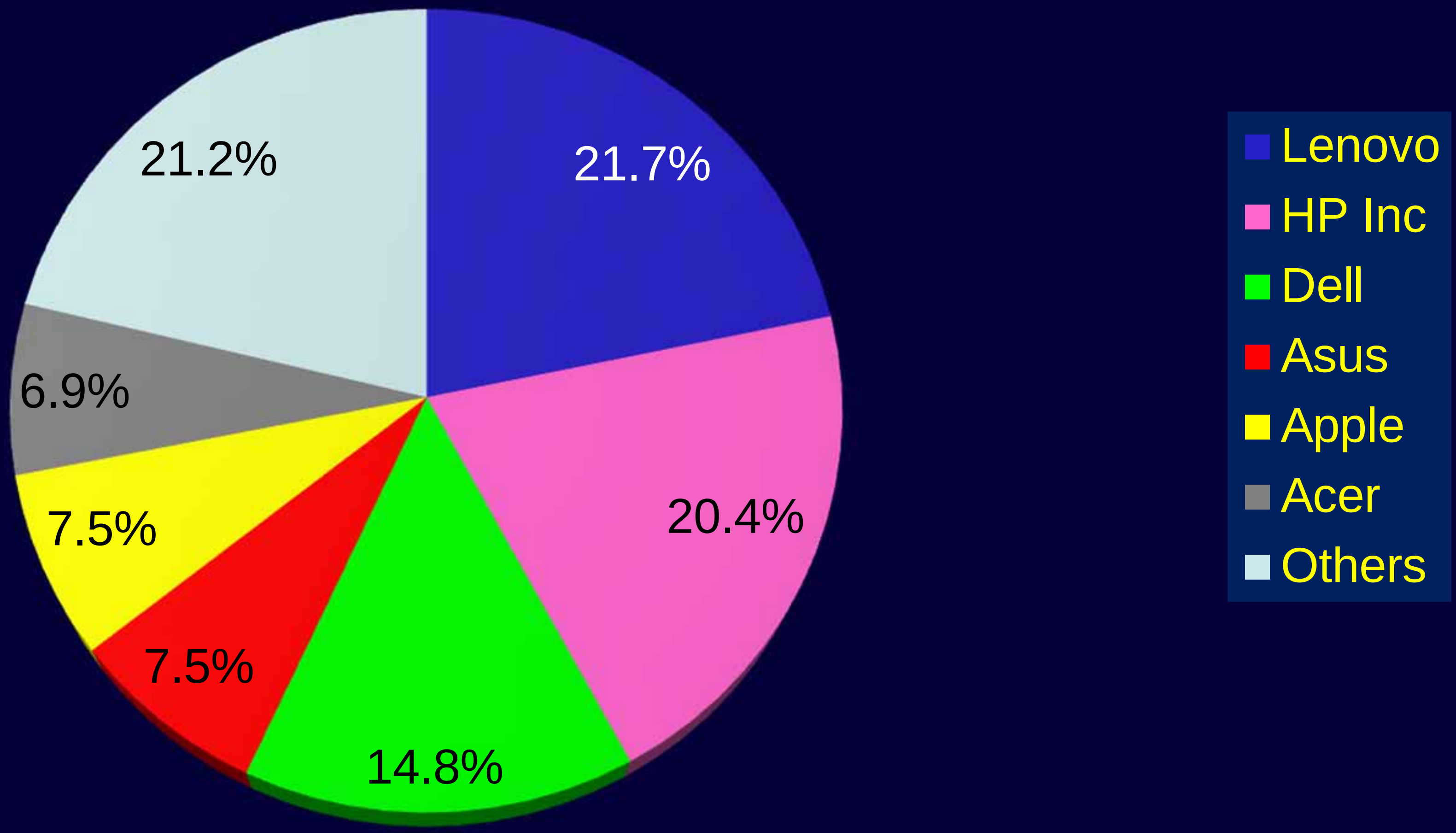
Total Personal Computer Unit Growth



IC Insights 9/15

20170113

World Personal Computer Market 4Q'16



TOTAL: 72.6 Million Units

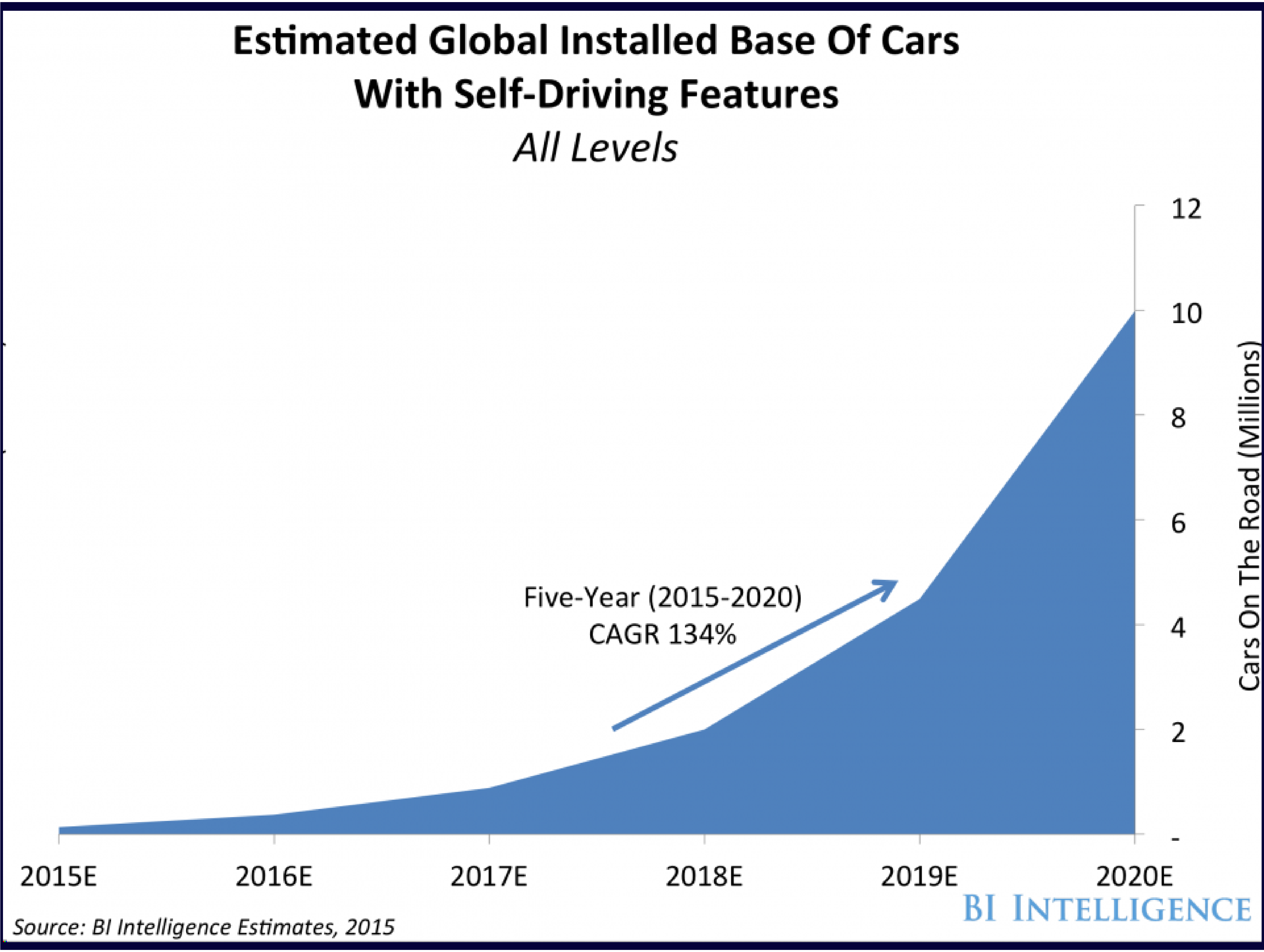
Includes desk-based PCs, mobile PCs, mini-notebooks but not Media Tablets

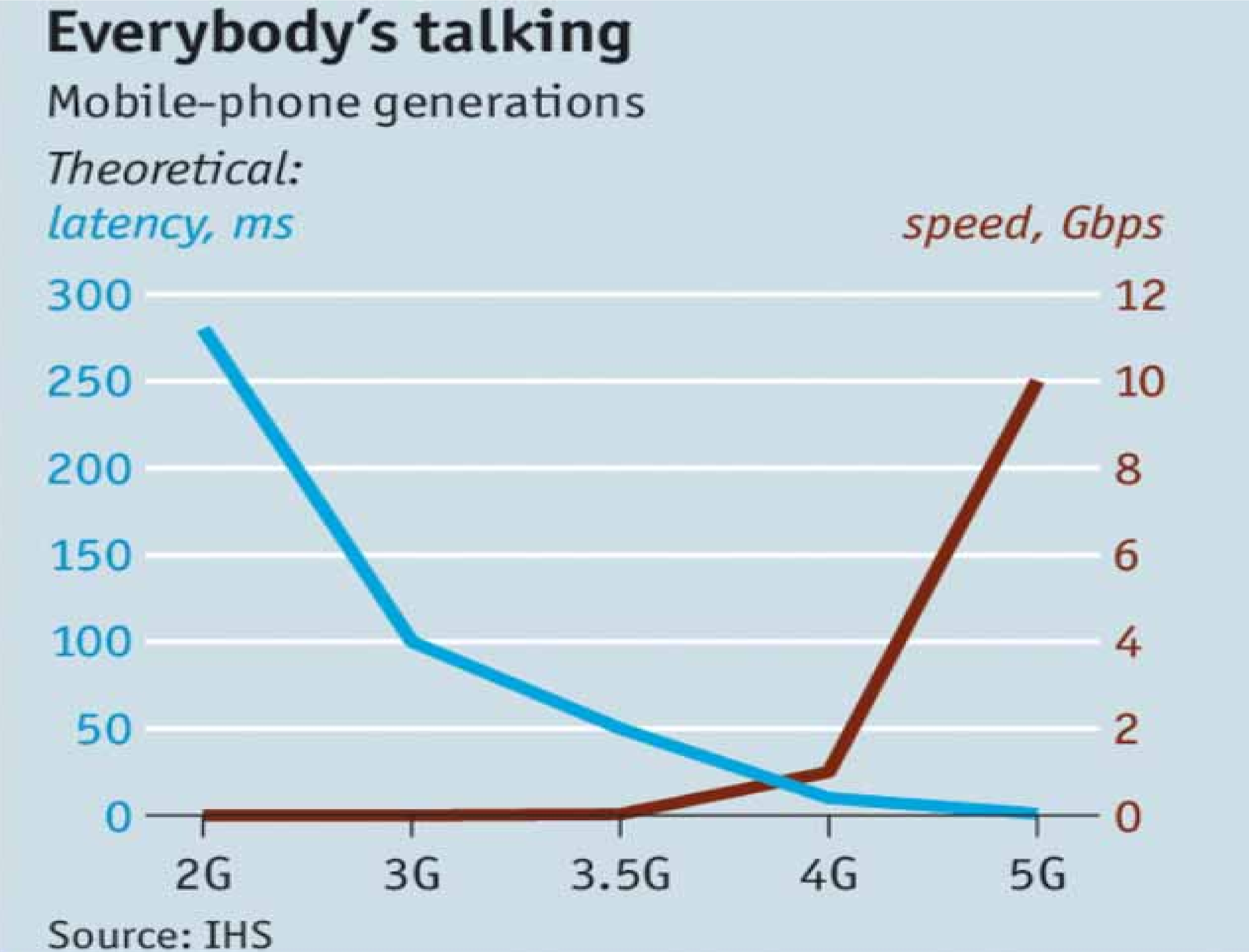
Gartner 1/17

Future High Volume Markets

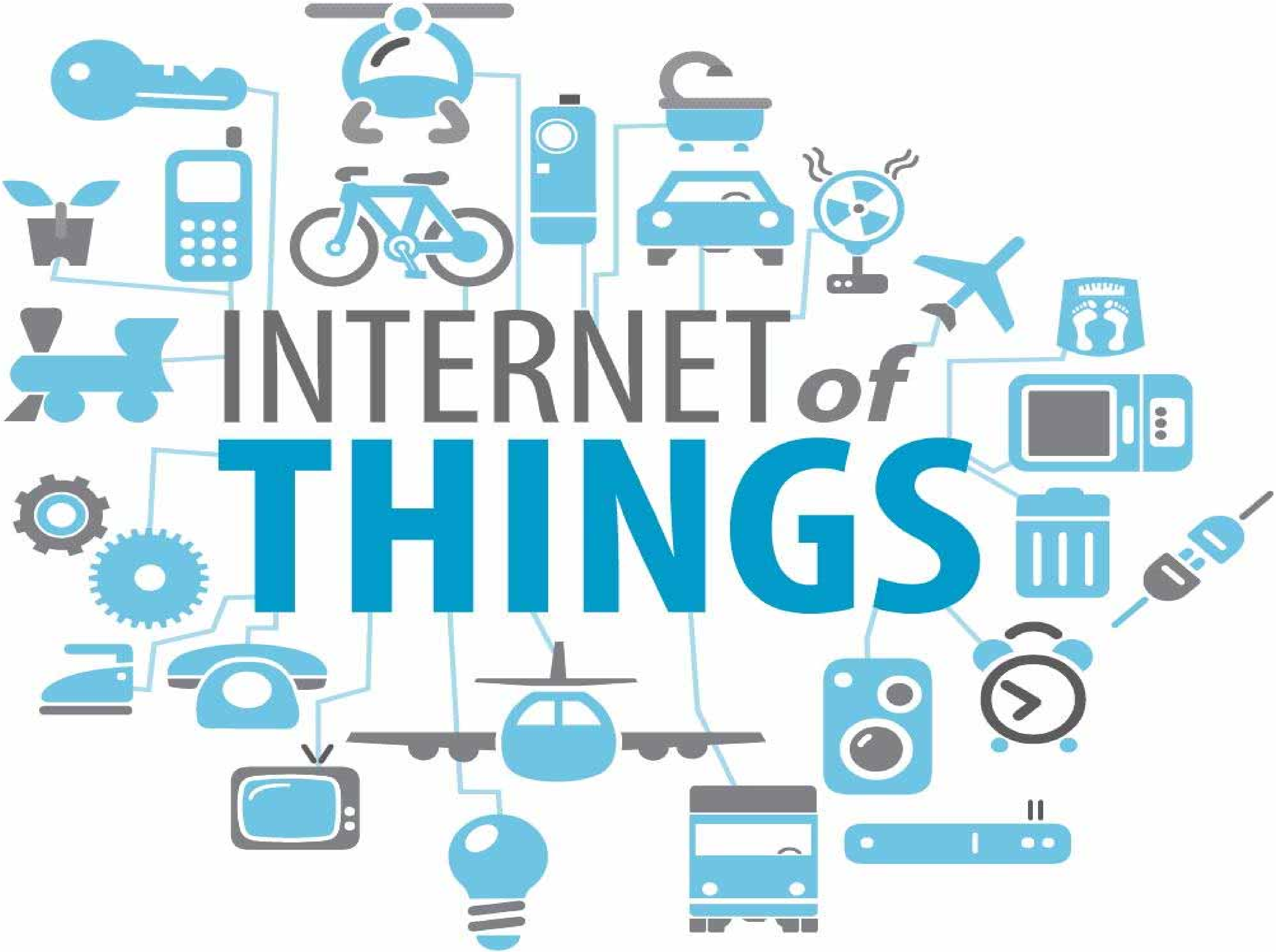
Future Volume Markets

Autonomous cars
Internet of Things
5G Handsets & Infrastructure
Drones
Robots
Wearables


Estimated Global Installed Base Of Cars
With Self-Driving Features
All Levels
12
10
8
6
4
2
-
Cars On The Road (Millions)
Five-Year (2015-2020)
CAGR 134%
2015E
2016E
2017E
2018E
2019E
2020E
BI INTELLIGENCE
Source: BI Intelligence Estimates, 2015



Everybody's talking
Mobile-phone generations
Theoretical:
latency, ms
speed, Gbps
300
250
200
150
100
50
0
12
10
8
6
4
2
0
2G
3G
3.5G
4G
5G
Source: IHS


INTERNET of
THINGS

20160221

Wearable Devices 2015-2017
Millions of Devices

Device	2015	2016	2017
Smartwatch	30.3	50.4	66.7
Head-mounted Display	0.1	1.4	6.3
Body-worn Camera	0.1	0.2	1.1
Bluetooth Headset	116.3	128.5	139.2
Wristband	30.2	35.0	44.1
Smart Garment	0.1	1.0	5.3
Chest Strap	12.9	13.0	8.0
Sports Watch	21.0	24.0	26.9
Other Fitnes Monitor	21.1	21.1	25.1
Total	232.0	274.6	322.7

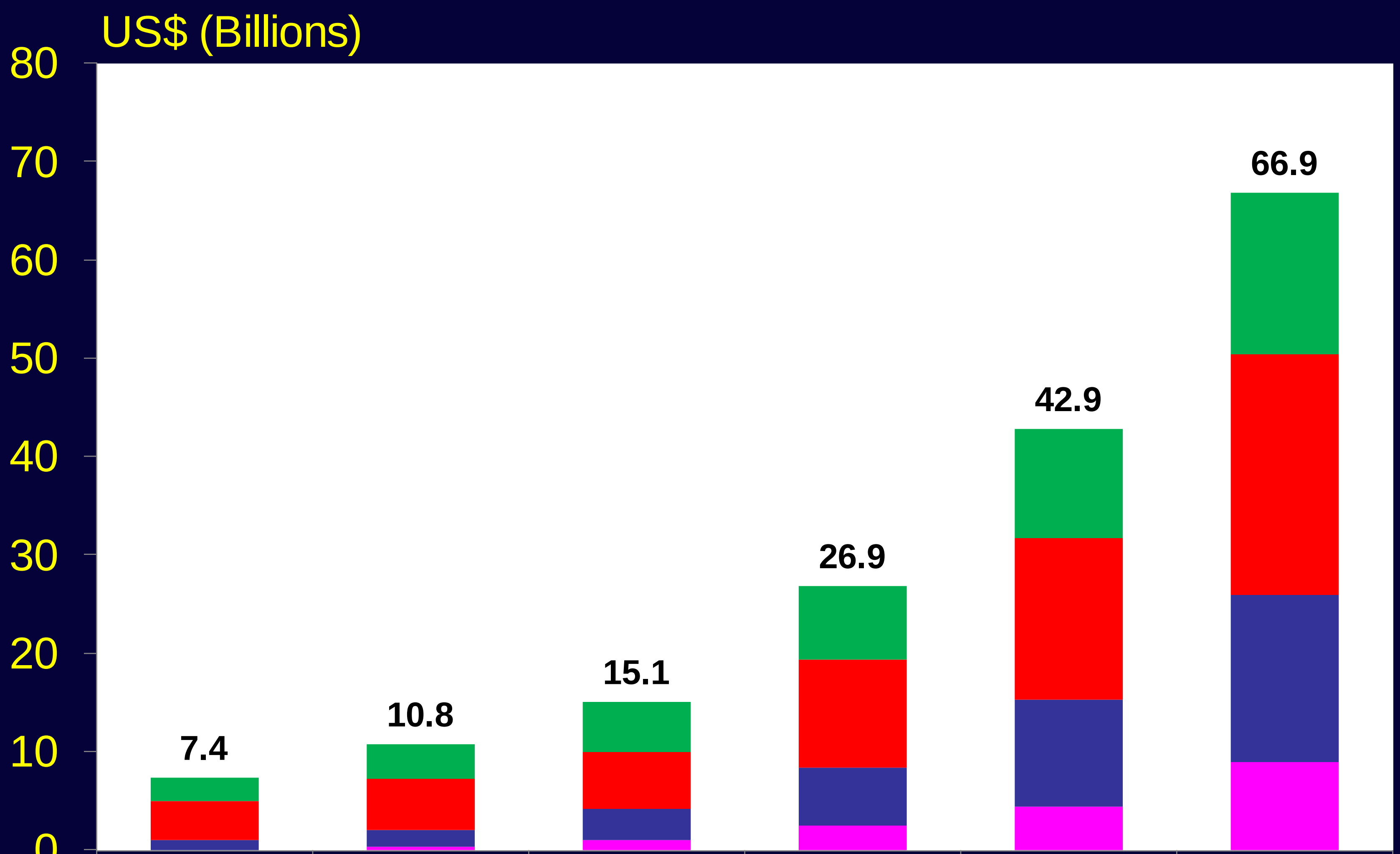
Gartner 2/2016

Most will take a few years
to develop

A Key Exception

20140906

World Spending on Robots



	2000	2005	2010	2015	2020	2025
Total	7.4	10.8	15.1	26.9	42.9	66.9
Military	2.4	3.5	5.1	7.5	11.2	16.5
Industrial	3.9	5.2	5.8	11.0	16.4	24.4
Commercial	1.1	1.7	3.2	5.9	10.8	17.0
Personal	0.0	0.4	1.0	2.5	4.5	9.0

BCG Analysis 9/14, International Federation of Robots, Japan Robot Assoc, Japan Ministry of Economy, Trade & Industry, euRobotics, company filings

Semiconductors

Monthly Semiconductor Shipments
$ Billions (3-month avg in US$)

