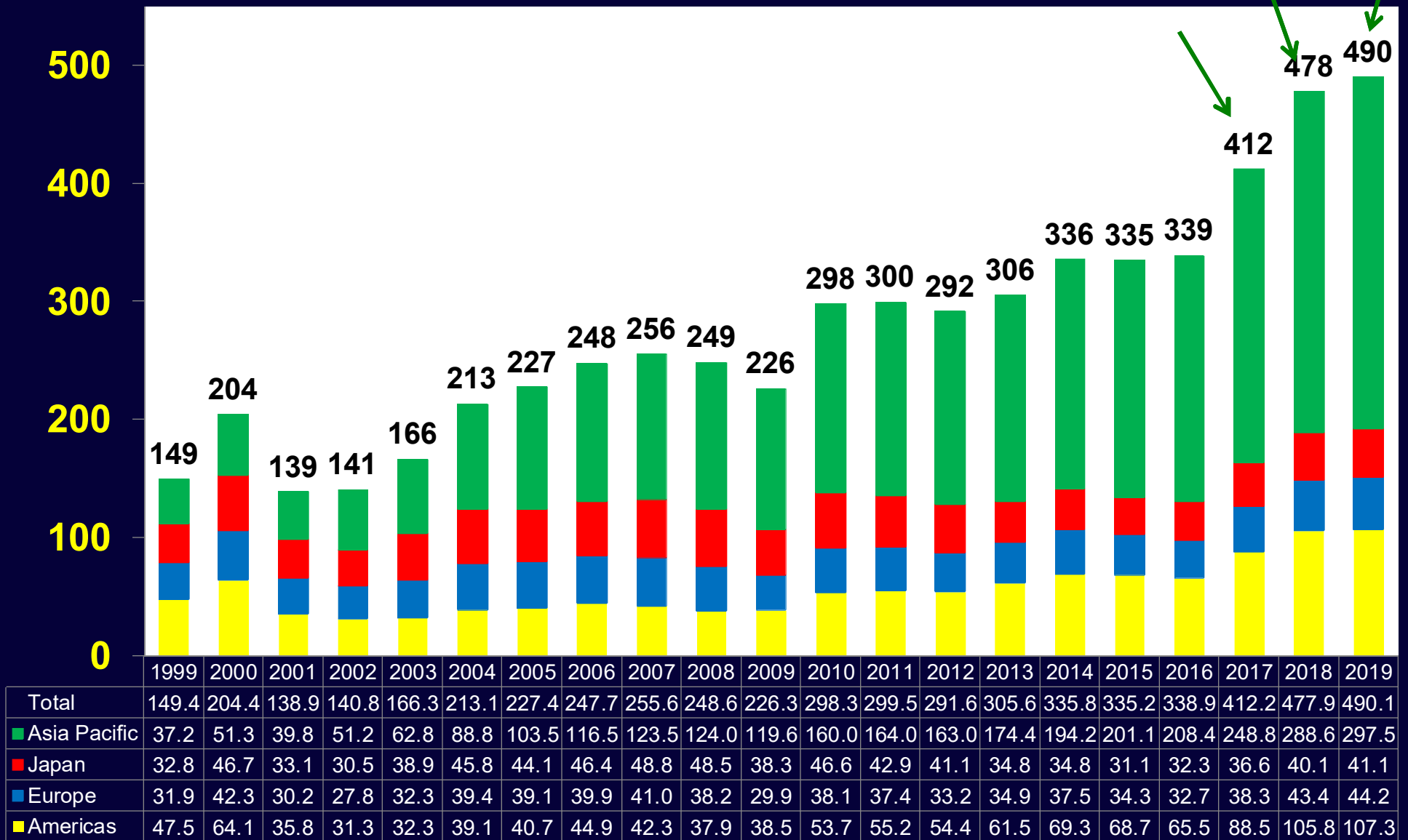


Chart 1

# Worldwide Semiconductor Market by Geography WSTS Forecast

+21.6% +15.9% +2.6%

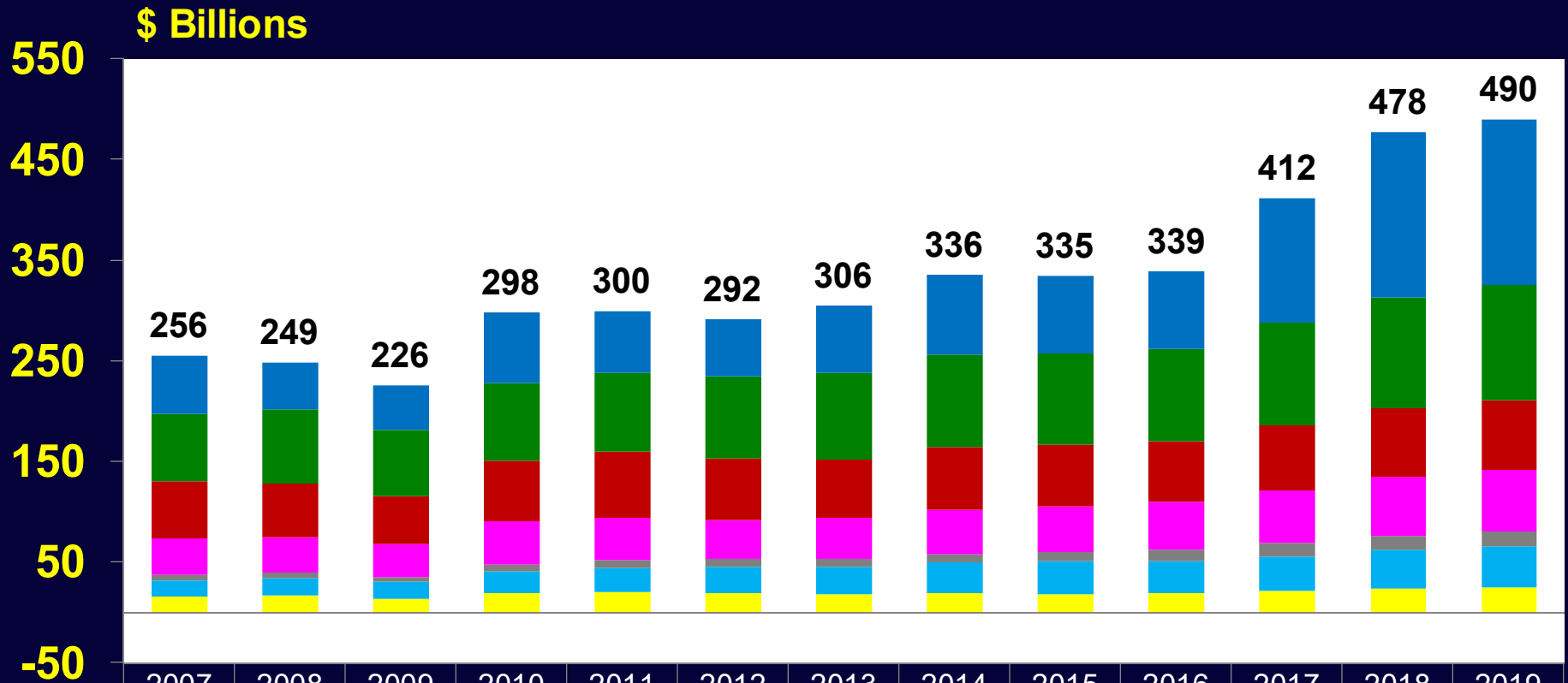
\$ B



WSTS 12/18

Chart 2

# Worldwide Semiconductor Market by Type WSTS Forecast



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total	255646	248604	226314	298316	299522	291561	305582	335842	335168	338931	412222	477937	490143
IC-Memory	57854	46348	44797	69614	60749	56995	67043	79232	77205	76767	123974	165110	164543
IC-Logic	67292	73531	65215	77377	78782	81703	85928	91633	90753	91498	102209	109672	113879
IC-Micro	56211	53140	48330	60633	65204	60238	58686	62072	61298	60585	63934	68041	70093
IC-Analog	36453	35637	32001	42285	42338	39303	40117	44365	45228	47848	53070	58803	61039
Sensors	5126	5111	4753	6903	7970	8009	8036	8502	8816	10821	12571	13402	14091
Optoelectronics	15901	17902	17043	21702	23092	26175	27571	29868	33256	31994	34813	38715	41354
Discrete	16809	16935	14175	19802	21387	19138	18201	20170	18612	19418	21651	24194	25144