20170202

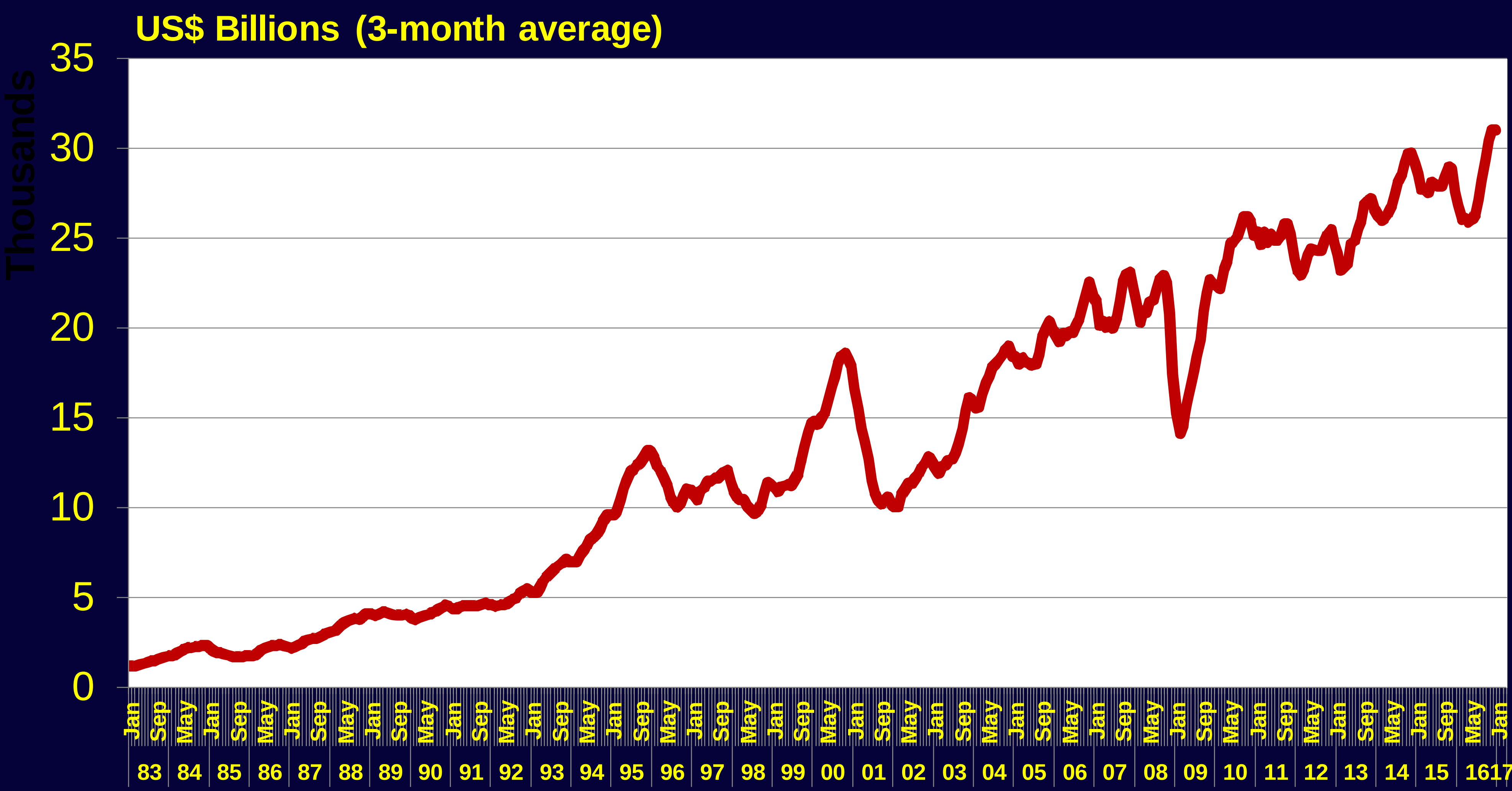
	12/15	12/16	% CH
Americas	5.75	6.33	+ 10.1%
Europe	2.77	2.80	+ 1.3%
Japan	2.57	2.84	+ 10.5%
China	8.45	10.17	+ 20.4%
Asia Pacific / All Other	8.08	8.86	+ 9.7%
Total	27.62	31.01	+ 12.3%

SIA www.sia-online.org/

World Semiconductor Shipments

20170202

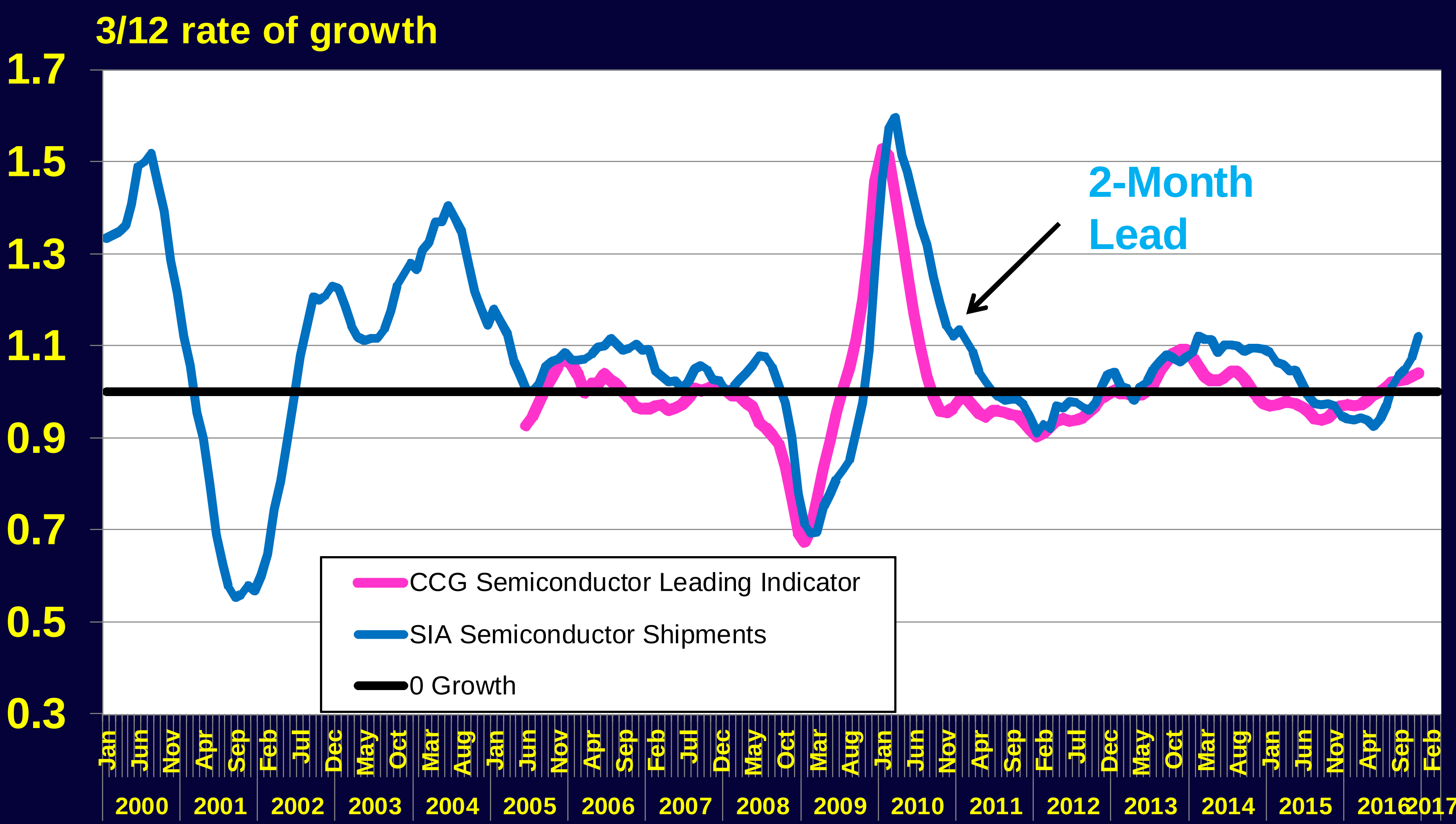
Monthly US$



SIA

CCG Semiconductor Leading Indicator vs. Global Semiconductor Shipments

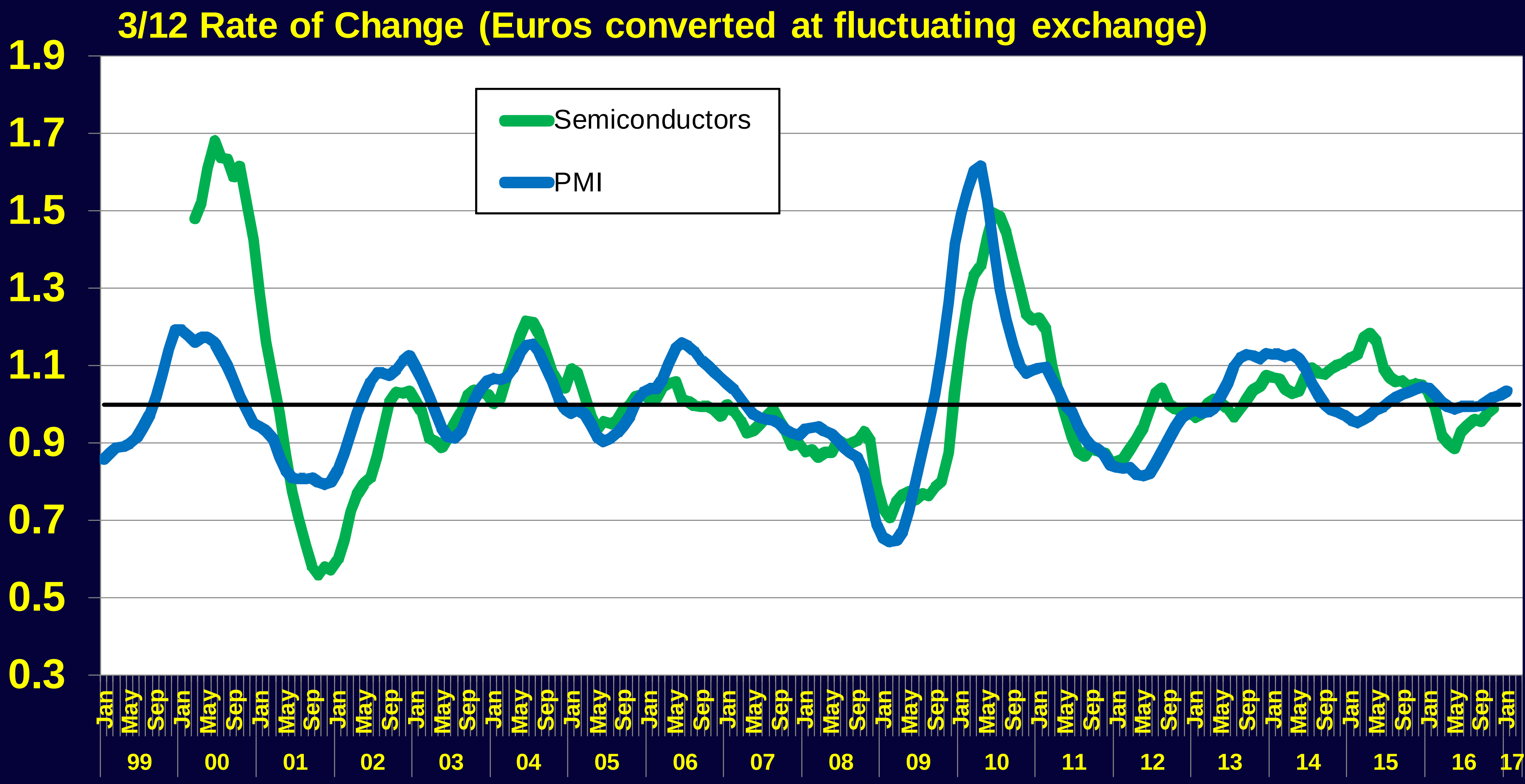
20170202



http://www.census.gov/indicator/www/m3/

20170131

Semiconductor Shipments to Europe vs. Eurozone PMI

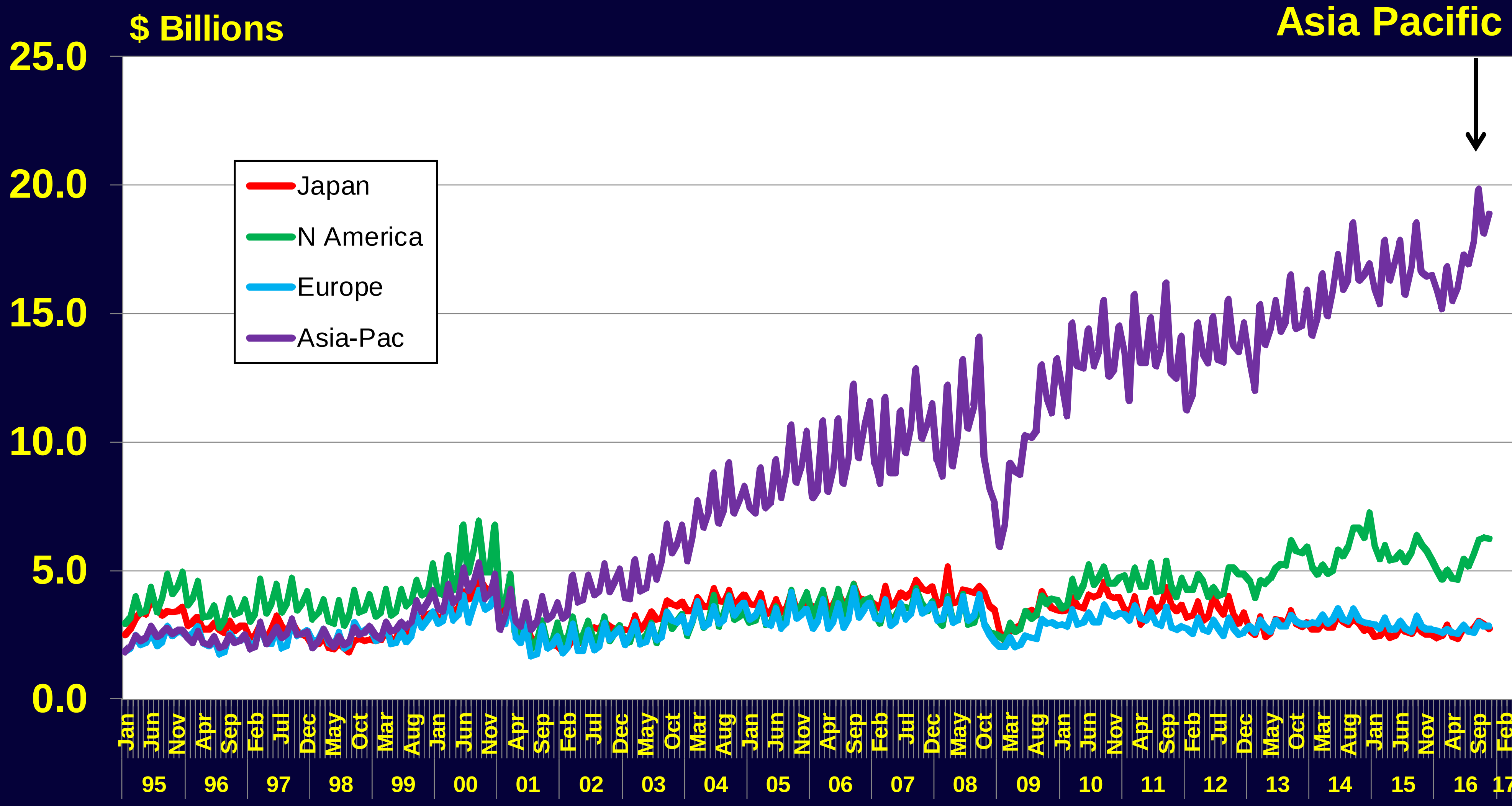


Total $ Semiconductor Shipments from All Countries to Europe www.sia-online.org/,
Eurostat class C26, EU27, European Computer, Electronic & Optical products Production

20170105

Total Semiconductor Shipments to an Area

Monthly Shipments - Reporting Firms

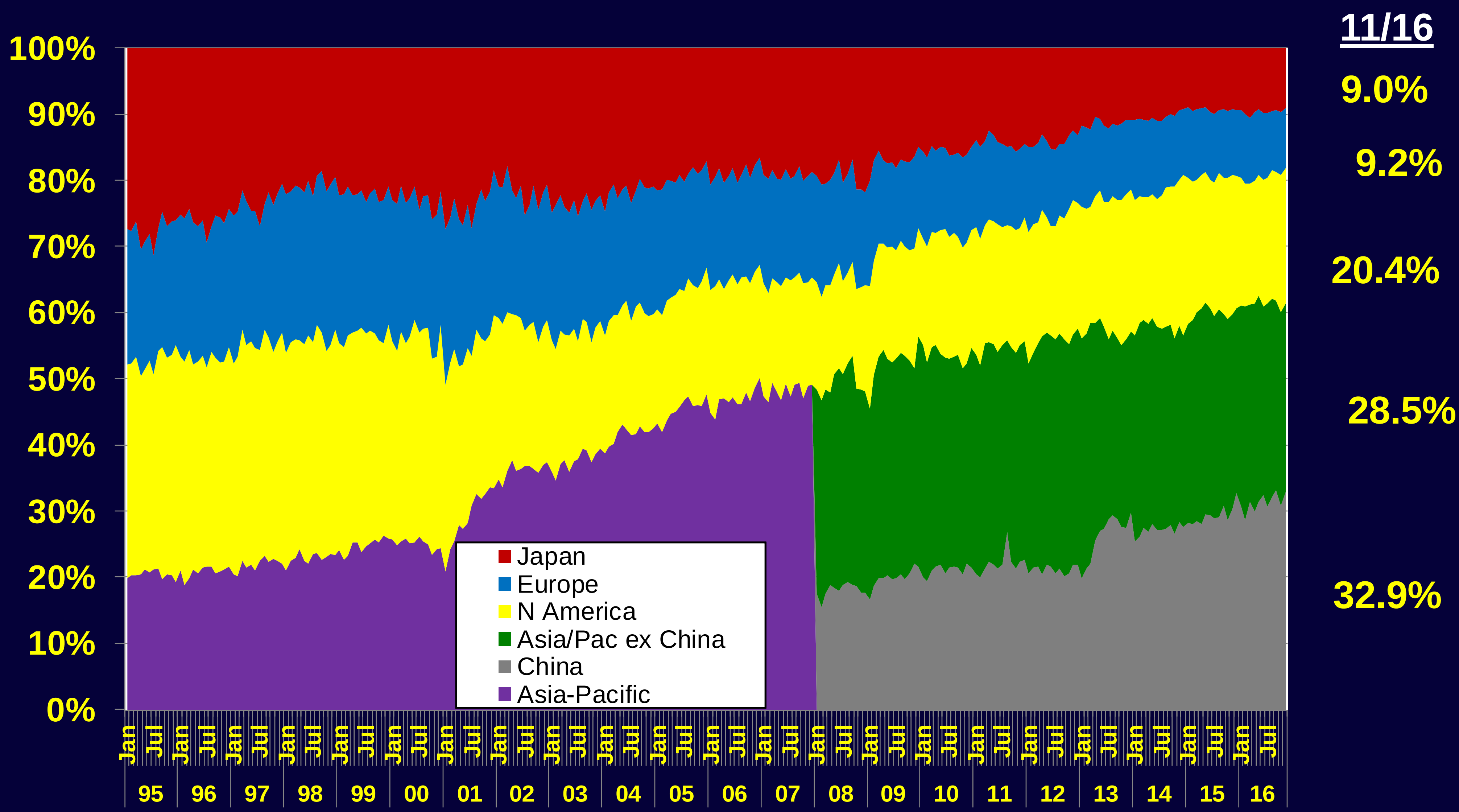


www.wsts.org,
www.sia-online.org/

20170105

Total Semiconductor Shipments to an Area

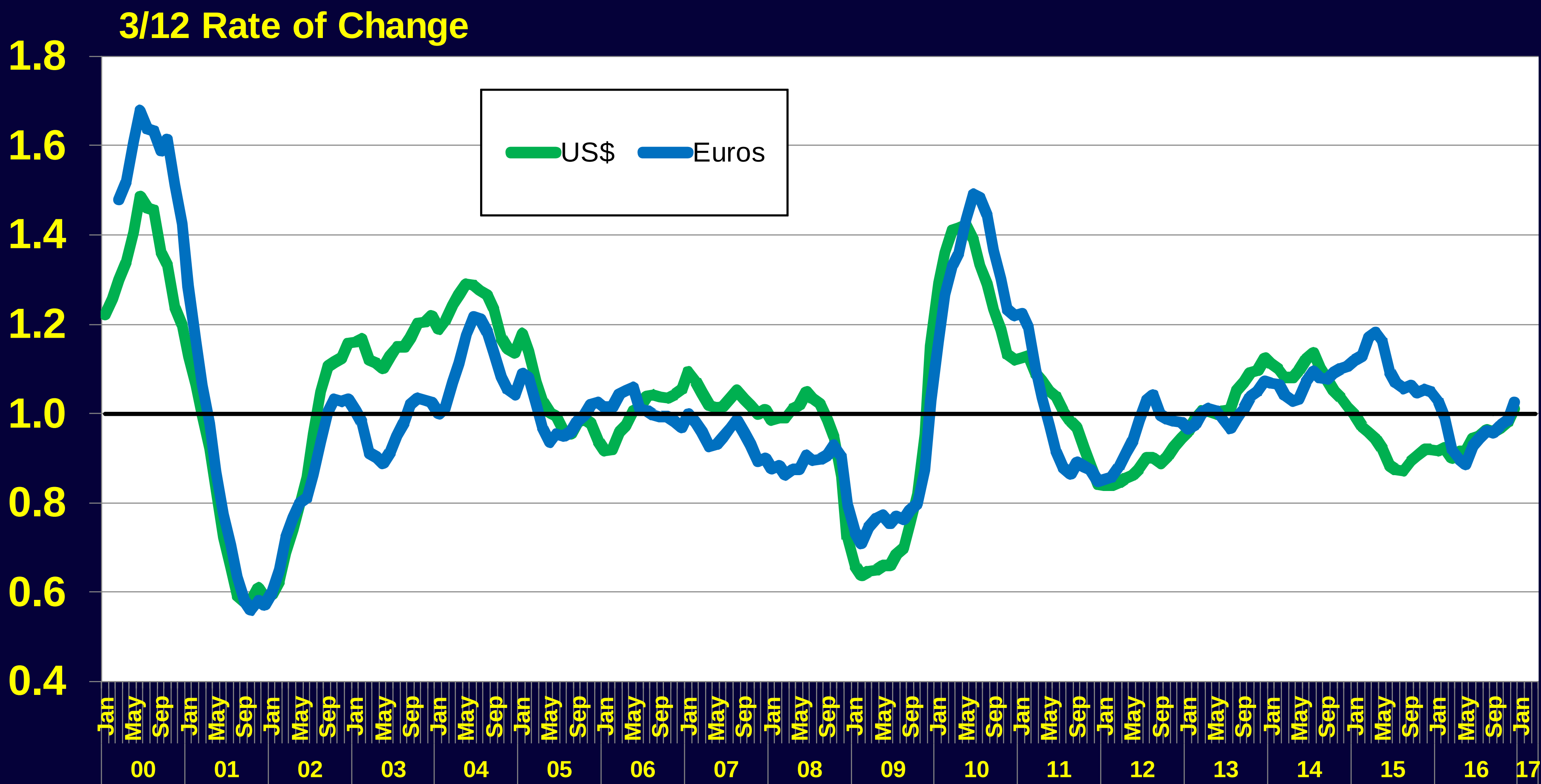
Monthly Shipments - Reporting Firms (showing China)



SIA website: www.sia-online.org/

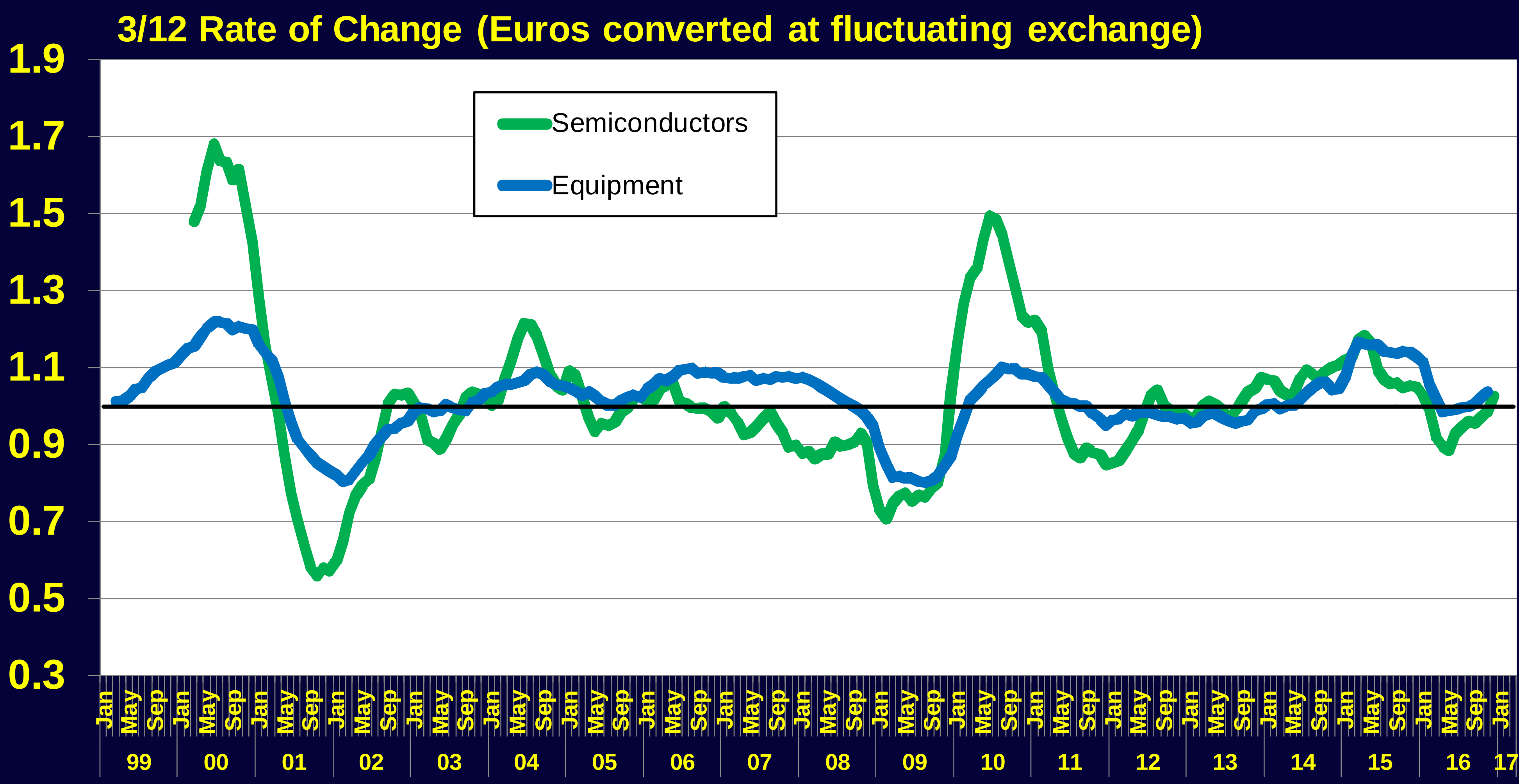
20170202

Effect of Exchange Rates on Semiconductor Shipment Growth to Europe



20170202

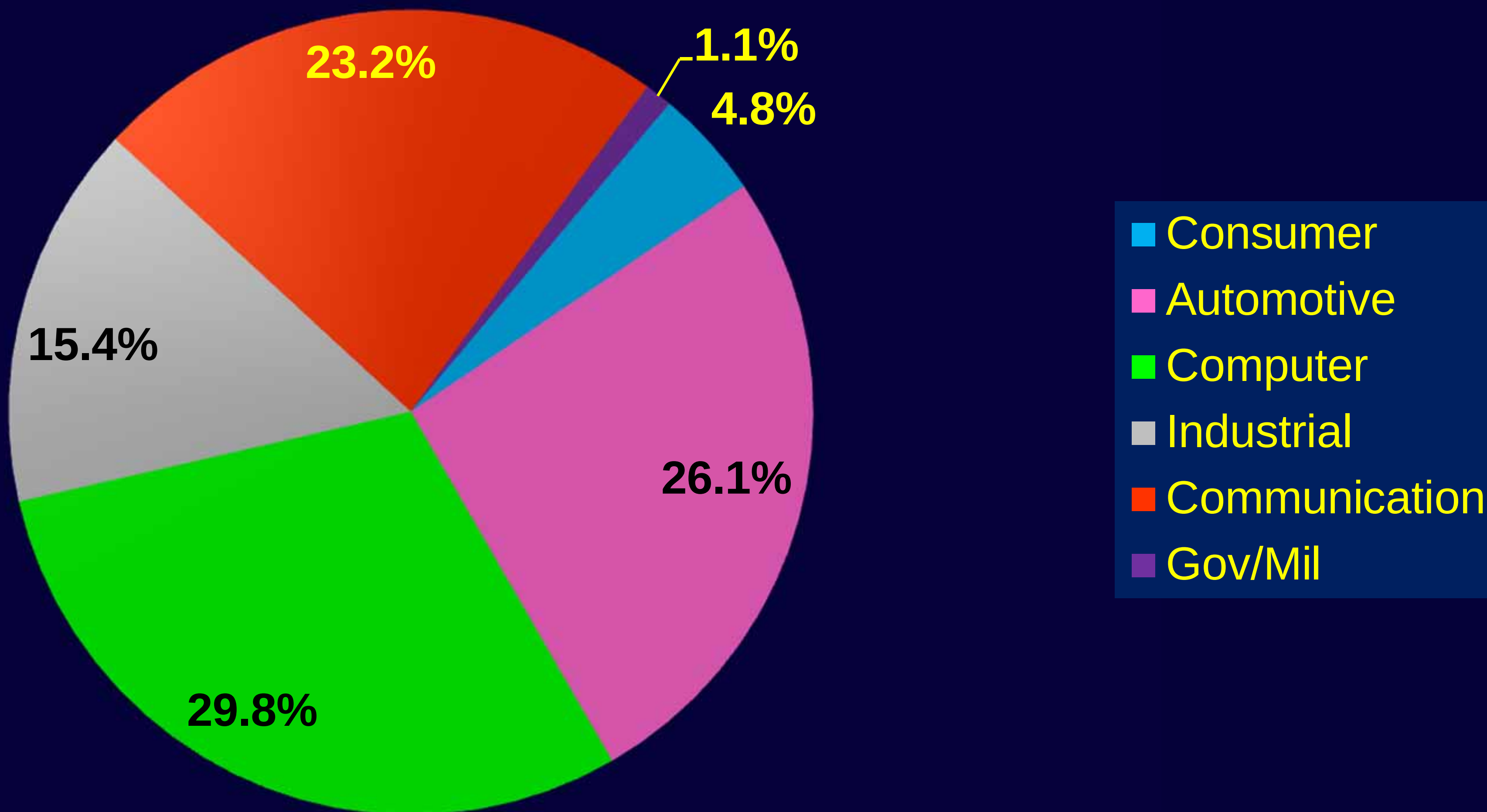
Semiconductor Shipments to Europe vs. European Electronic Equipment Production



Total $ Semiconductor Shipments from All Countries to Europe www.sia-online.org/,
Eurostat class C26, EU27, European Computer, Electronic & Optical products Production

20160917

Europe IC Usage by System – 2016F

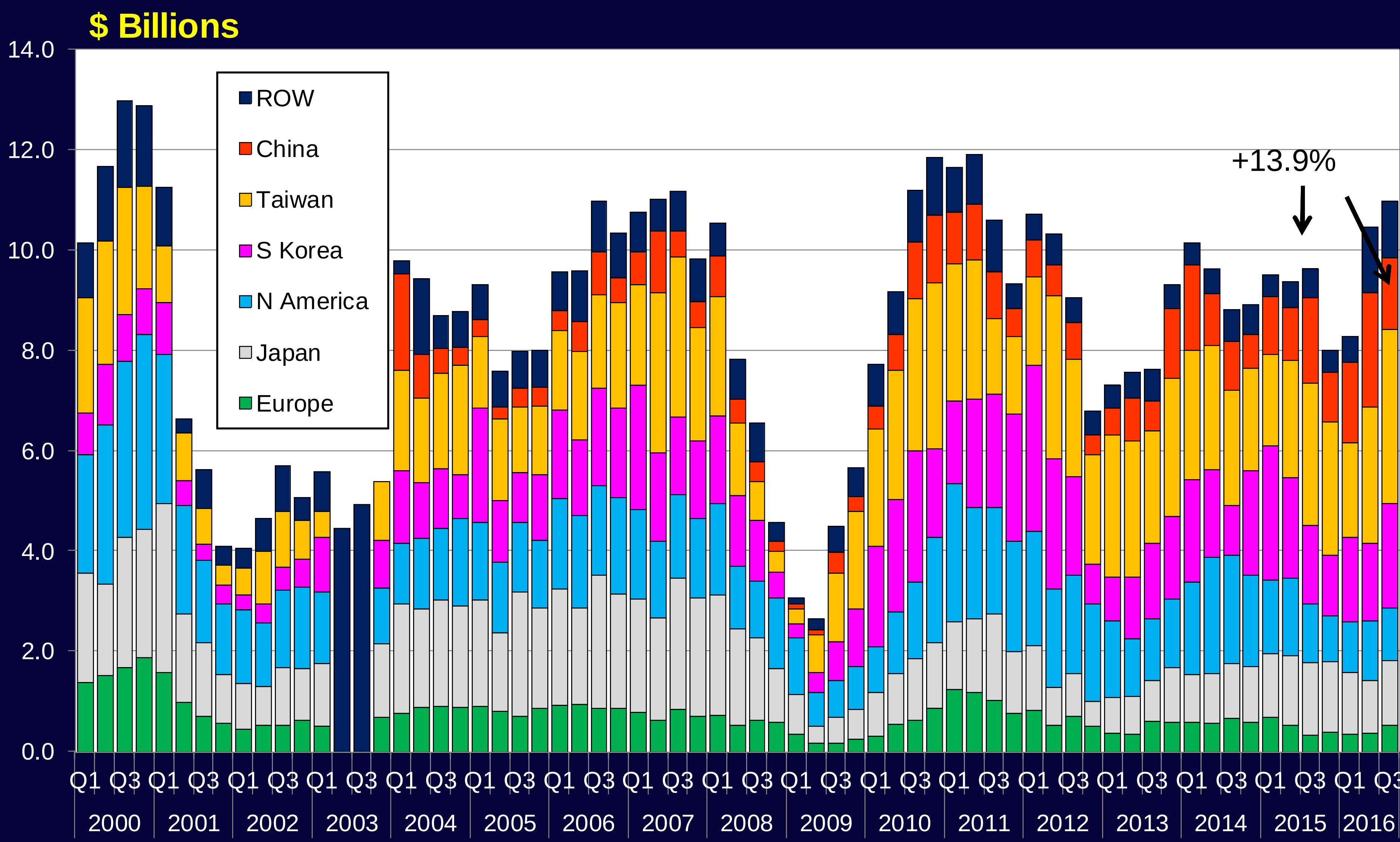


Total: $25.6 Billion

IC Insights 9/16

Semiconductor Capital Equipment

Semiconductor Capital Equipment Shipments by Area

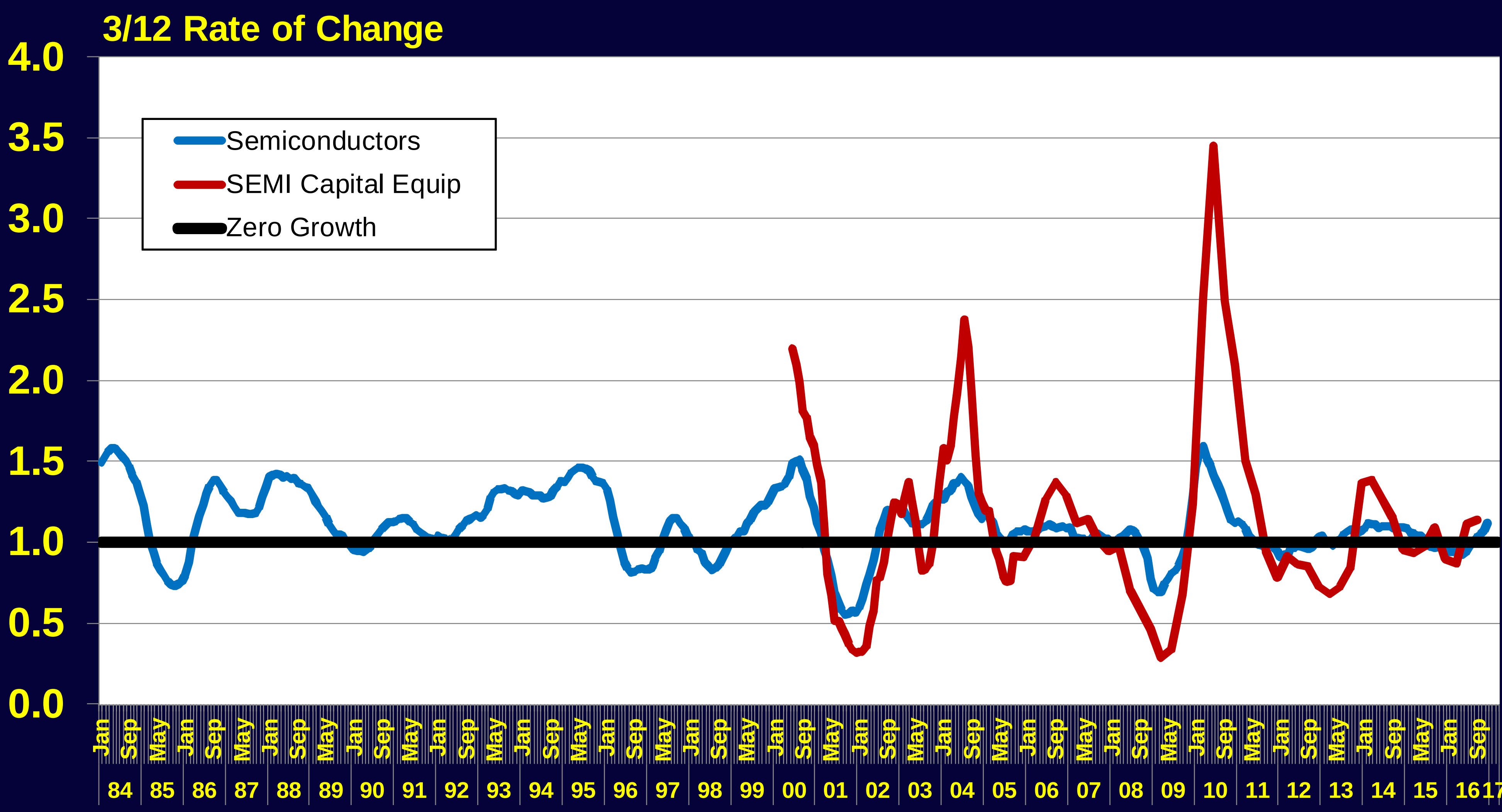


www.semi.org, www.seaj.or.jp/ 12/16 & prior reports

Global Semiconductor & Semiconductor Capital Equipment

3-Month Shipment Growth Rates on $ Basis

20170202

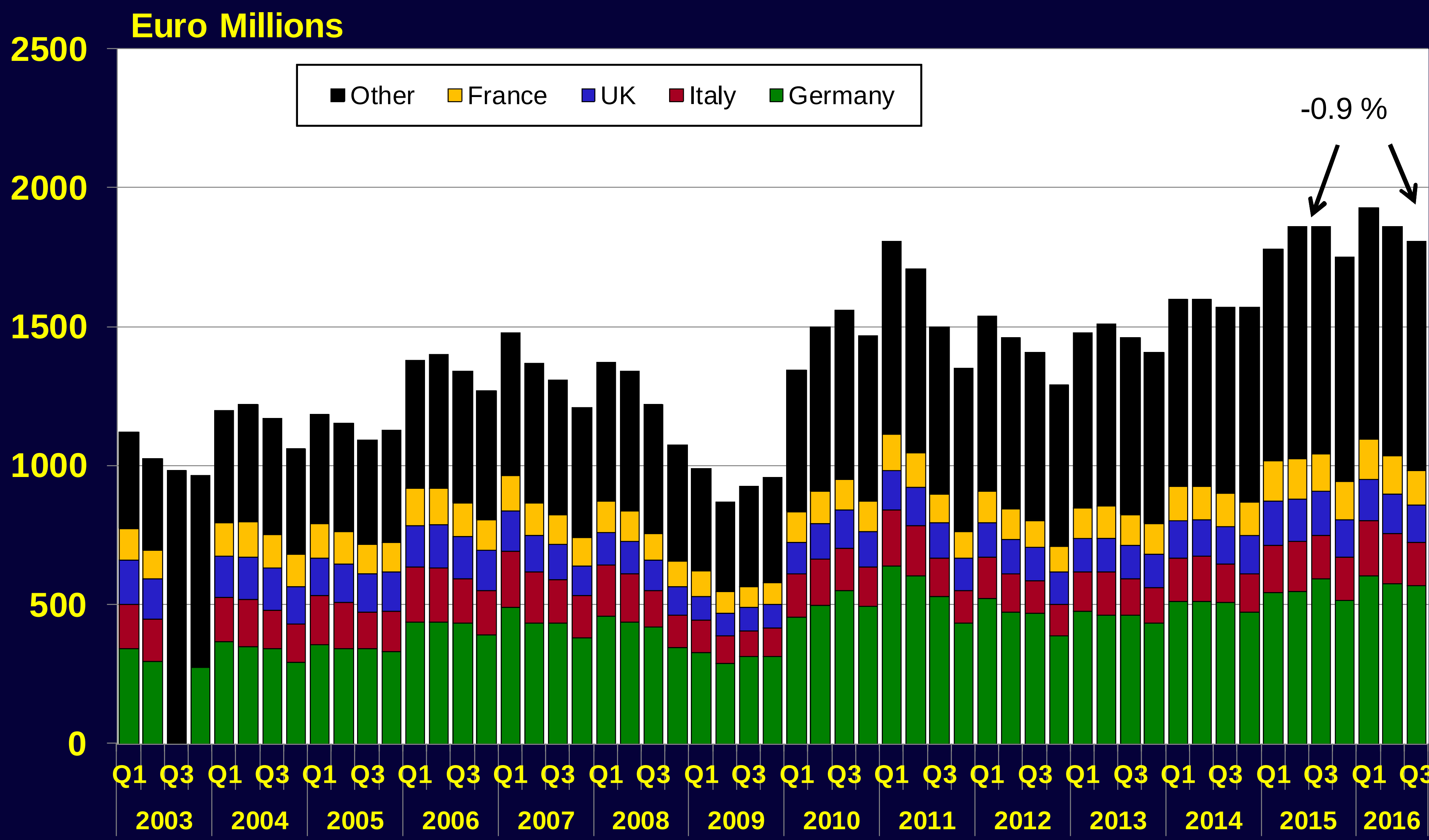


Sources: SIA; Semiconductor Equipment Association of Japan, www.semi.org, Custer Consulting Group SEMI equipment sector composite growth

European Component Shipments by Country

20161119

DMASS - European Semiconductor Distribution Industry

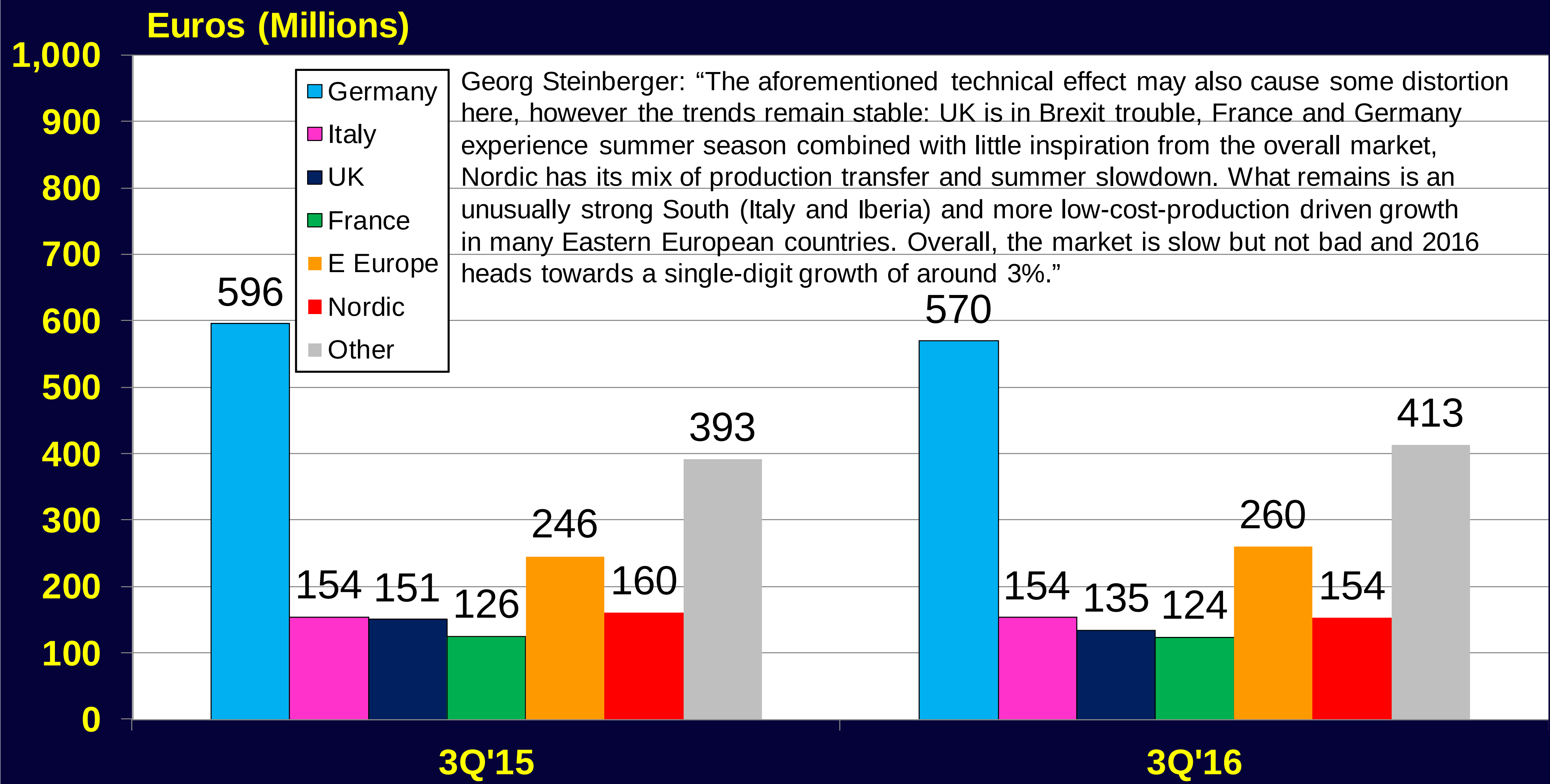


http://dmass.com/ 11/16

20161119

DMASS

European Semiconductor Distribution Industry



"**Growth rate for semiconductor distribution slips into negative during summer. Technical effects. Israel, Eastern Europe and Benelux surprisingly strong. Analog remains stable** stronghold"

DMASS 11/2016; http://dmass.com/

EMS & ODM Companies

20170130

Large Global EMS Providers

2016 vs. 2015 Sales ($M)