Chart 3

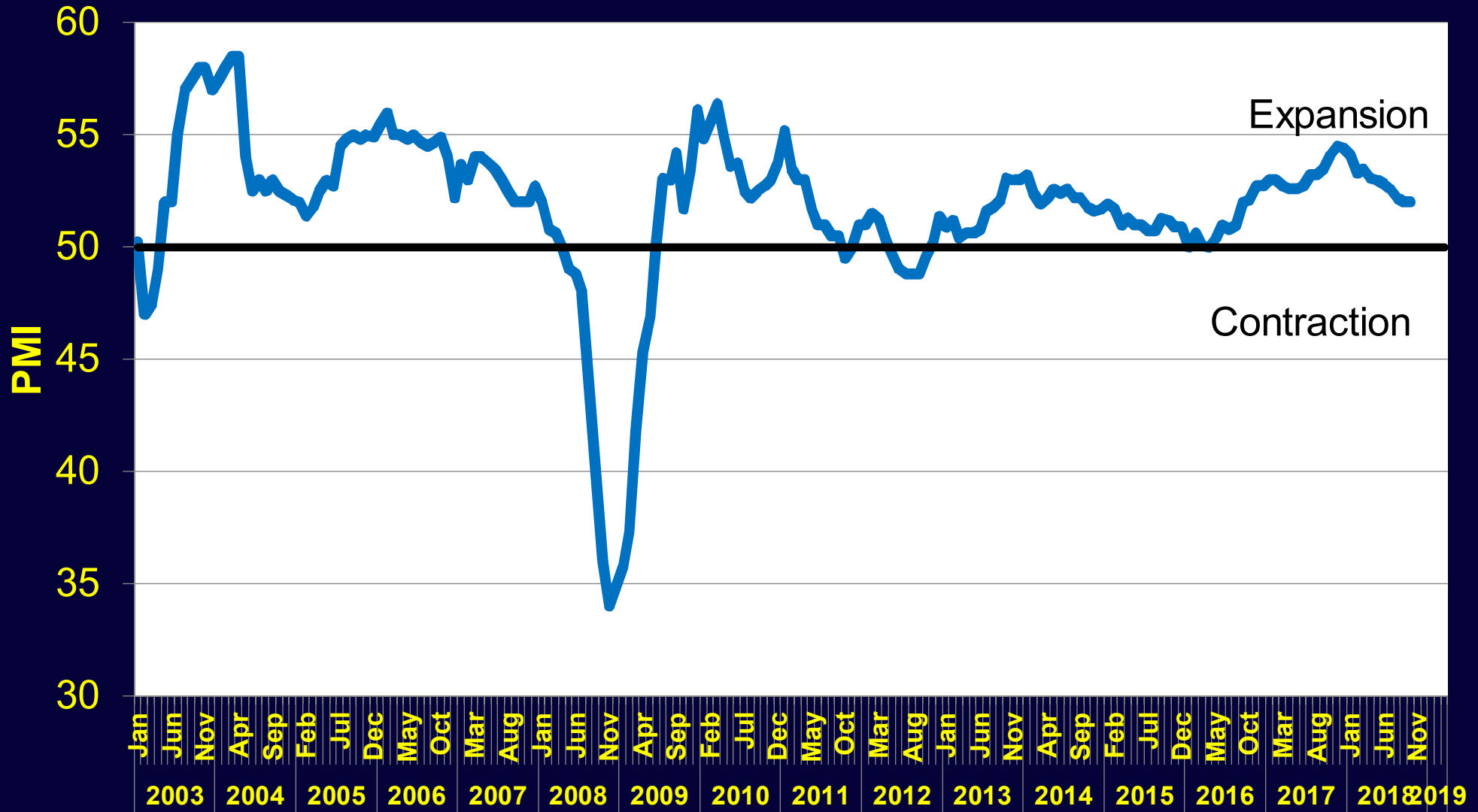
# Monthly Semiconductor Shipments \$ Billions (3-month avg in US\$)