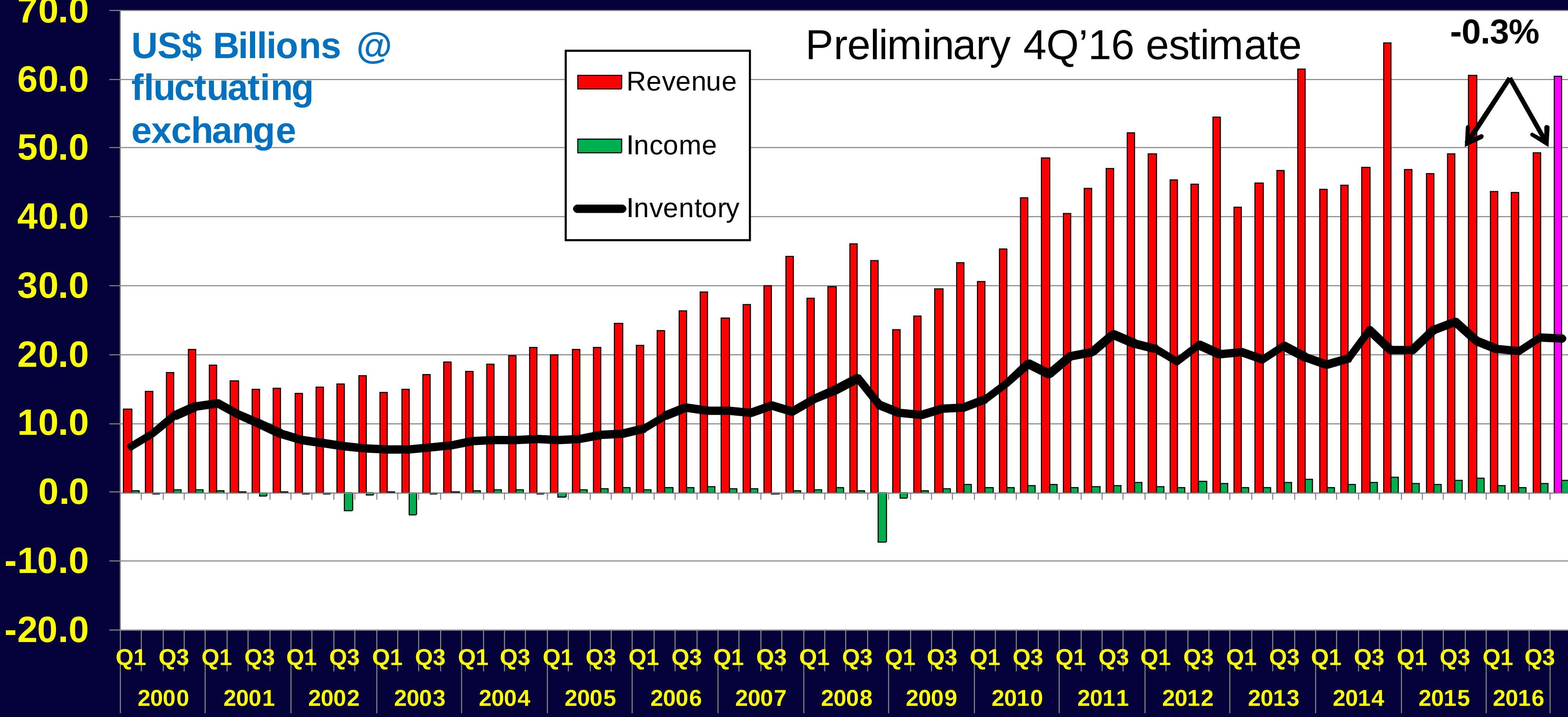
		2016	2015	2016/2015 Growth %
Hon Hai (Foxconn)	Taiwan	144,050	141,717	+1.6%
Flextronics	Singapore	24,419	24,598	-0.7%
Jabil Circuit	USA	18,651	18,557	+0.5%
Sanmina	USA	6,322	6,238	+1.3%
Celestica	Canada	5,694	5,639	+1.0%
Benchmark Elec	USA	2,469	2,541	-2.8%
Plexus	USA	2,574	2,606	-1.3%
Venture Mfg	Singapore	1,940	1,928	+0.6%
Sypris	USA	135	145	-6.9%
Total		205,956	204,291	+0.8%

Sources: Company data; 4Q'16 estimates for Benchmark. Sypris, Venture
Local currency converted at fluctuating exchange

20170130

Large EMS Providers Composite of 9 Public Companies

Revenue, Net Income & Inventory

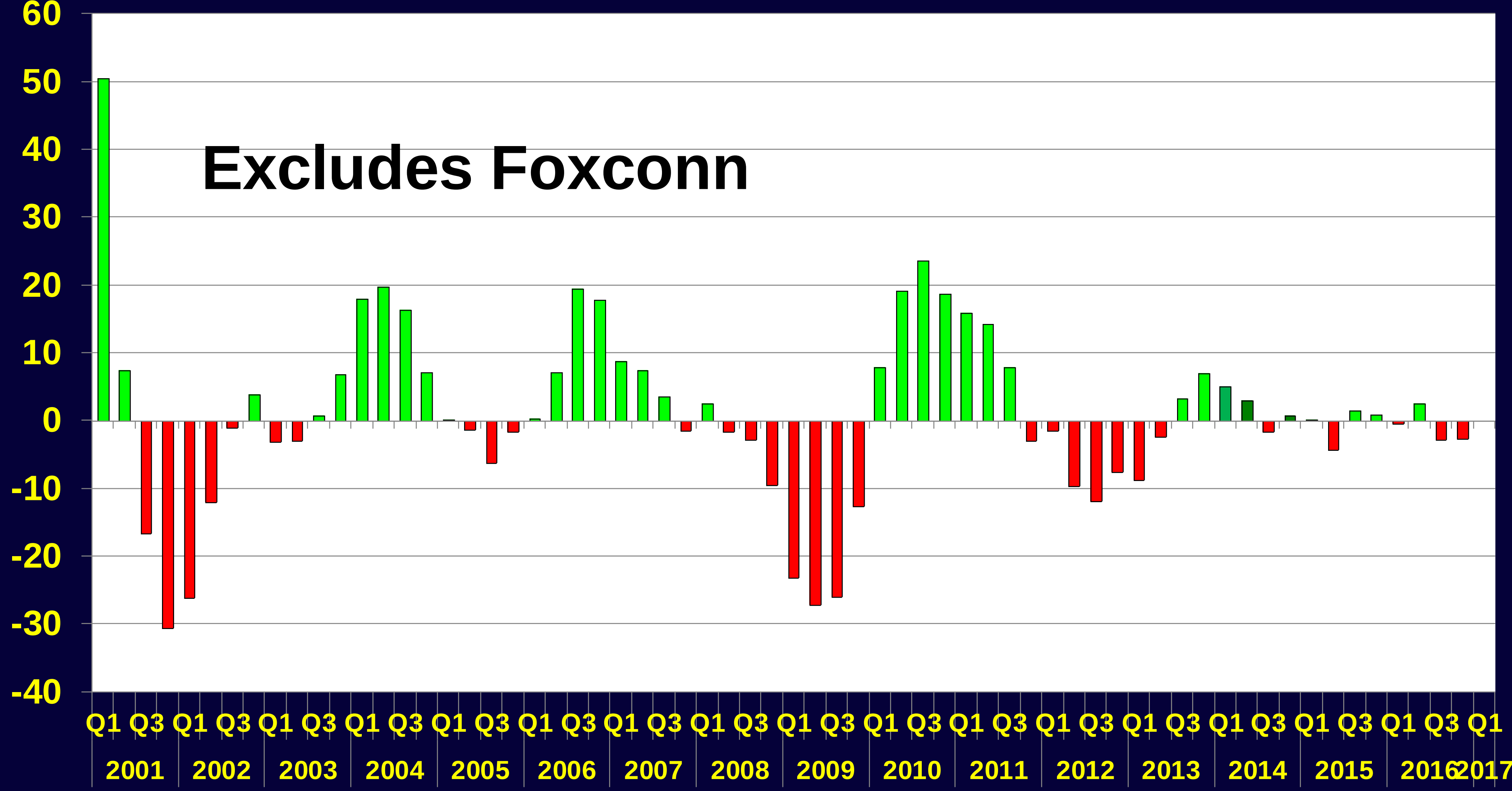


Benchmark+Pemstar, Celestica, Flextronics+Solectron, Foxconn, Jabil, Plexus, Sanmina, Sypris, Venture Mfg

20170130

Large EMS Providers
Composite of 8 Public Companies

Quarterly Revenue Growth



Benchmark+Pemstar, Celestica, Flextronics+Solectron, Jabil, Plexus, Sanmina-SCI, Sypris, Venture Mfg

20170113

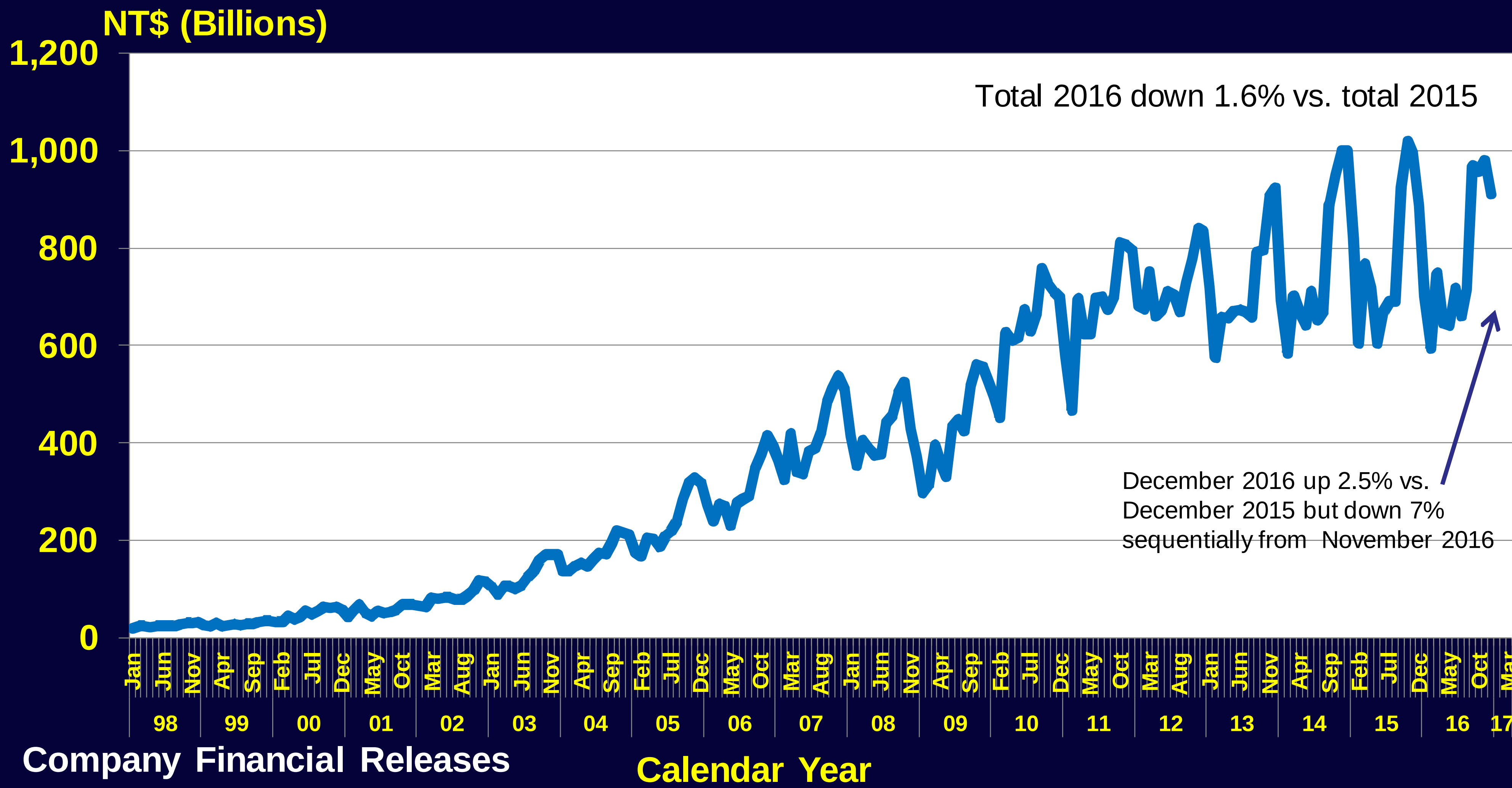
Large Taiwan ODM Providers

2015 vs. 2016 Sales ($M)

	2015	2016	2016/2015 Growth %
Foxconn (Hon Hai)	139,067	135,155	-2.8%
Pegatron	37,646	35,929	-4.6%
Quanta Computer	31,246	27,738	-11.3%
Compal Electronics	26,281	23,787	-9.5%
Wistron	19,334	20,455	+5.8%
Asustek Computer	14,650	14,486	-1.1%
Inventec	12,268	13,292	+8.4%
Chimei Innolux	11,295	8,906	-21.2%
Lite On Technology	6,725	7,120	+5.9%
Total	298,512	286,868	-3.9%

Source: Company data, NT$ converted at constant avg 2016 exchange (32.24 NT$ = 1US$)
Consolidated company sales

Taiwan ODM Companies
Composite Sales of 11 Large Manufacturers



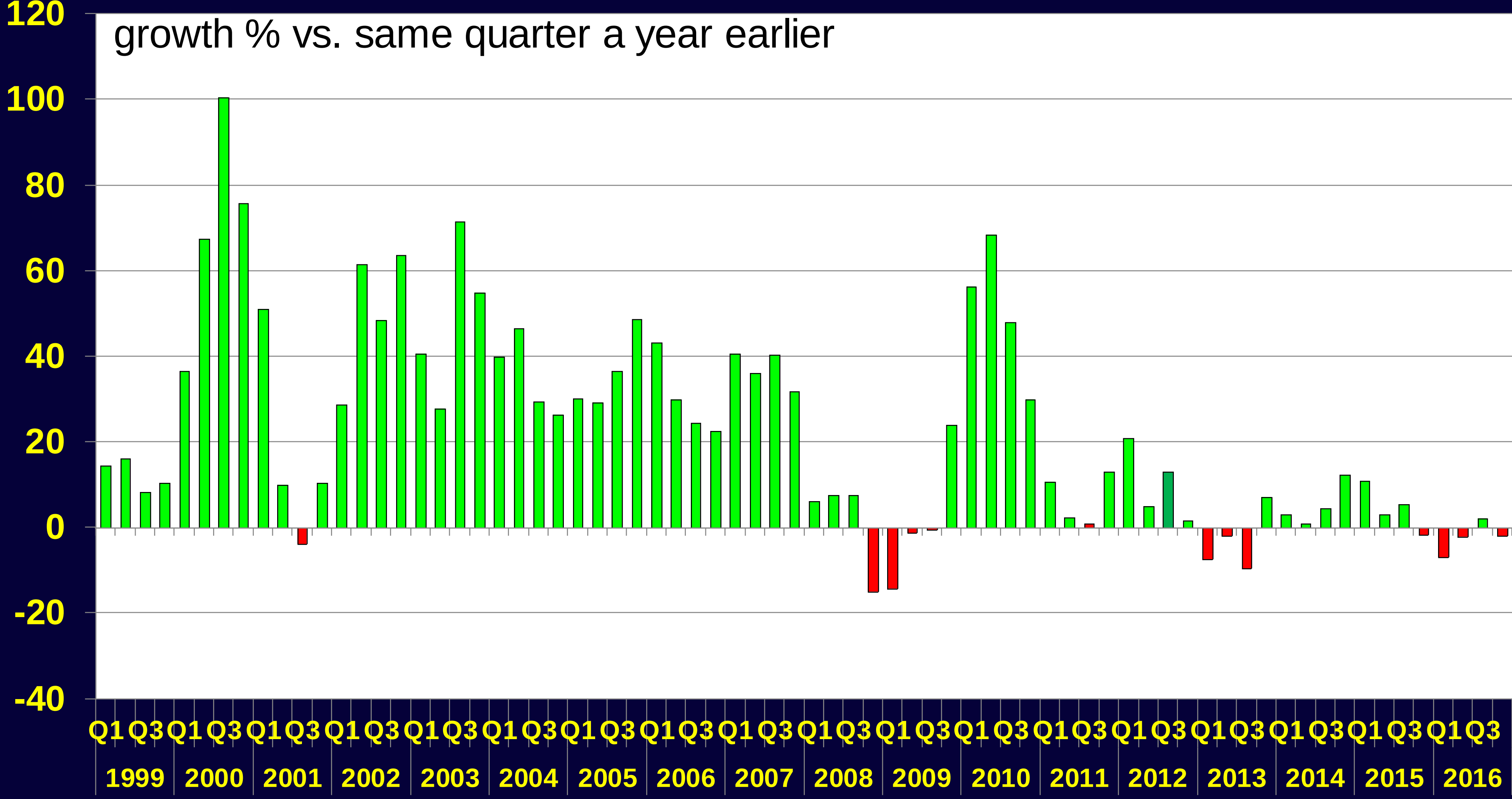
Company Financial Releases

Asustek Computer, Chei Mei, Compal Electronics, Foxconn, Chimei Innolux , Inventec, Inventec Appliance, Lite On Technology, Mitac International, Pegatron, Quanta Computer, Wistron, Chei Mei Display replacing Chei Mei & Innolux Display 3/10 & later

Large ODM Companies

Composite of 11 Taiwan-listed Manufacturers

Quarterly Revenue Growth in NT$



Asustek Computer, Compal Electronics, Foxconn, Chimei Innolux, Inventec, Inventec Appliance, Lite On Technology, Mitac International, Pegatron, Quanta Computer, Wistron

20170113

European Loaded Electronic Board Production

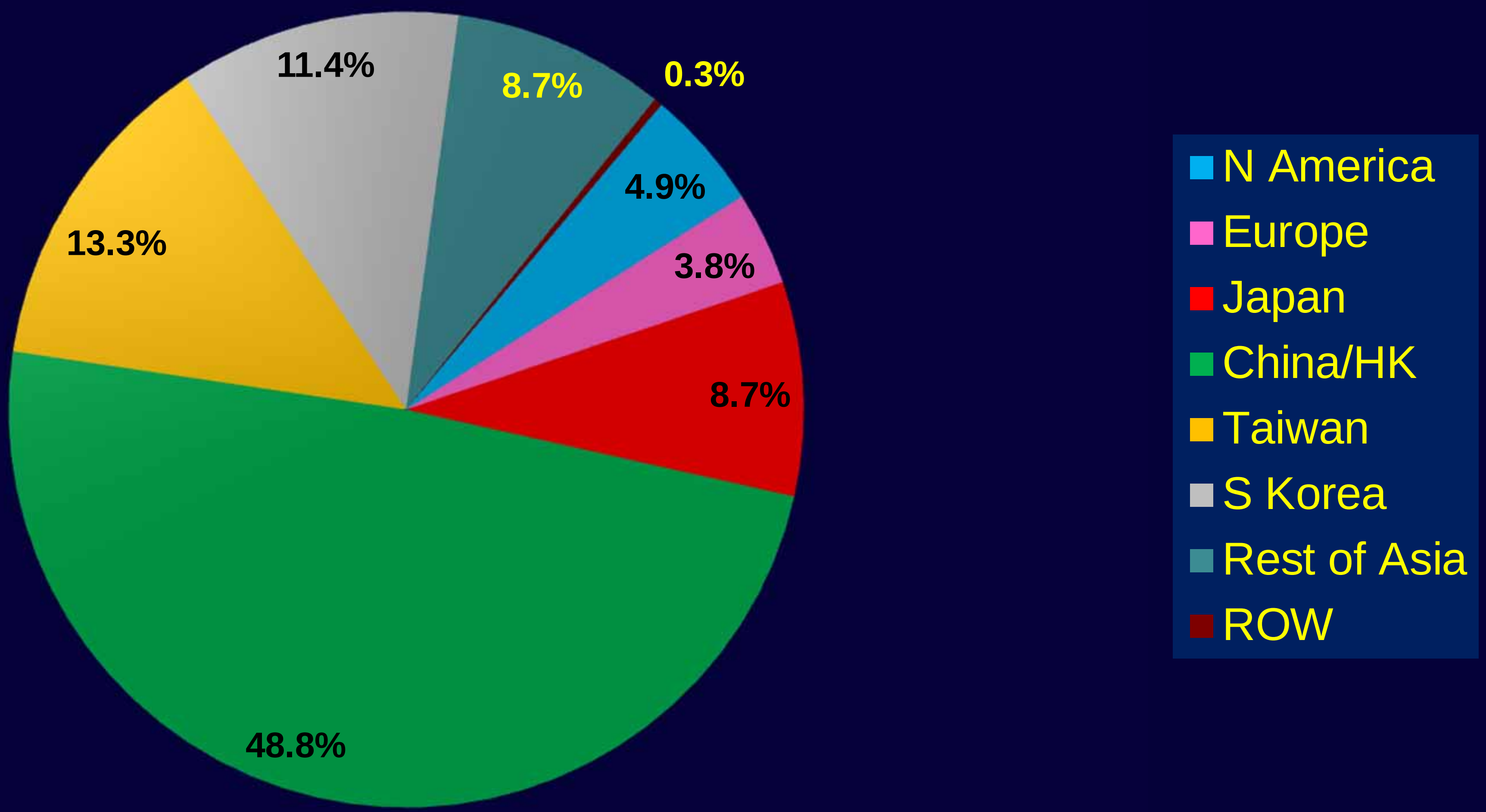
Eurostat, C2612

PCB Fabrication

20161101

2015 World Total PCB Production by Geographical Area

(US$ M @ Average 2015 Exchange)



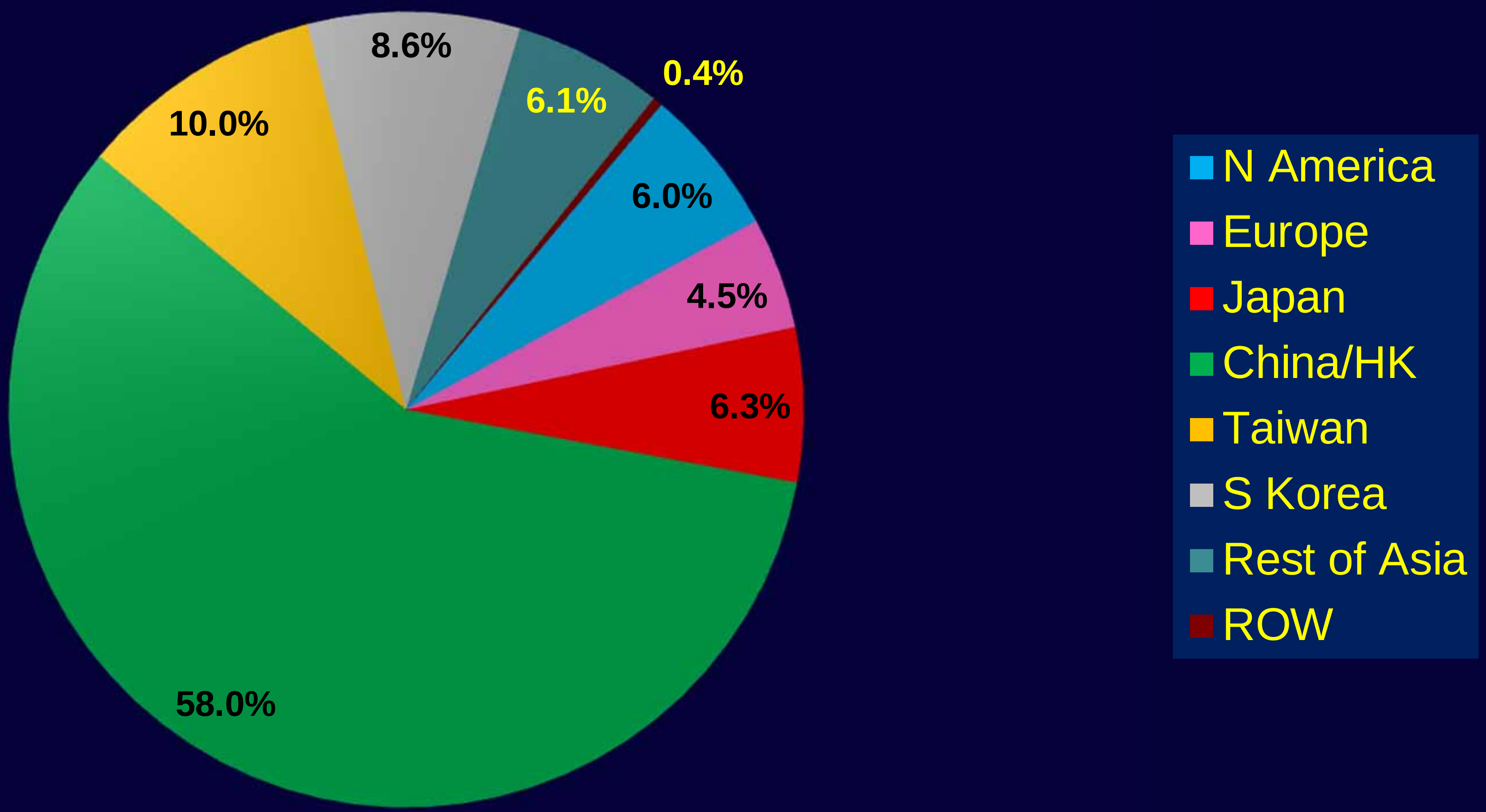
Total: $58.6 Billion

IPC 10/16

20161101

2015 World Rigid PCB Production by Geographical Area

(US$ M @ Average 2015 Exchange)



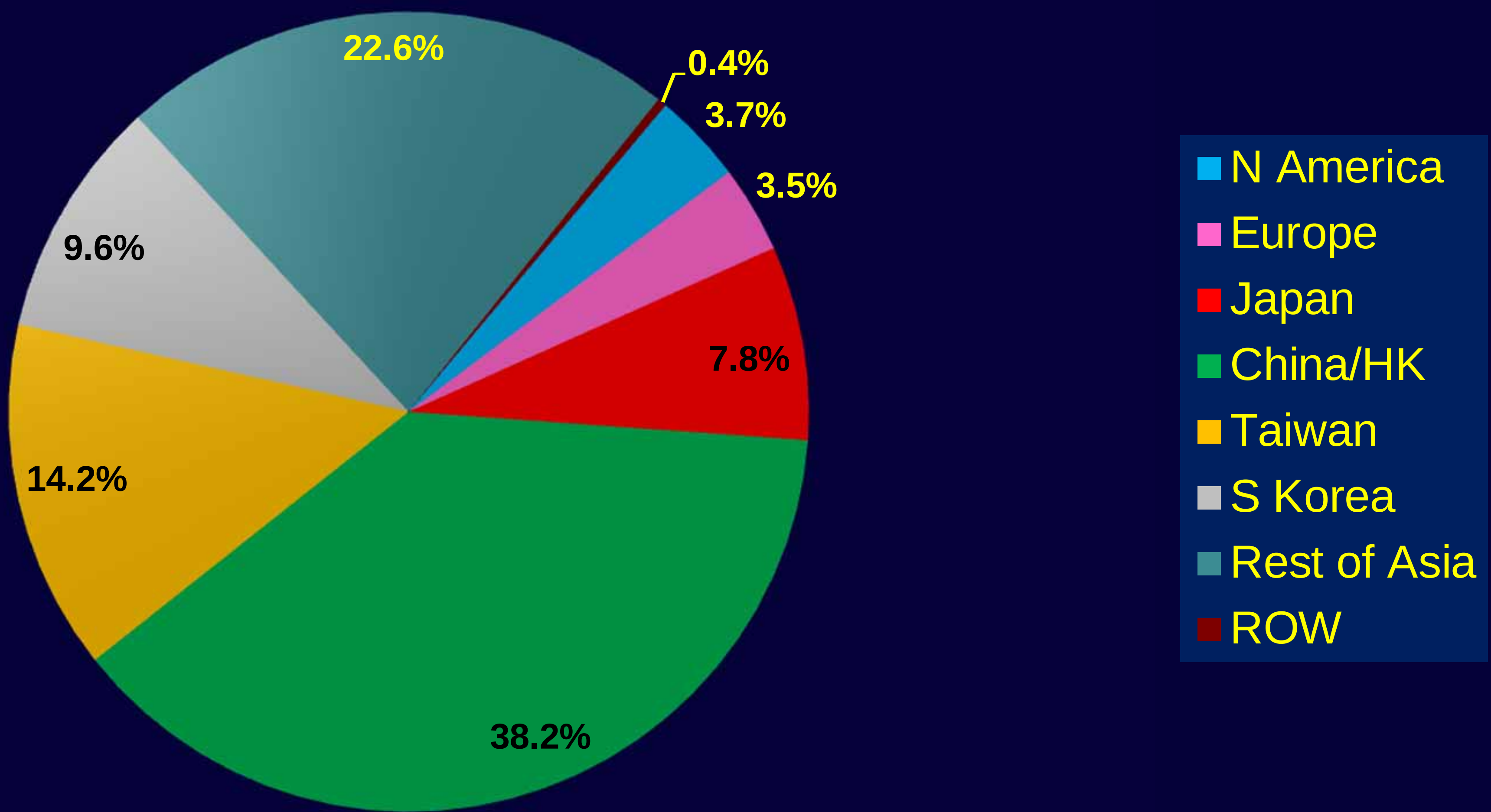
Total: $41.0 Billion

IPC 10/16

2015 World Flex & Rigid Flex PCB Production by Geographical Area

20161101

(US$ M @ Average 2015 Exchange)



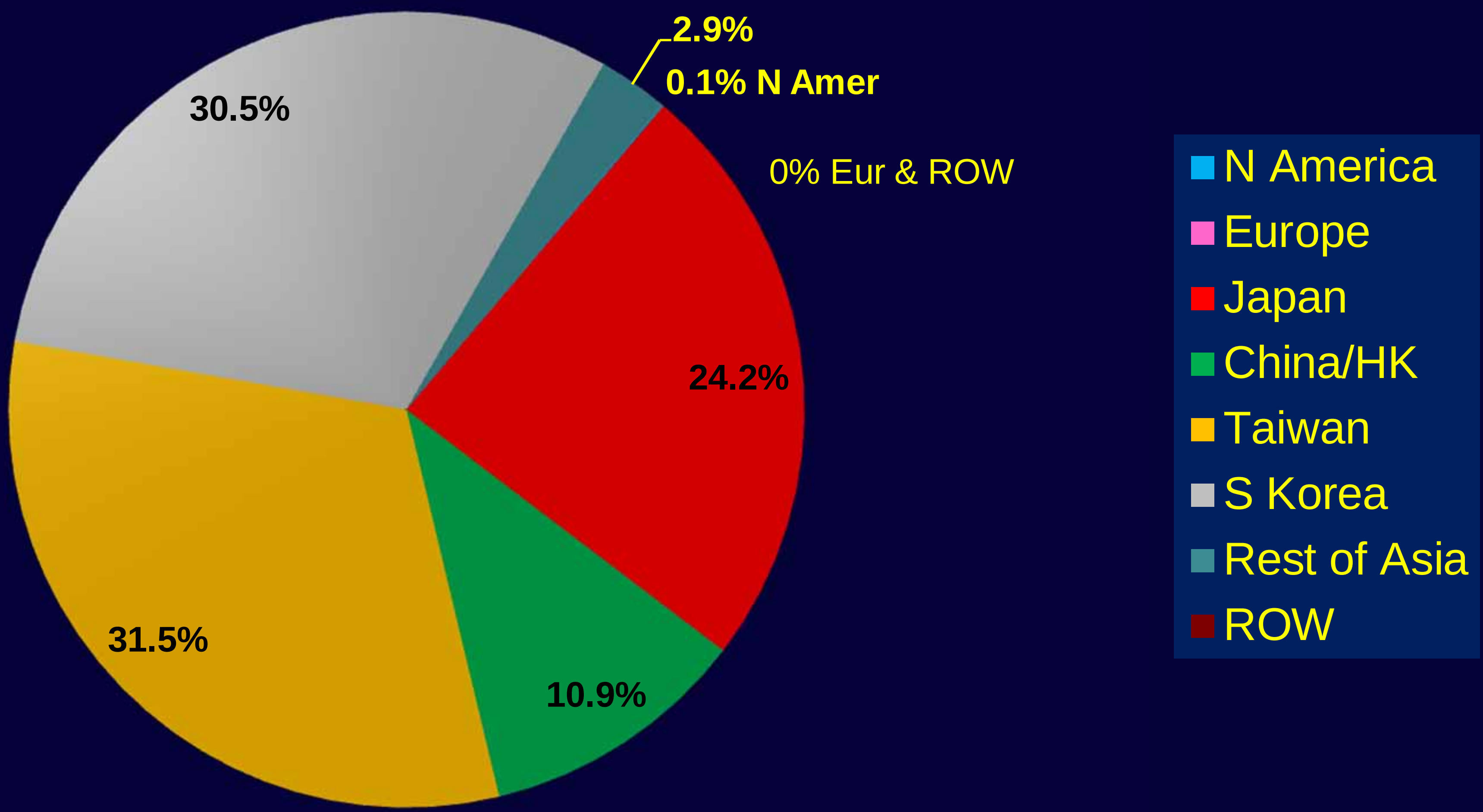
Total: $10.5 Billion

IPC 10/16

20161101

2015 World IC Substrate Production by Geographical Area

(US$ M @ Average 2015 Exchange)



Total: $7.0 Billion

IPC 10/16

20150728

World's Top 25 PCB Companies – 2015

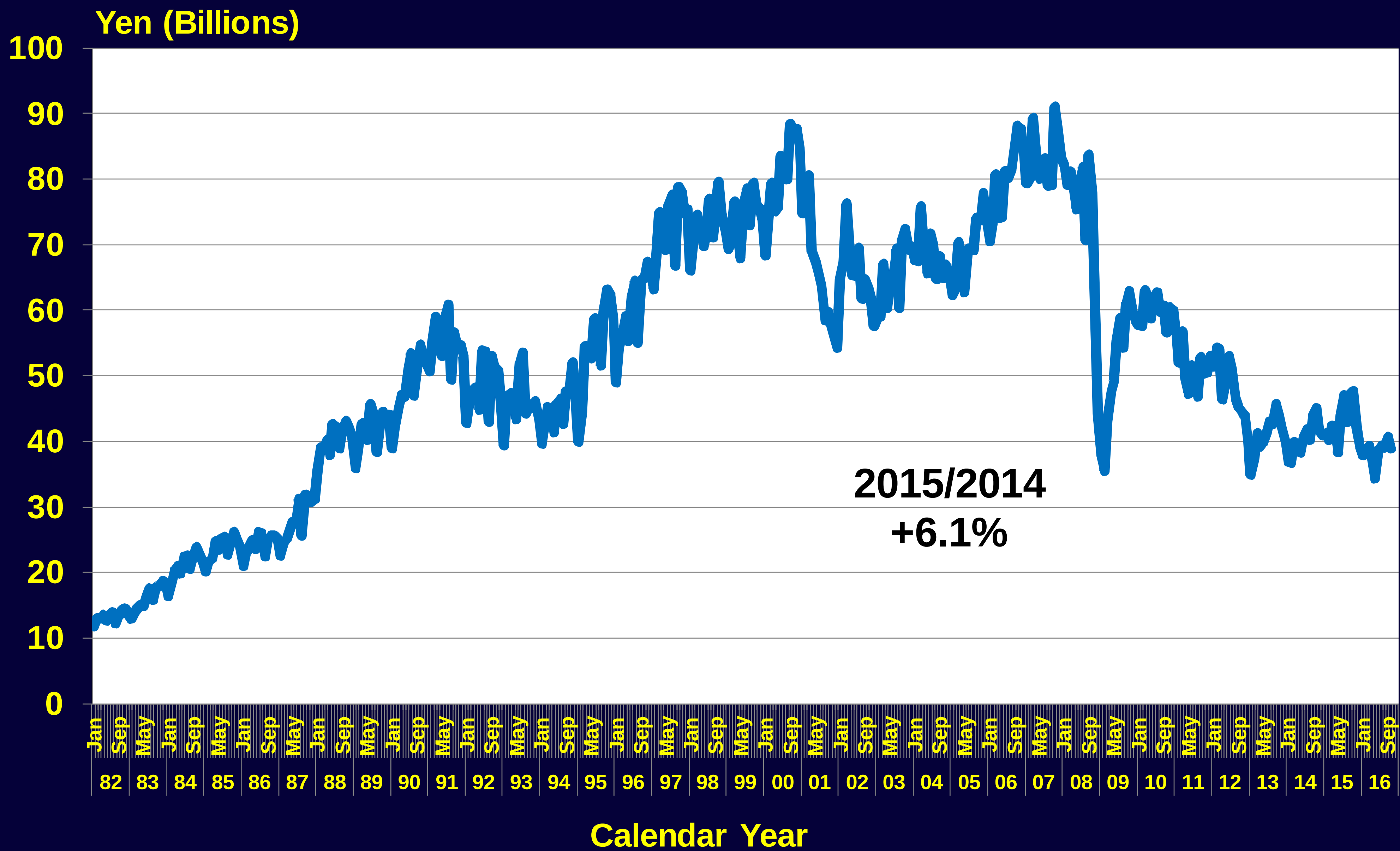
US$M (converted at 2015 exchange rates)

Rank	Maker	Nationality	2014	2015	Growth	Brief Comments
1	Nippon Mektron*	Japan	2957	3414	15.5%	Major customer: Apple
2	ZD Tech*	Taiwan	2390	2698	12.9%	Major customer: Apple
3	TTM Technologies	USA	1326	2450	84.8%	Major customer: Apple
4	Unimicron	Taiwan	2130	2210	3.8%	Uniflex, Subtron, Ruwel, Clover
5	Sumitomo Denko*	Japan	1260	1503	19.3%	Major customer: Apple
6	Compeq	Taiwan	1065	1397	31.2%	Major customer: Apple
7	Tripod	Taiwan	1335	1365	2.3%	Aiming high at automotive
8	Samsung E-M	S. Korea	1445	1364	-5.6%	Shifting to Vietnam
9	Young Poong Group*	S. Korea	1413	1295	-8.4%	Coming back in 2016
10	HannStar	Taiwan	1531	1272	-16.9%	Including GBM/PCBA
11	Ibiden	Japan	1332	1232	-7.5%	Restructuring product lines
12	Nanya PCB	Taiwan	1100	941	-14.5%	Subsrate, automotive
13	KBC PCB Group	China	972	930	-4.3%	Elec & Eltek, Techwise, etc.
14	Daeduck Group	S. Korea	1063	874	-16.8%	Still profitable
15	AT&S	Austria	740	846	14.3%	China, China, China!
16	Fujikura*	Japan	590	810	37.3%	Major customer: Apple
17	Meiko	Japan	756	794	5.0%	Major Field: Automotive
18	Multek	USA	780	730	-6.4%	Inlcuding Minnesota Northfield
19	Kinsus	Taiwan	785	726	-7.5%	Substrate (TW+Suzhou)+Piotek
20	Chin Poon	Taiwan	670	716	6.9%	Major Field: Automotive
21	T.P.T.	Taiwan	751	706	-6.0%	NB Motherboard
22	Shinko Denski	Japan	681	680	-0.2%	Substrate
23	Wus Group	Taiwan	669	671	0.3%	Network/Server, Automotive
24	Simmtech	S. Korea	576	662	14.9%	Buying Eastern?
25	Mflex*	USA	632	637	0.8%	Major customer: Apple

Dr Hayao Nakahara, N.T. Information Ltd 7/2016

20161223

Japan PCB Production

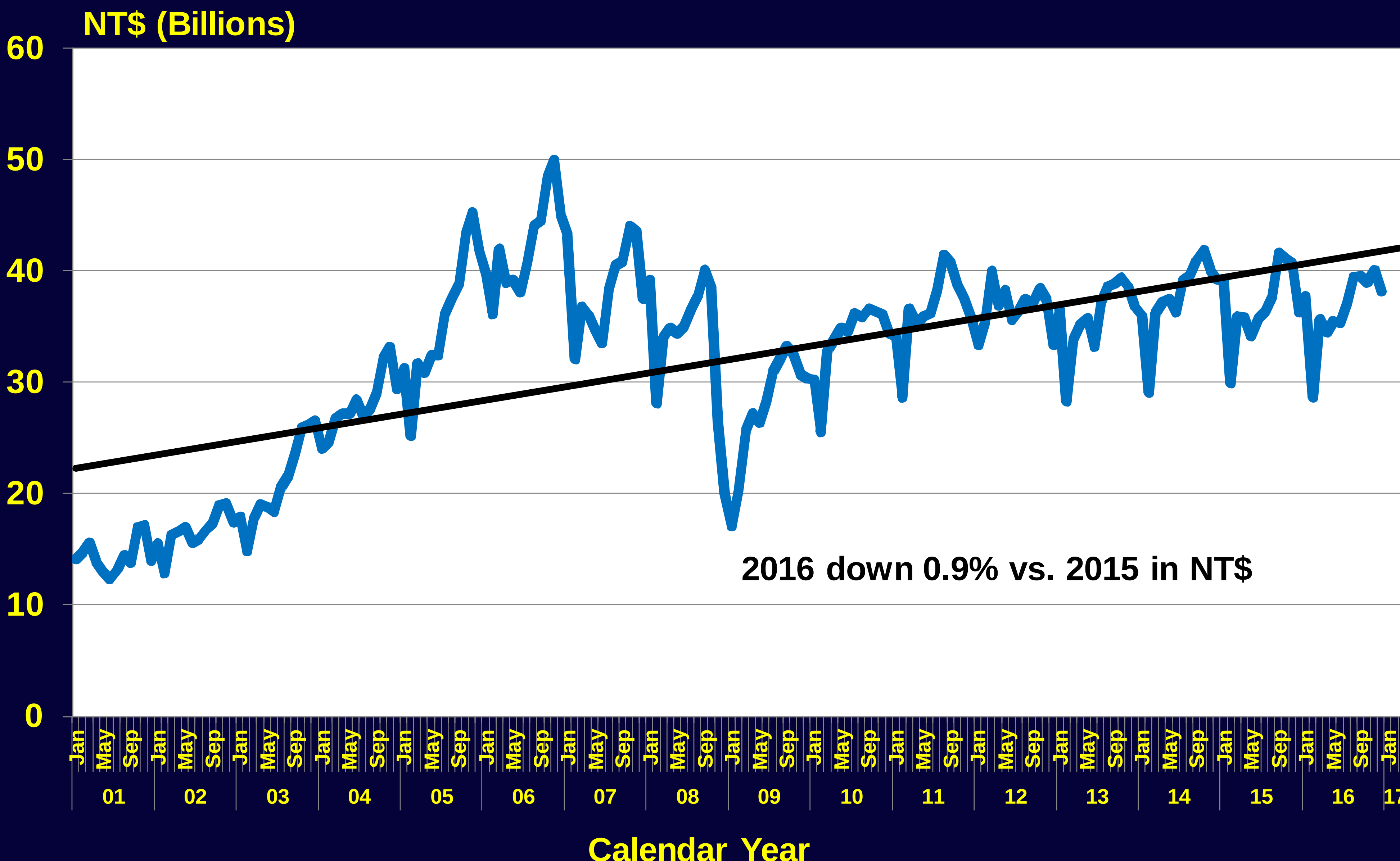


JEITA

20170113

Taiwan Rigid & Flex PCB Shipments

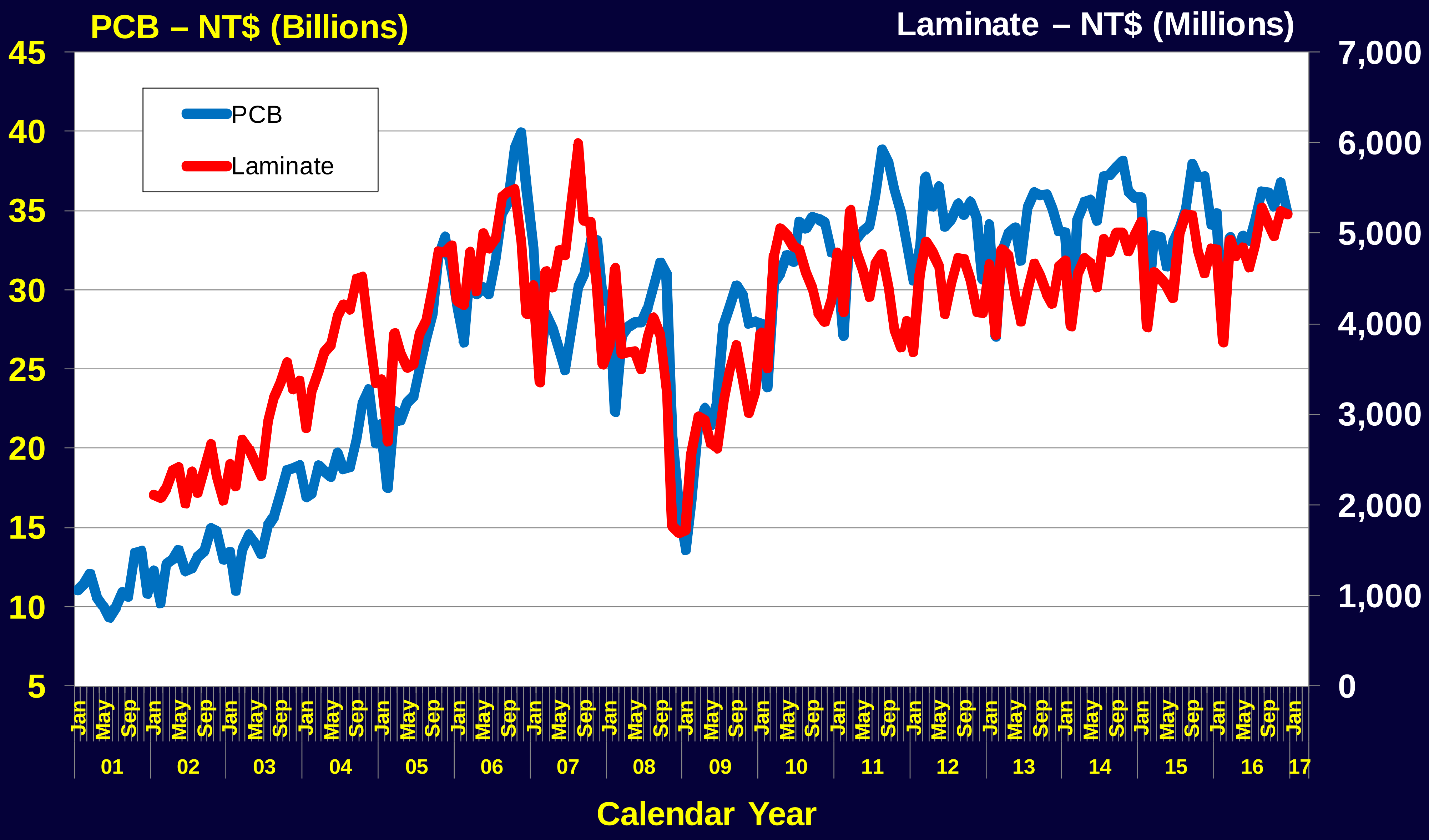
Broad Composite of 46 Taiwan-listed Manufacturers