	<u>10/17</u>	<u>10/18</u>	<u>% CH</u>
Americas	8.54	9.75	+ 14.1%
Europe	3.36	3.60	+ 7.0%
Japan	3.20	3.37	+ 5.5%
China	11.65	14.37	+ 23.3%
Asia Pacific / All Other	10.33	10.72	+ 3.7%
Total	37.09	41.81	+ 12.7%

Chart 4

# Global "Purchasing Managers" Index

Diffusion Index, >50 = Growth



# World Semiconductor Shipments

## Monthly US\$

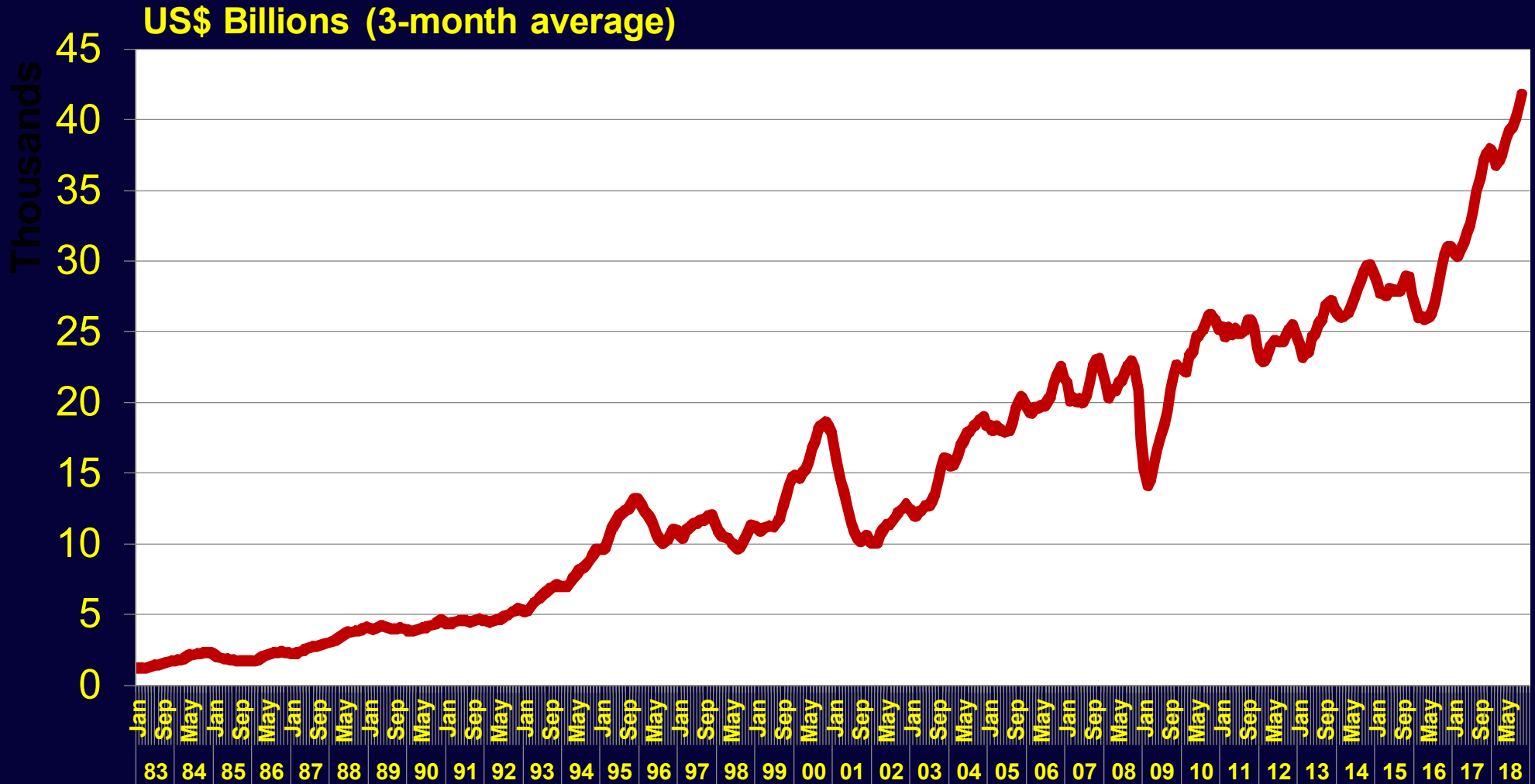
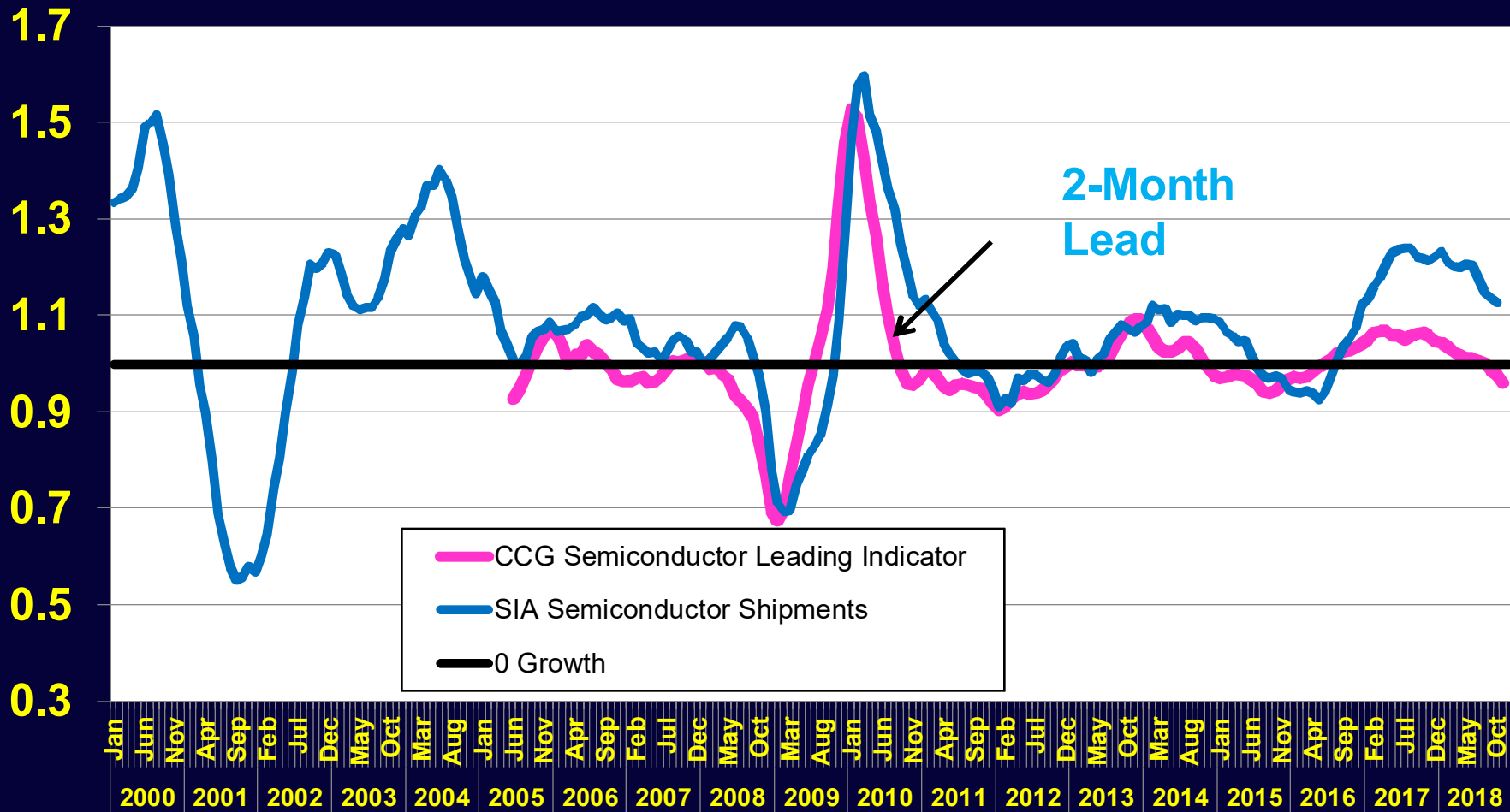