Company Financial Releases

20170113

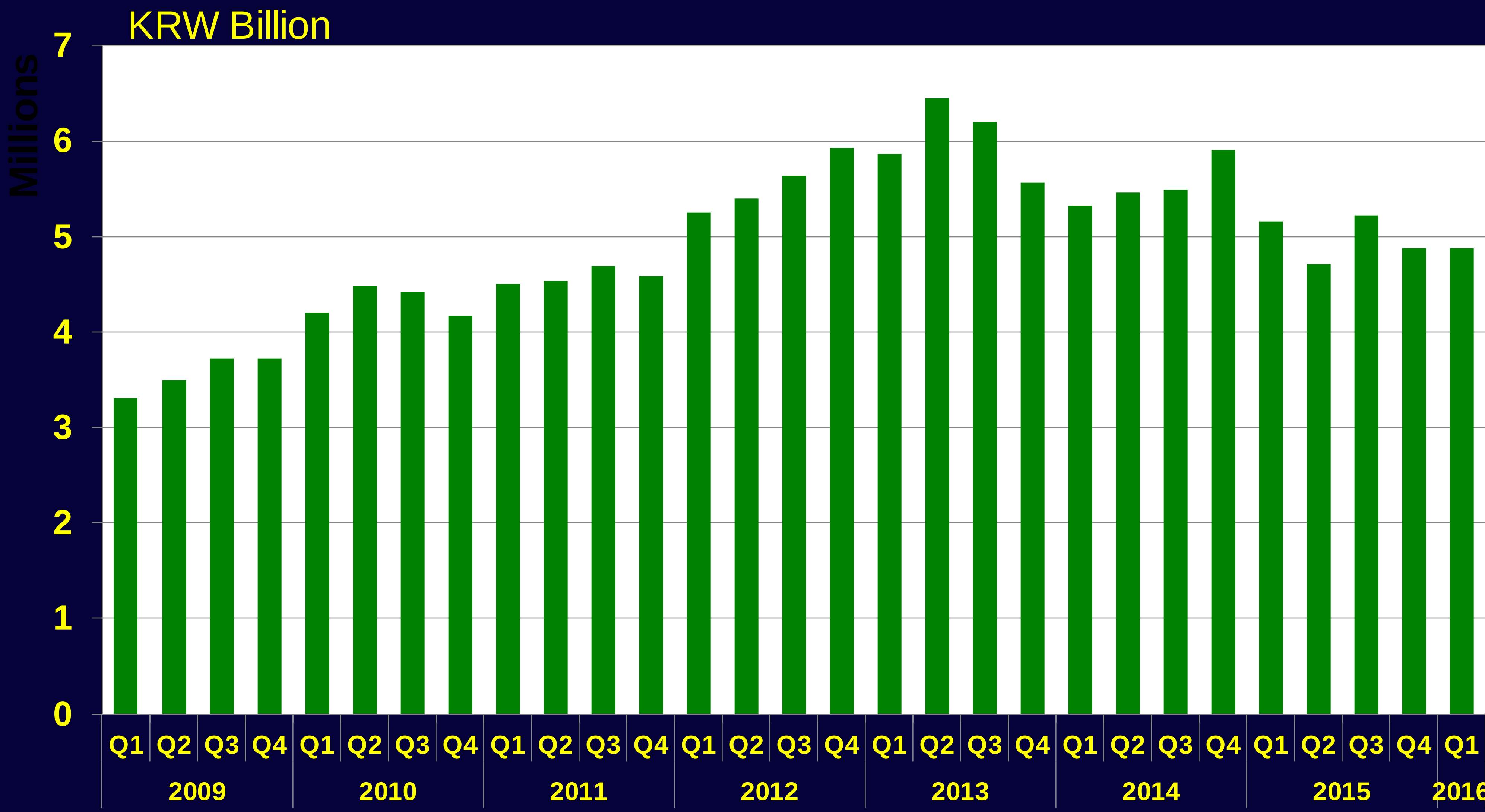
Taiwan Shipments
42 Rigid PCB & 8 Laminate Manufacturers



Company Financial Releases

20160925

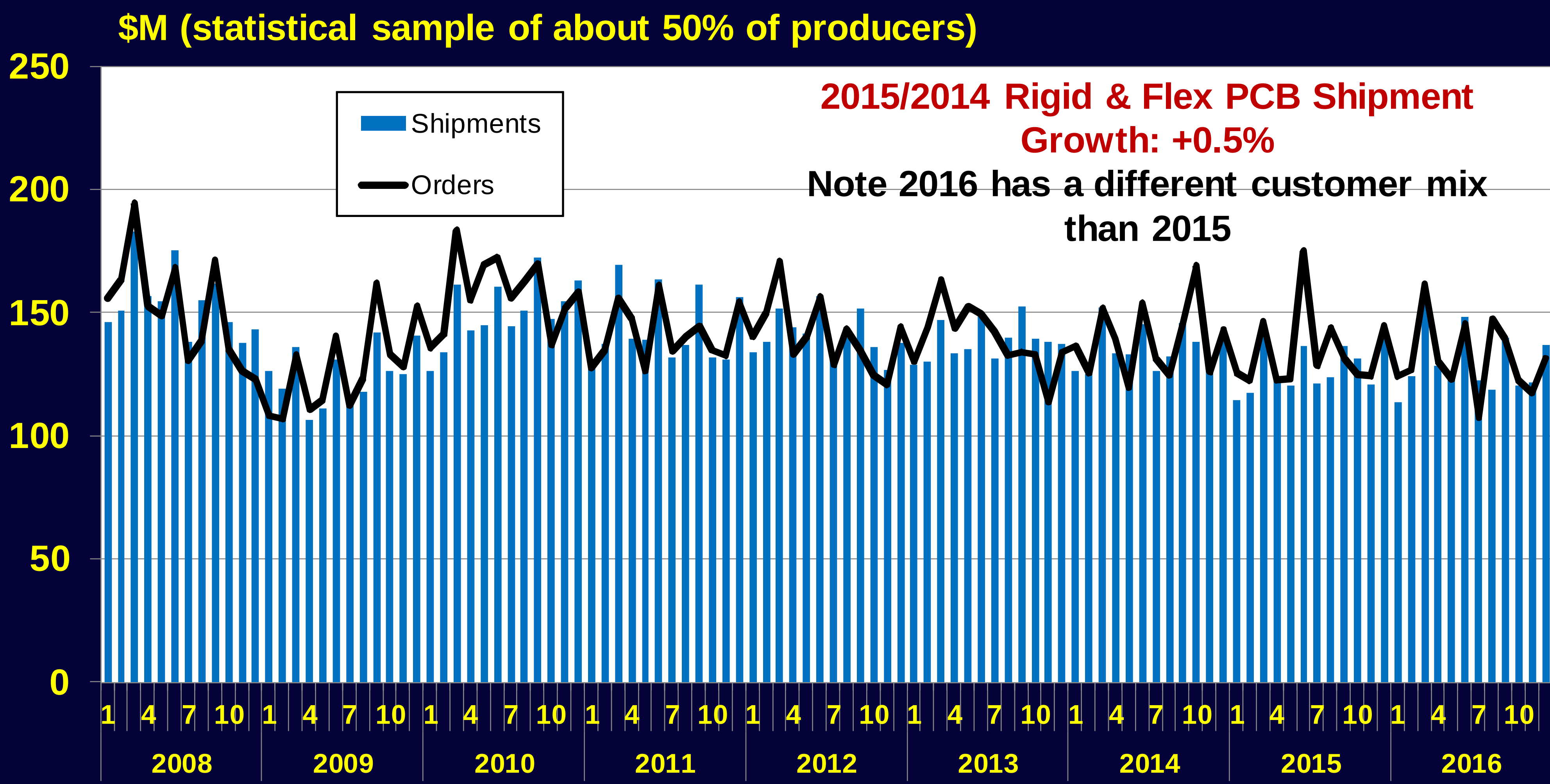
S. Korean PCB Revenues
Composite of 11 Publicly Traded Manufacturers
Quarterly Revenue



Samsung EM, Young Poong, Daeduck, Simm Tech, Isu Petasys, Flexcom, DAP, BH, Samsung Techwin, Korea Circuit

20170201

N American Rigid & Flexible PCB Shipments & Orders

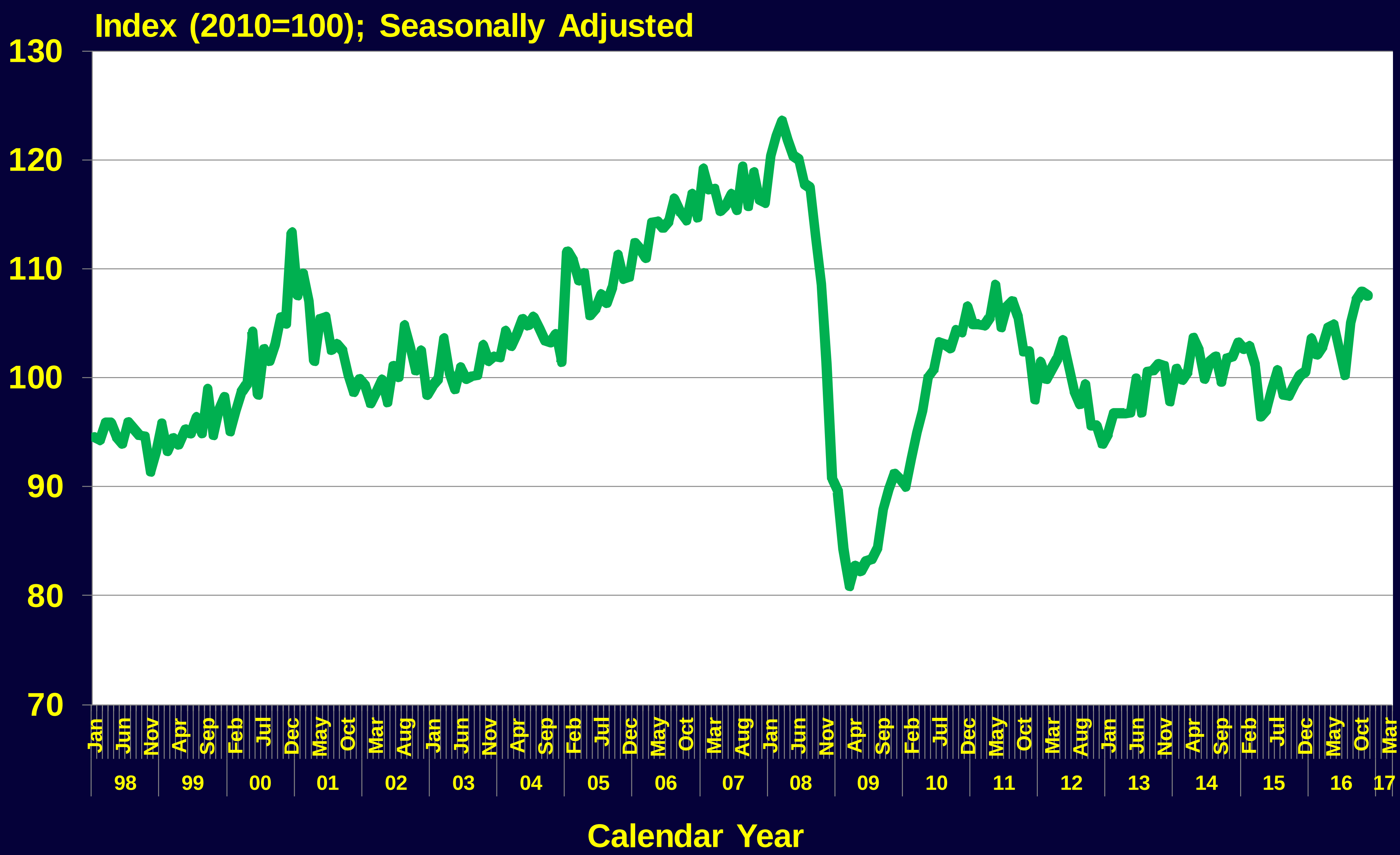


Note: IPC survey captures "market" not domestic production. About 15% of the above represents imported boards resold by N American PCB producers in survey.

IPC

20170113

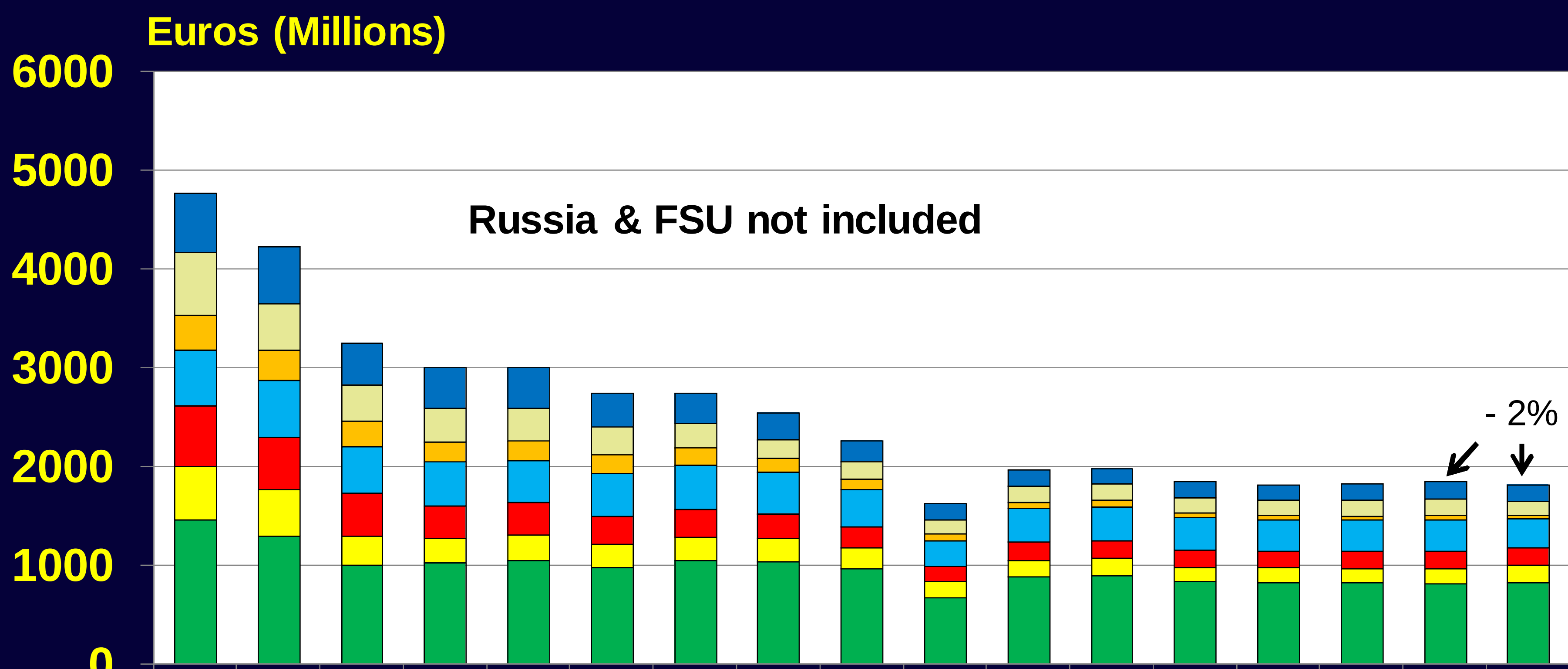
European Electronic Wiring Devices



Eurostat

20160915

European PCB Production

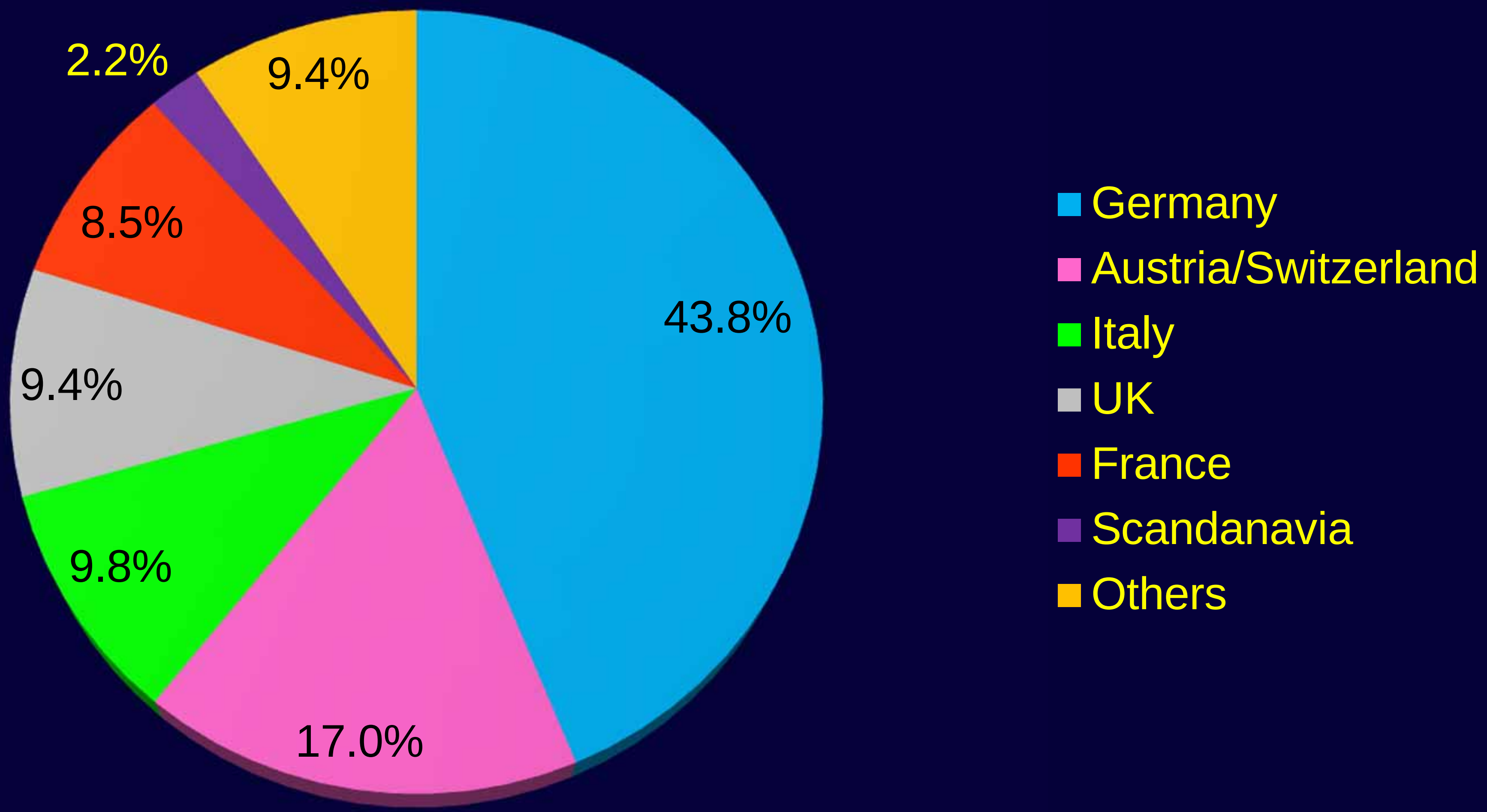


	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016 E
Other	601	577	422	408	410	346	309	264	221	169	170	155	157	151	158	174	165
UK	641	478	368	340	330	278	252	197	177	137	165	161	158	153	165	174	140
Scandanavia	351	309	260	201	200	198	169	137	103	64	64	64	50	40	42	40	35
Austria/Switzerland	561	575	463	447	427	427	447	427	378	258	341	343	325	323	312	315	296
Italy	619	530	444	338	324	281	284	248	212	156	181	186	174	168	174	181	180
France	541	465	287	244	266	240	234	231	206	165	170	166	147	148	148	157	173
Germany	1461	1300	1006	1027	1044	981	1054	1039	970	676	883	902	835	828	825	811	825

Data4PCB 9/16

2015 European PCB Production (excludes & FSU Russia)

20160502

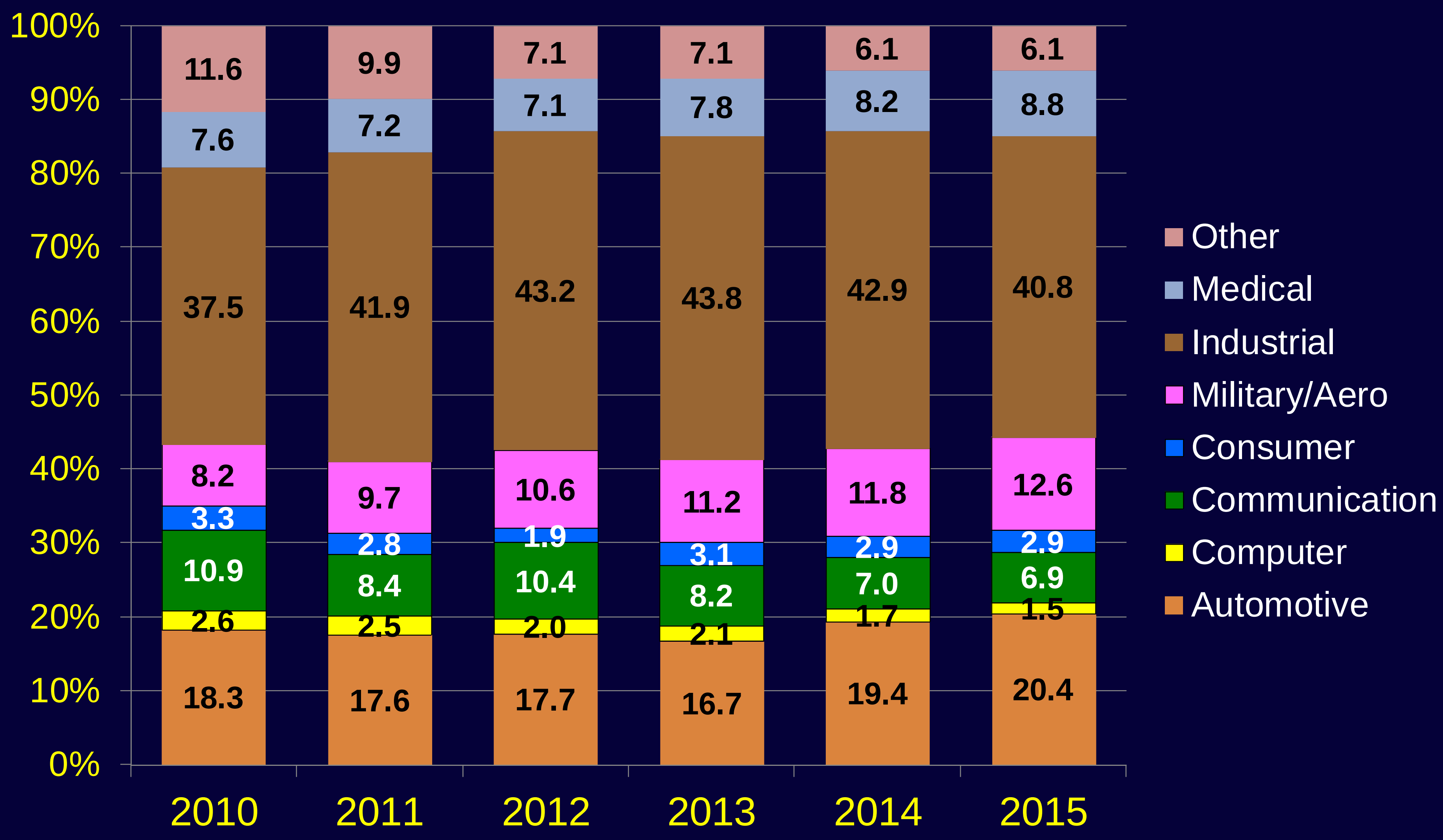


2015 Total: EUR 1852 million

Data4PCB 4/16

20160502

European PCB Production by End Market



Data4PCB 4/16

20160502

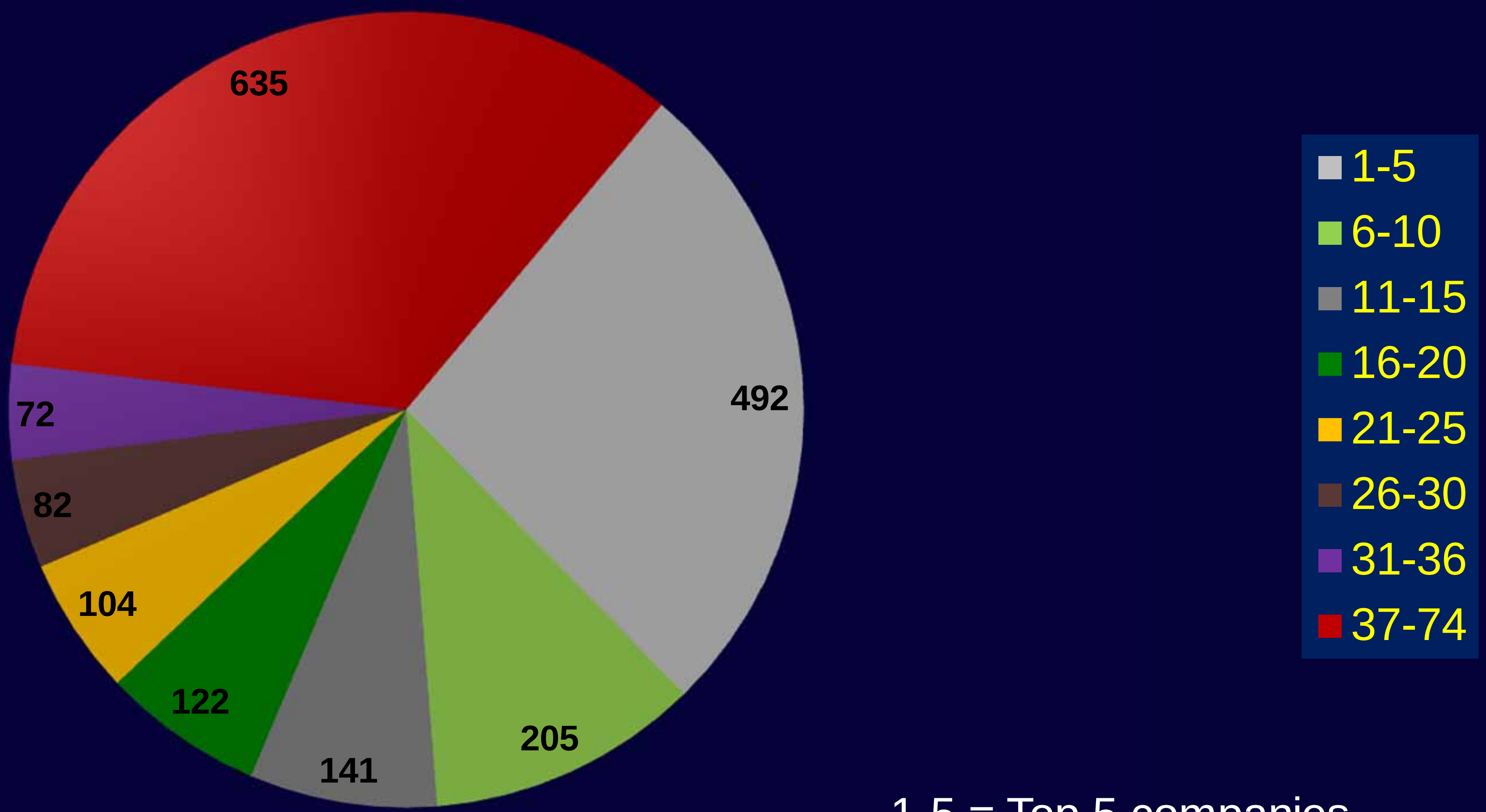
Europe's Top 36 PCB Companies Ranked by 2015 Revenues

Rank	Company	Rank	Company
1	AT&S	19	Schaltungsdruck Storz
2	Würth	20	Schoeller
3	Schweizer Electronic	21	Technomaster Group
4	KSG	22	Cimulec Gruppe
5	Elvia	23	Optiprint
6	Mektec Europe	24	Precoplat
7	Ruwel	25	Eurocircuit Group
8	SoMaCis	26	Rohde & Schwarz
9	GS Swiss PCB	27	Graphic-Group
10	Varioprint	28	Ilfa
11	Elco Group	29	OMR Italia
12	hmp	30	Aspocomp
13	Dyconex	31	Polytron Print
14	Cicor Group	32	Elekonta Marek
15	Cistelaier Group	33	TW Electronik
16	Häusermann	34	Merlin (Falcon) Group
17	Invotec	37	Exception
18	ACB Group	38	Ggp Peters

2015 Top 74 Largest European PCB Companies

(totals for each group)

20160502



1-5 = Top 5 companies
6-10 = Next 5 companies
etc.

Total: 1852 Million Euros

Data4PCB 4/16

European PCB Market Comments

20170131

There is really no news. I am just starting to gather the data from the European industry.

The assumption for 2016 is that it will be a little less than in 2015. Results of individual countries may vary - especially those with their own currency. (this is the case with Switzerland and UK). Overall I expect sales of 1810 m€, about 2 billion $.

The largest concern of the industry is the shortage of copper foil which translates into price increases and supply bottlenecks for laminates. It will become especially dire from the 2nd quarter onwards as Apple wishes to celebrate the 10th anniversary of the iPhone with a new or at least special edition which will drain a lot of substrate and foil from the market

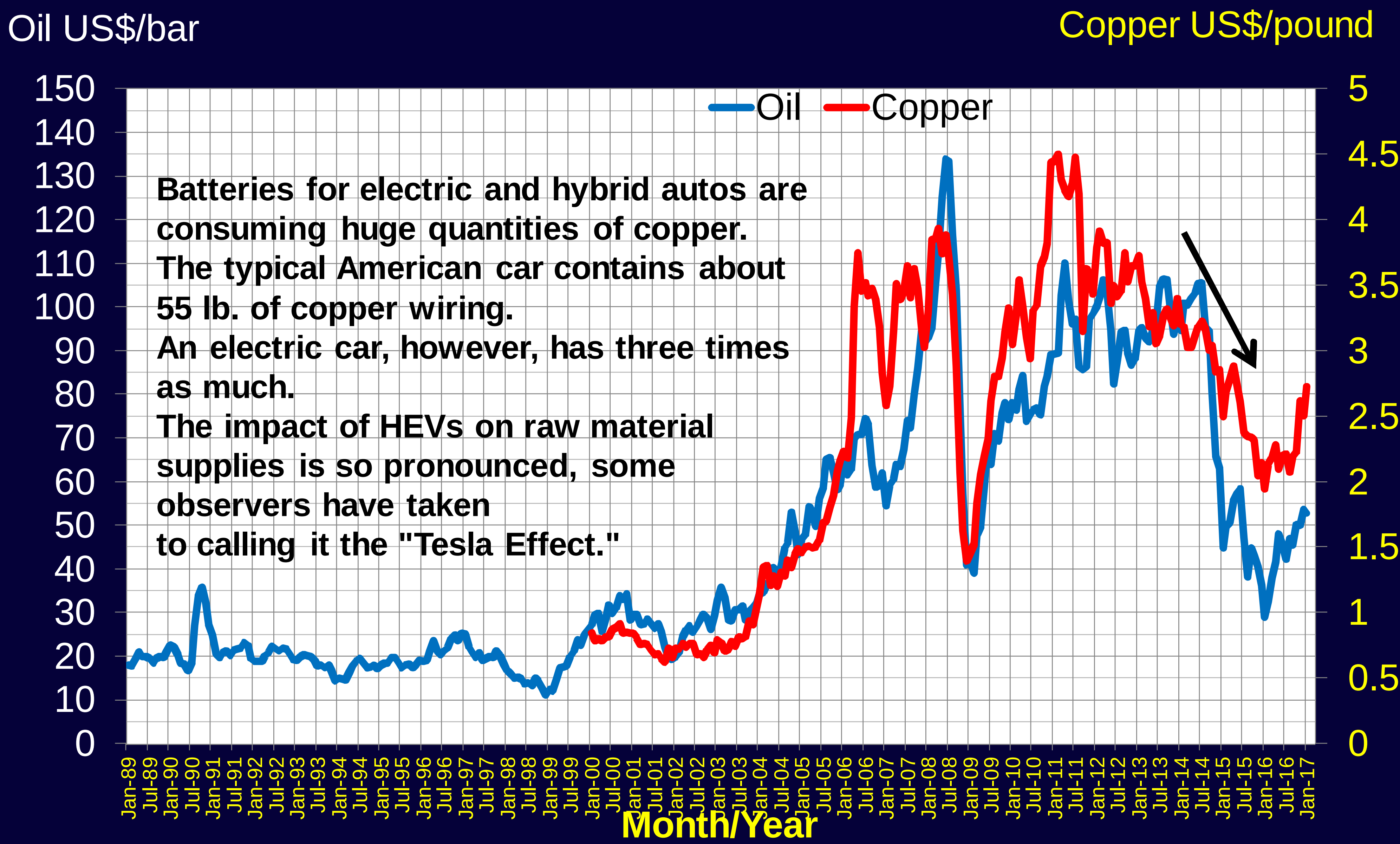
(it might be different if Trump is accelerating his path a bit and bans all imports from China in time or slaps at least the famous 35% duties on everything).

Michael Gasch, Data4PCB 1/17

Material Supplies

20170201

Oil Price vs. Copper Prices



http://www.eia.gov/dnav/pet/pet_pri_spt_s1_d.htm

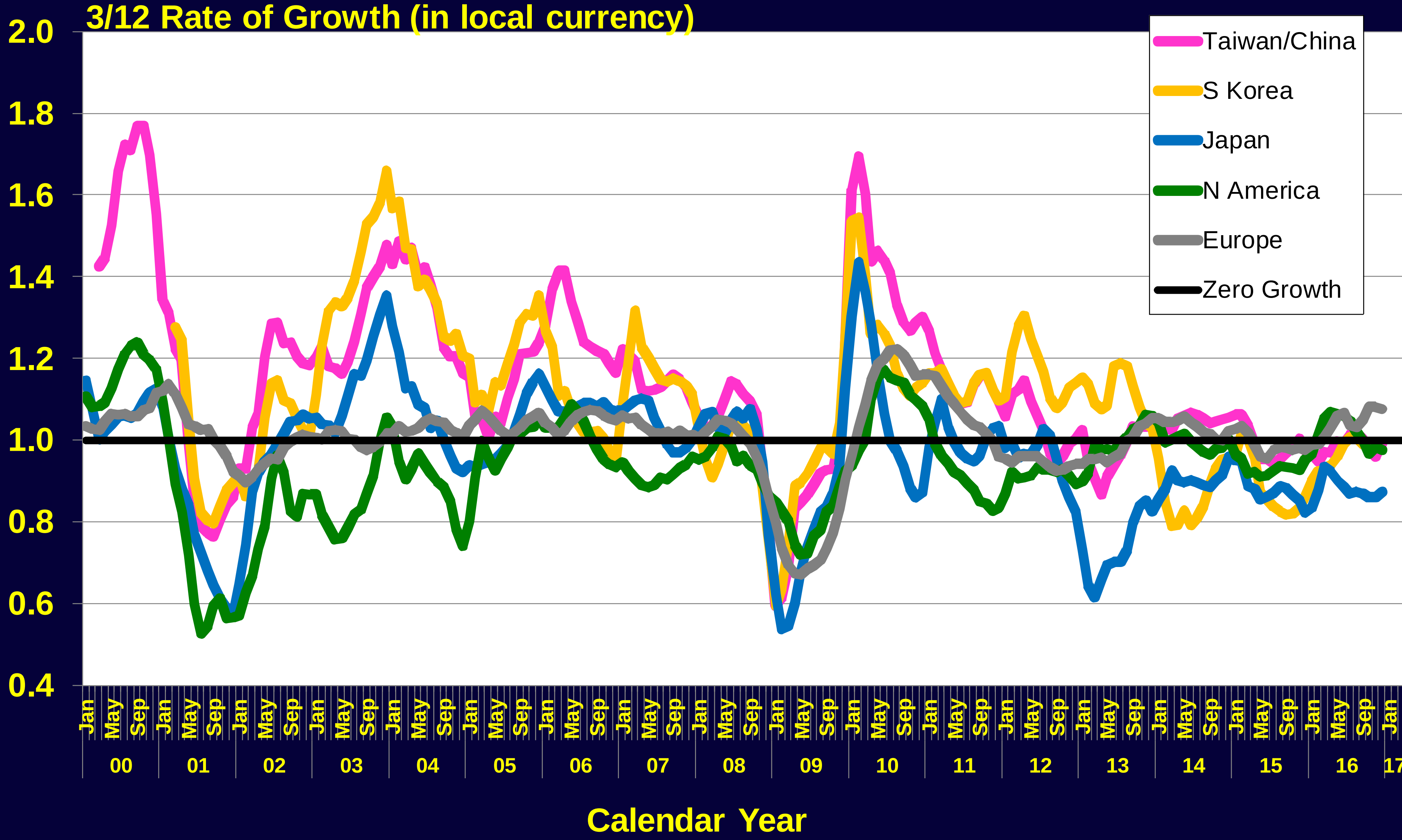
http://futures.tradingcharts.com/chart/CP/B9

Copper Foil Supply is Real Issue

World PCB Shipments

20170230

Regional PCB Shipment Growth

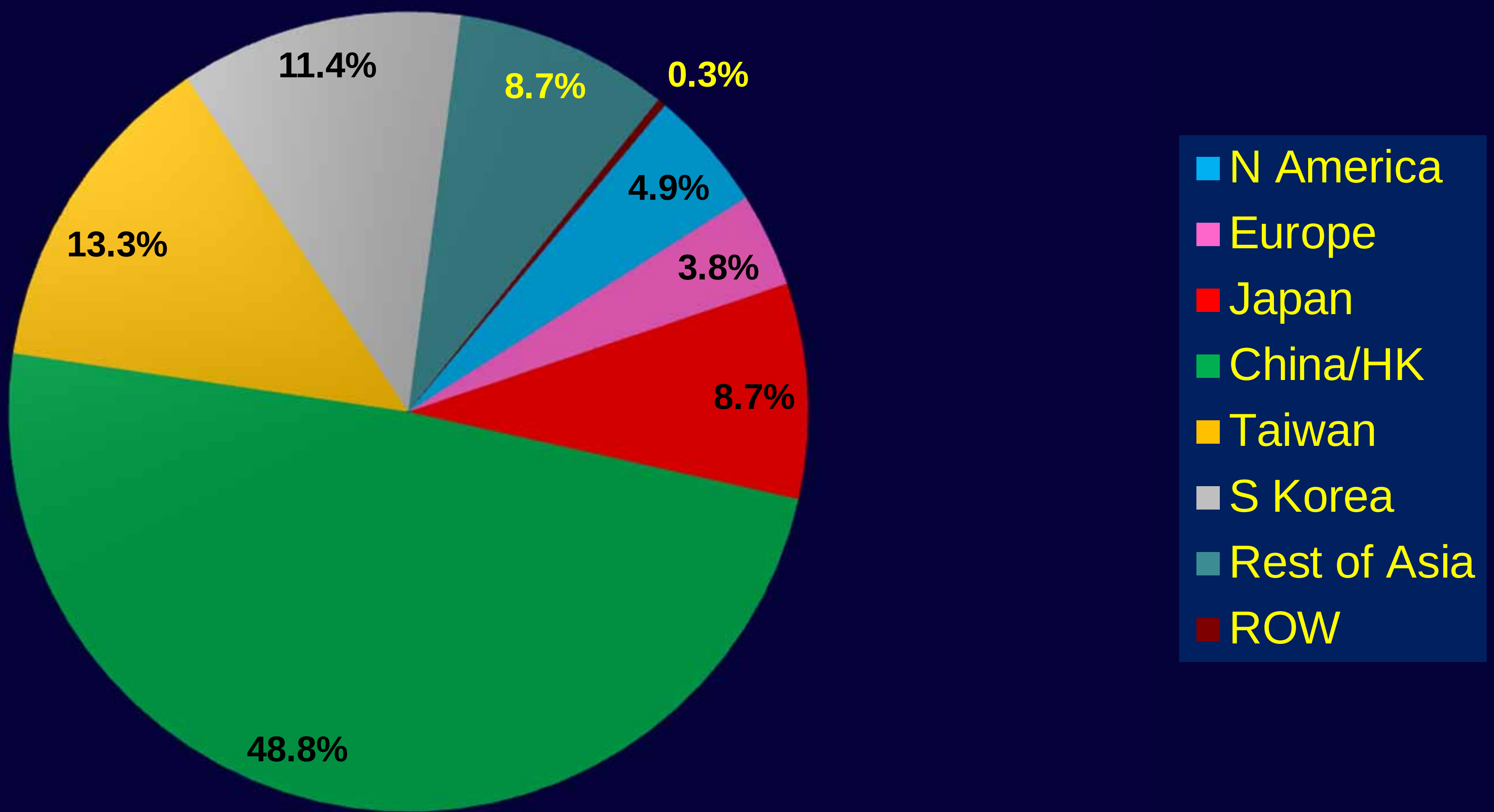


Sources: IPC, JPCA, Taiwan/China composite; Eurostat "wiring devices" for Europe

20161101

2015 World Total PCB Production by Geographical Area

(US$ M @ Average 2015 Exchange)