Chart 6

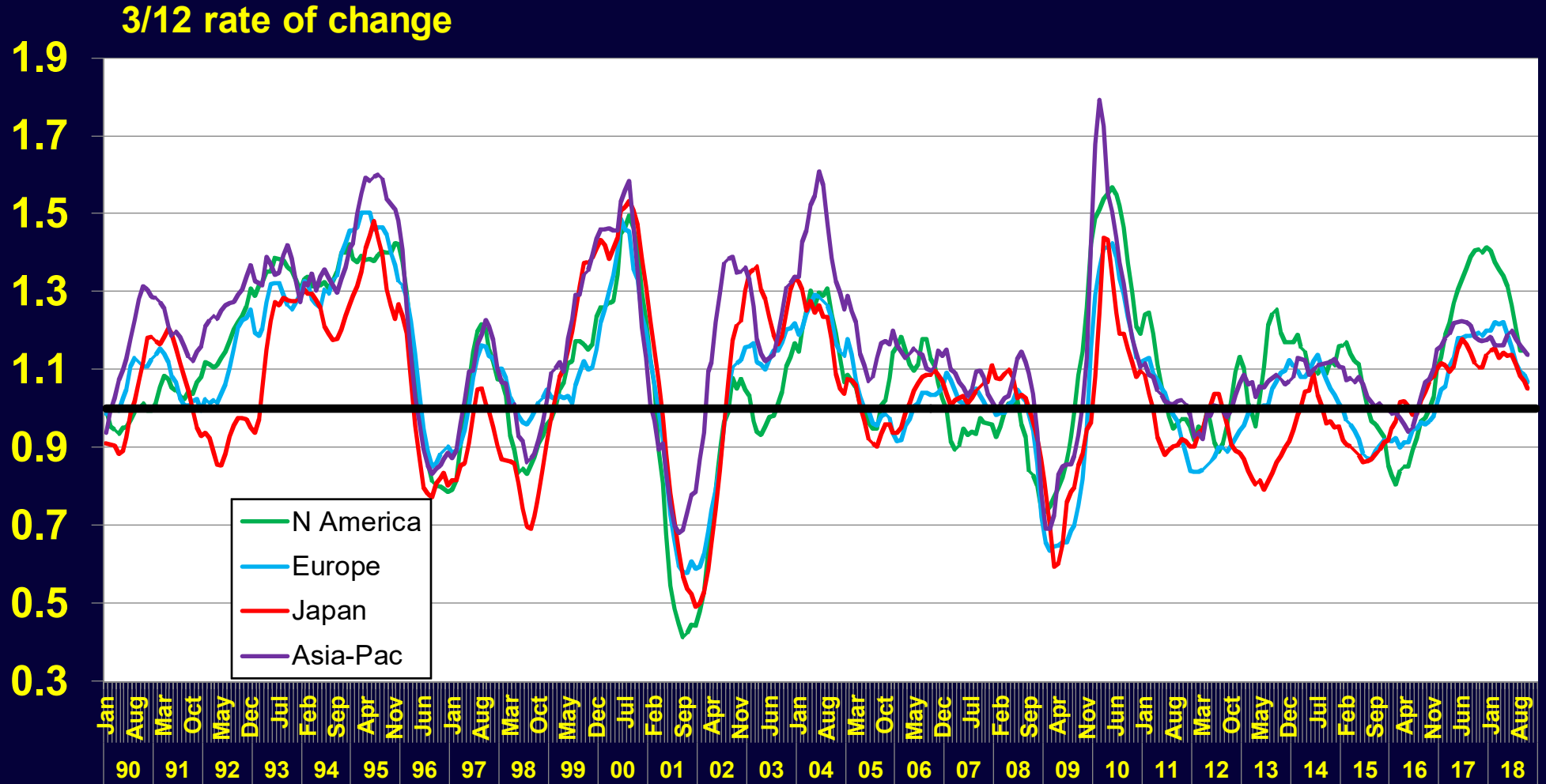
# CCG Semiconductor Leading Indicator vs. Global Semiconductor Shipments