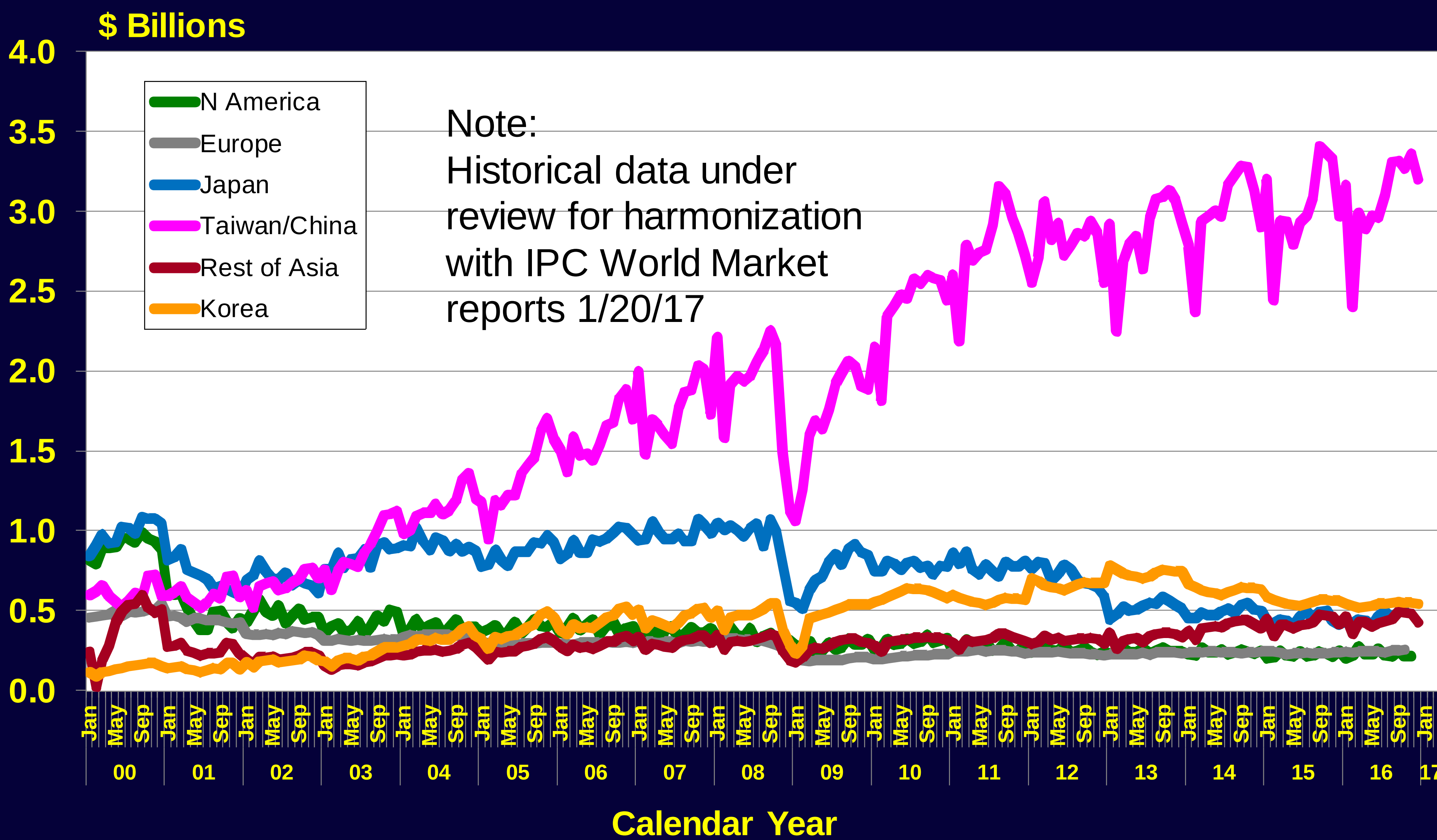
Total: $58.6 Billion

IPC 10/16

20170120

World PCB Monthly Shipments

Converted @ Fluctuating Exchange Rates

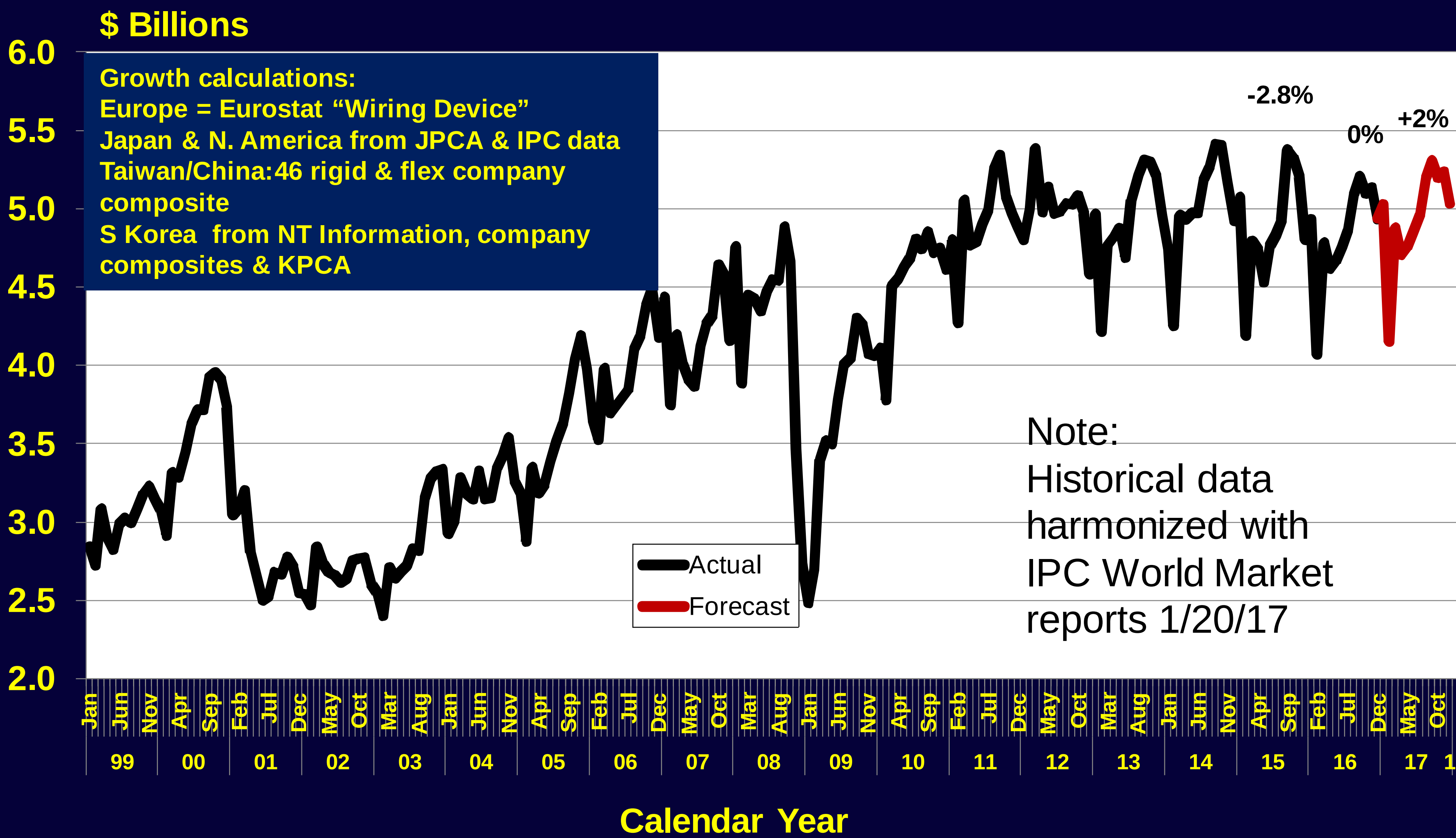


Source: Custer Consulting Group

20170127

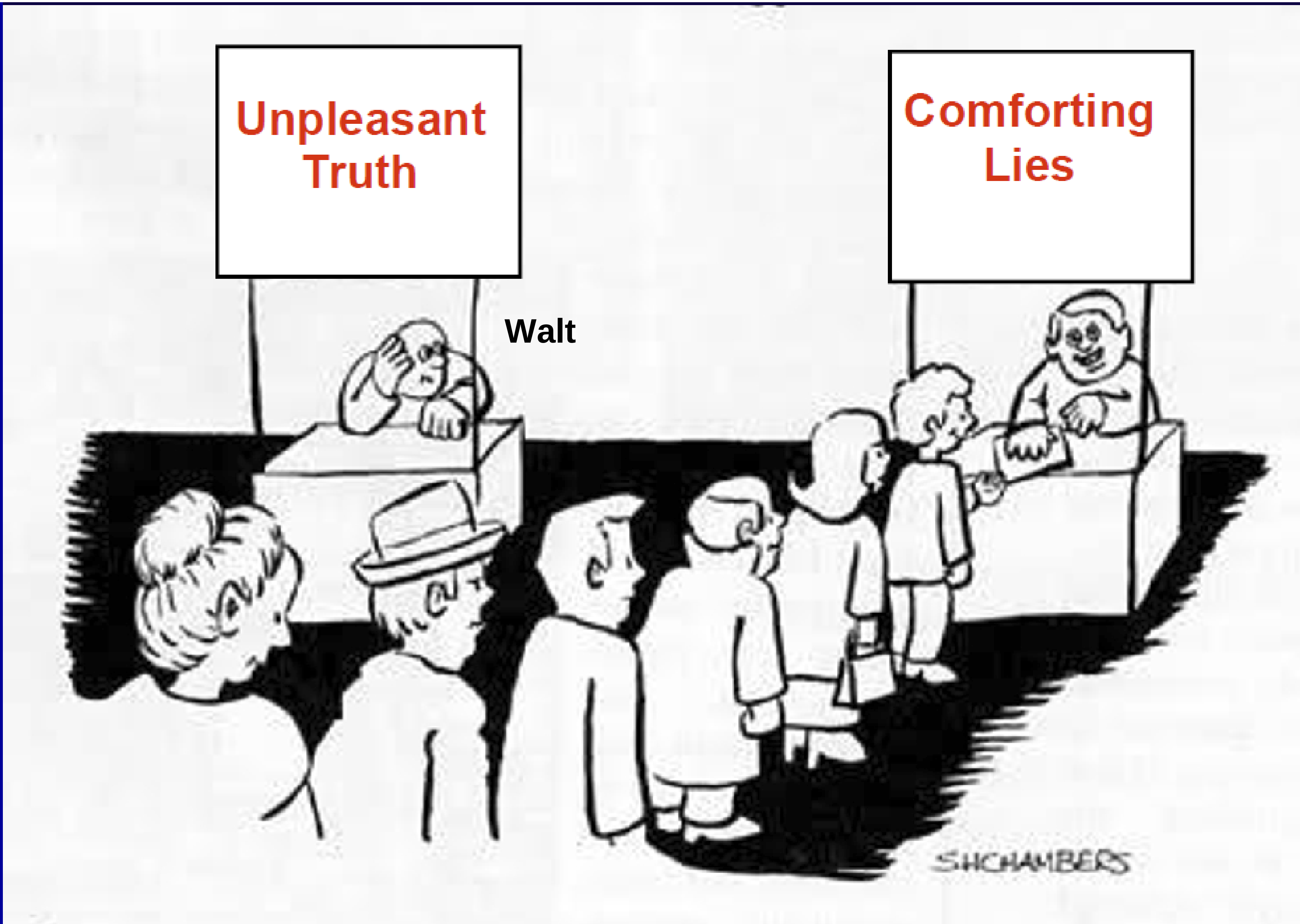
World PCB Shipments (with forecast)

Converted @ Fluctuating Exchange Rates



Source: Custer Consulting Group - 2010 base year expanded by monthly growth of N. American, European, Japanese, Korean & Taiwan/China monthly PCB shipments

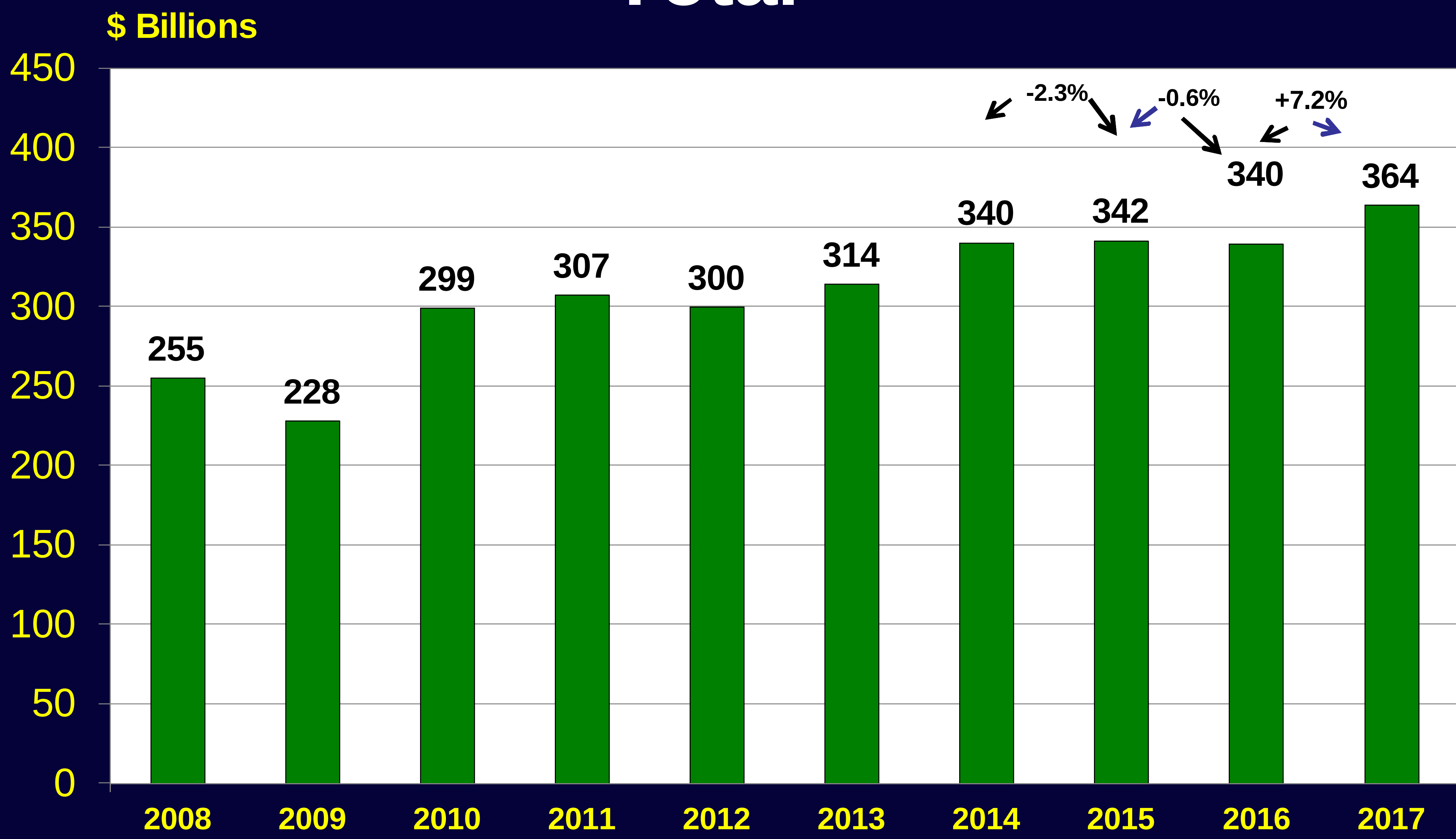
Forecasts


Unpleasant Truth
Comforting Lies
Walt
SHCHAMBERS

20161015

World Semiconductor Sales

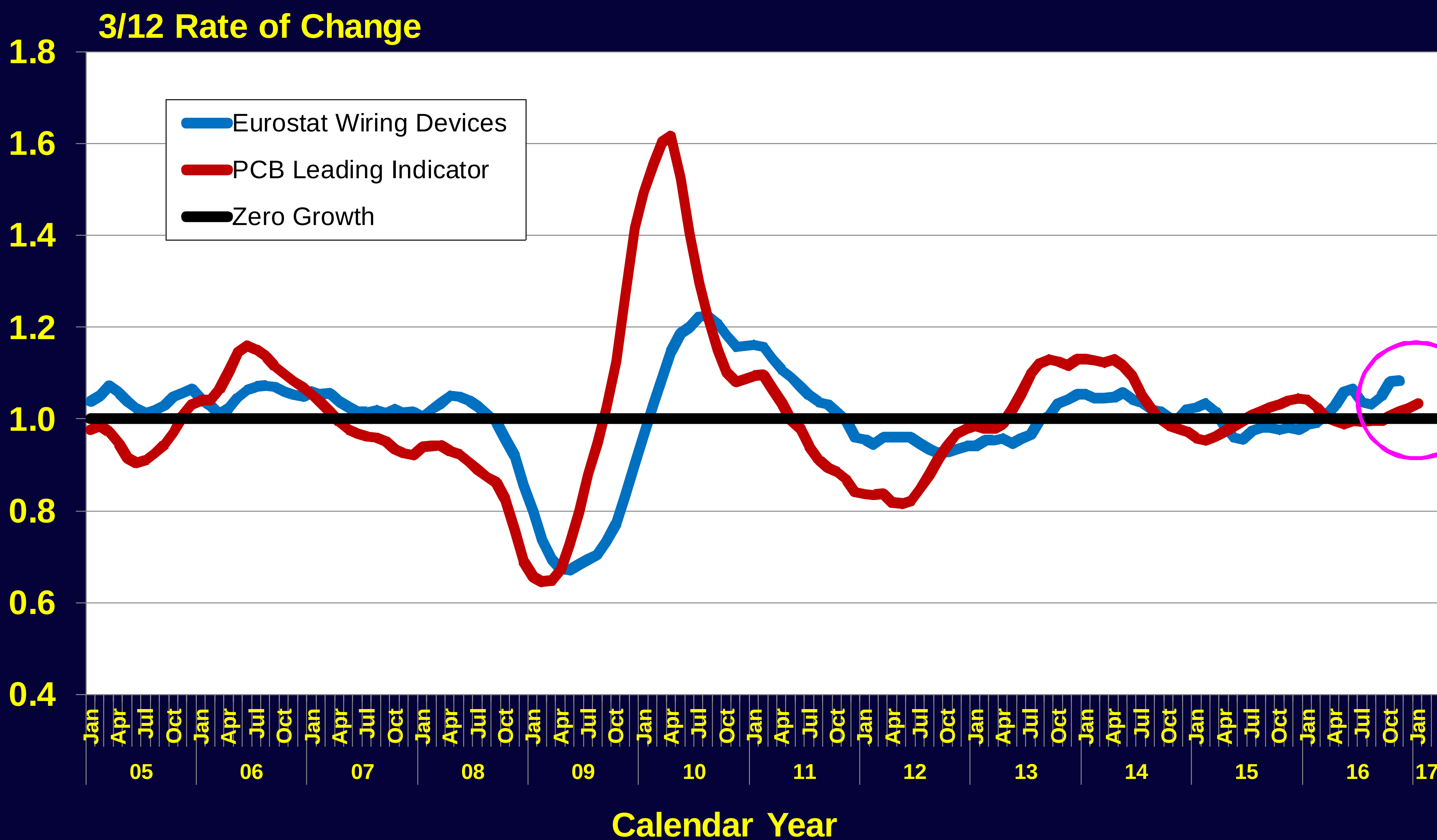
Total



Gartner 1/17 & prior reports

20161214

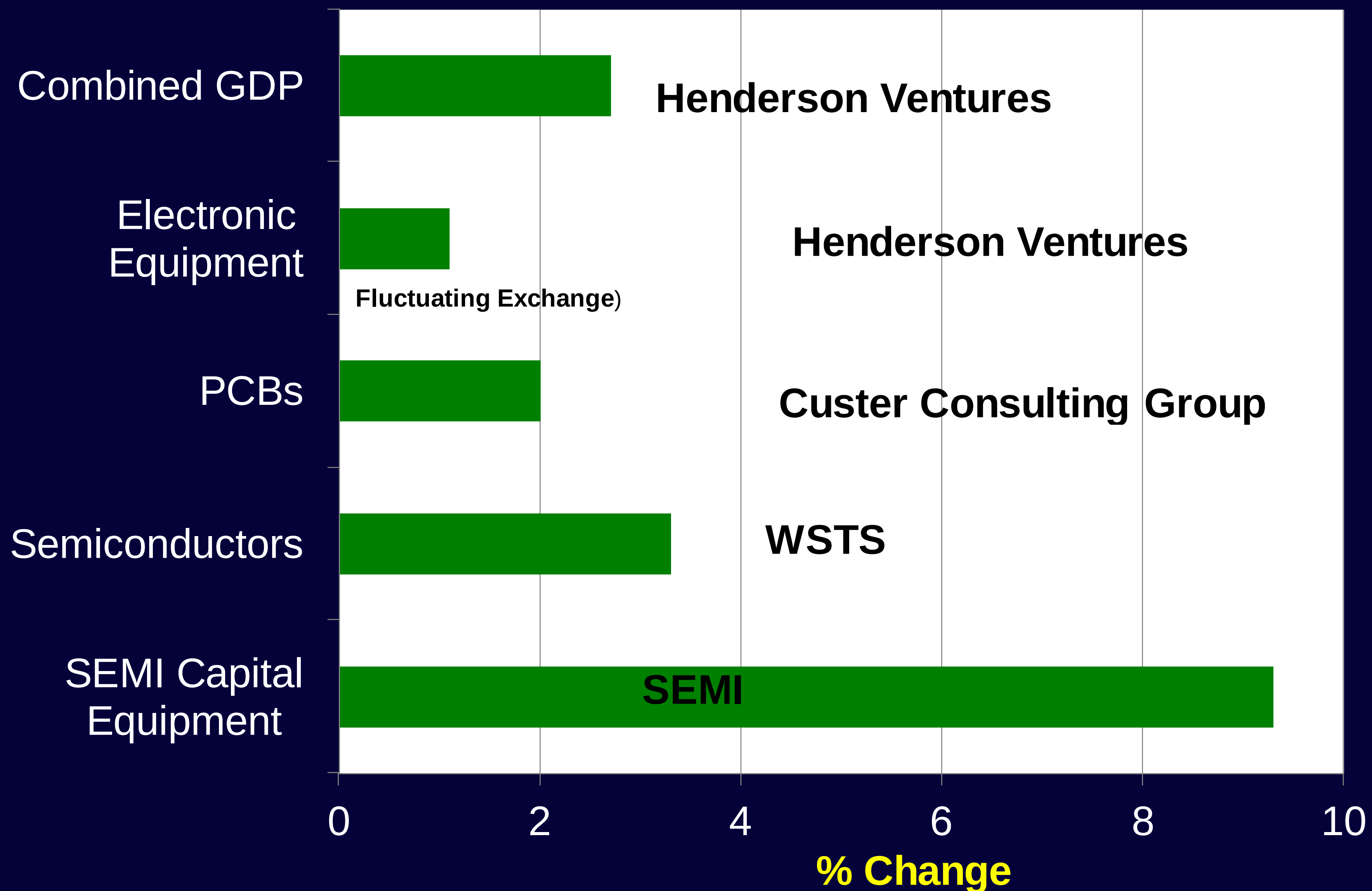
Europe PMI Leading Indicator vs. Europe Wiring Devices



Source: Custer Consulting Group

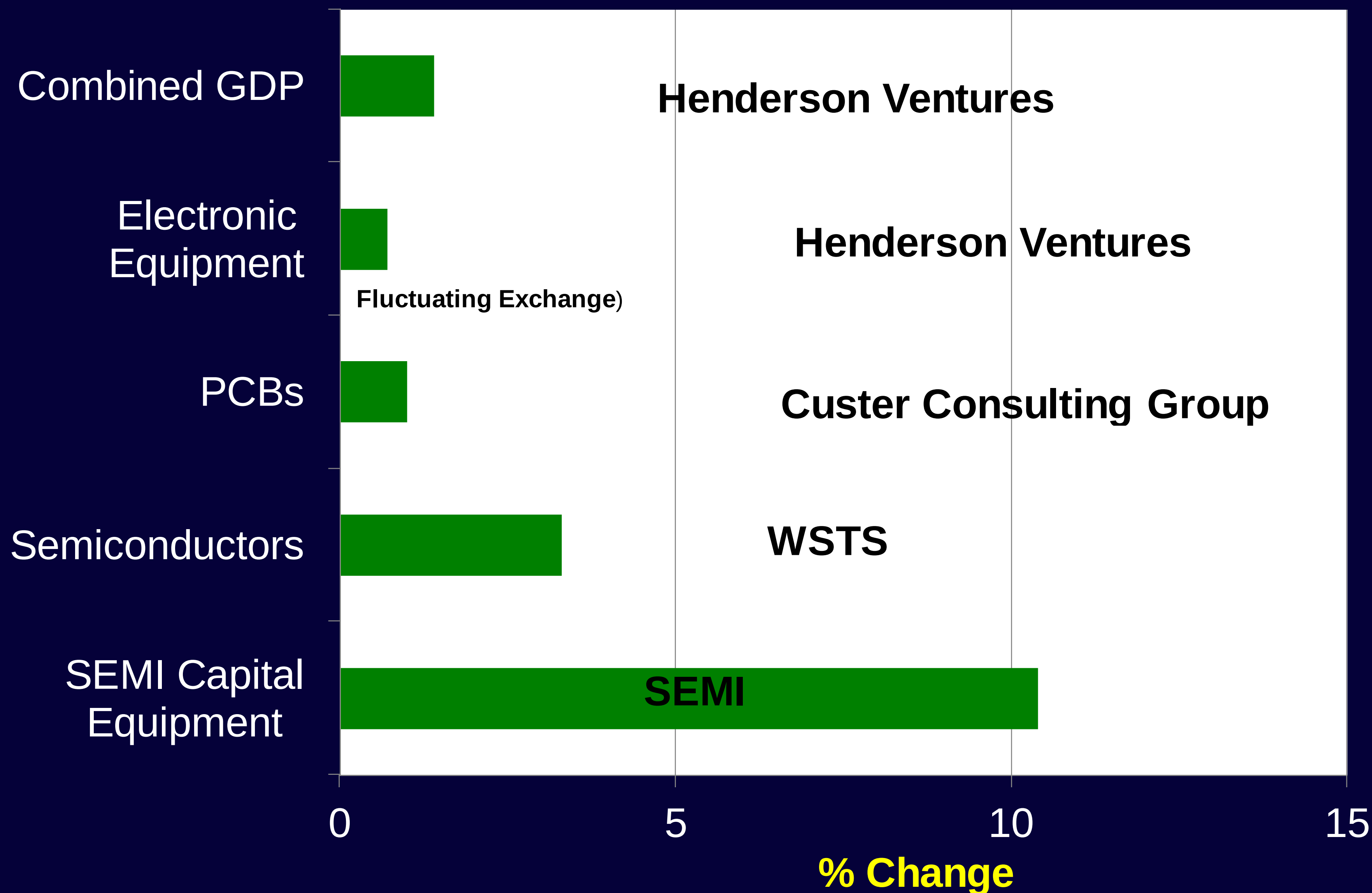
Global Electronic Supply Chain Forecast

2017 vs. 2016



Europe Electronic Supply Chain Forecast

2017 vs. 2016



Summary

Business conditions are improving globally

Europe is strong

End markets are growing especially automotive, medical and SEMI fab equipment

Geopolitical situation is MAJOR worry

20111007

Custer Consulting Group Products

Daily News Services (6 days/week)

- **Global electronics supply chain**
- **Solar/Photovoltaic supply chain**

Business Outlook

- **Market charts & data**
  - **Global market**
  - **OEMs**
  - **Components, EMS, ODM, materials & process equip**
  - **Solar/Photovoltaic**
- **Weekly Market Comments with latest charts**