3/12 rate of growth



# Semiconductor Growth Rates

## Total \$ Shipments to an Area



Total \$ Shipments from All Countries to an Area  
SIA website: [www.semiconductors.org/](http://www.semiconductors.org/)

Chart 8

# Semiconductor Capital Equipment Shipments by Area

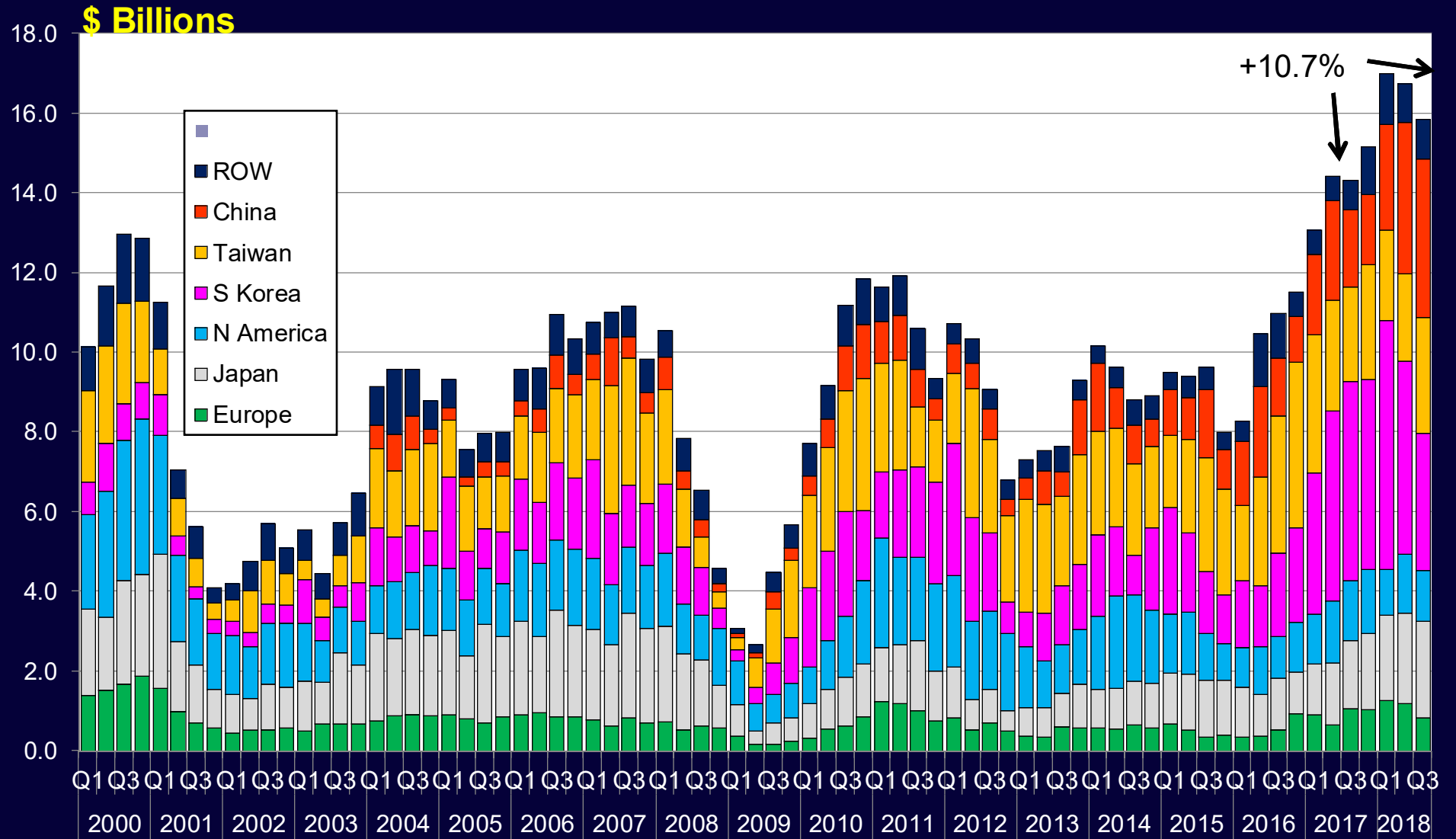
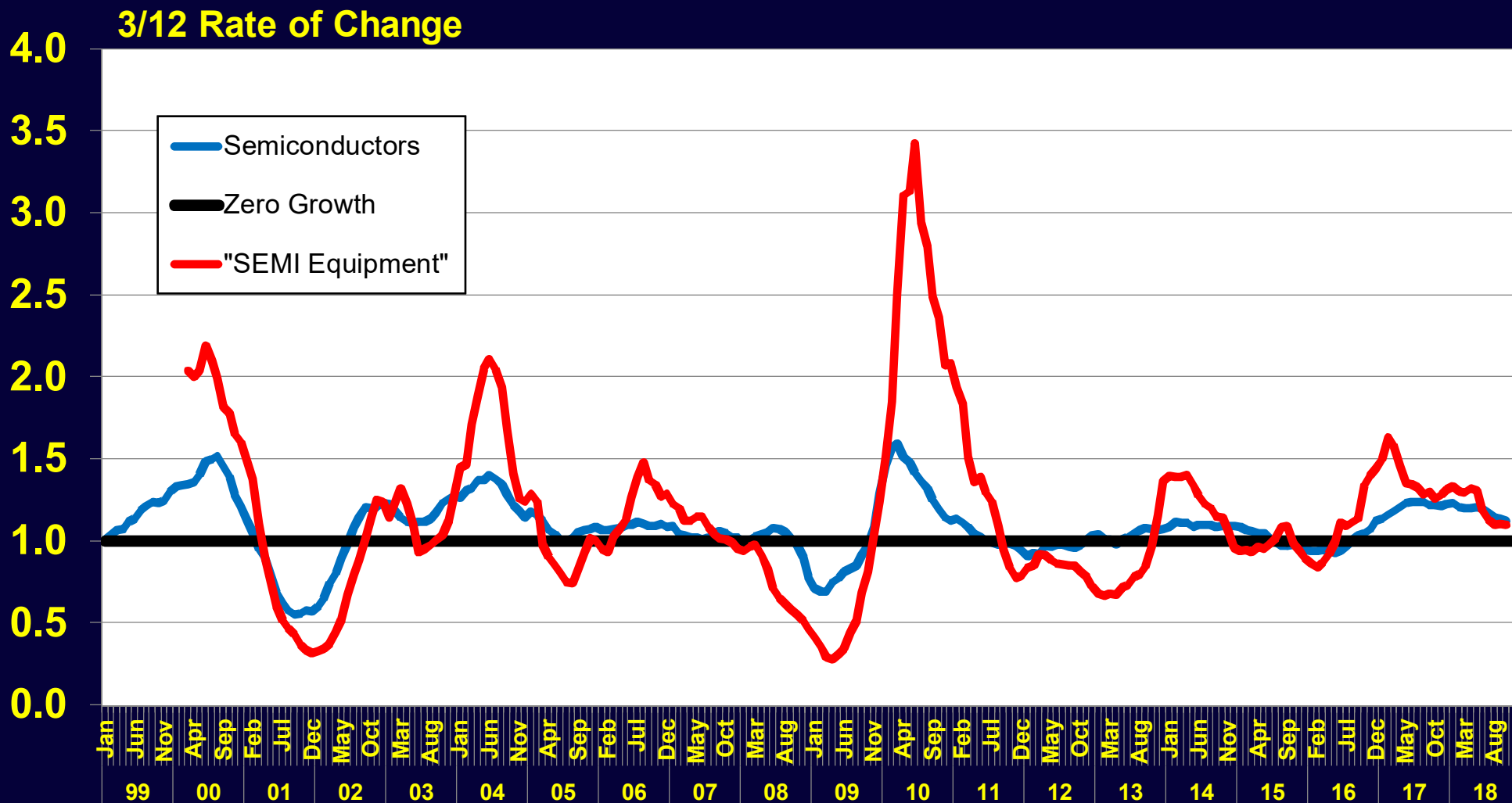


Chart 9

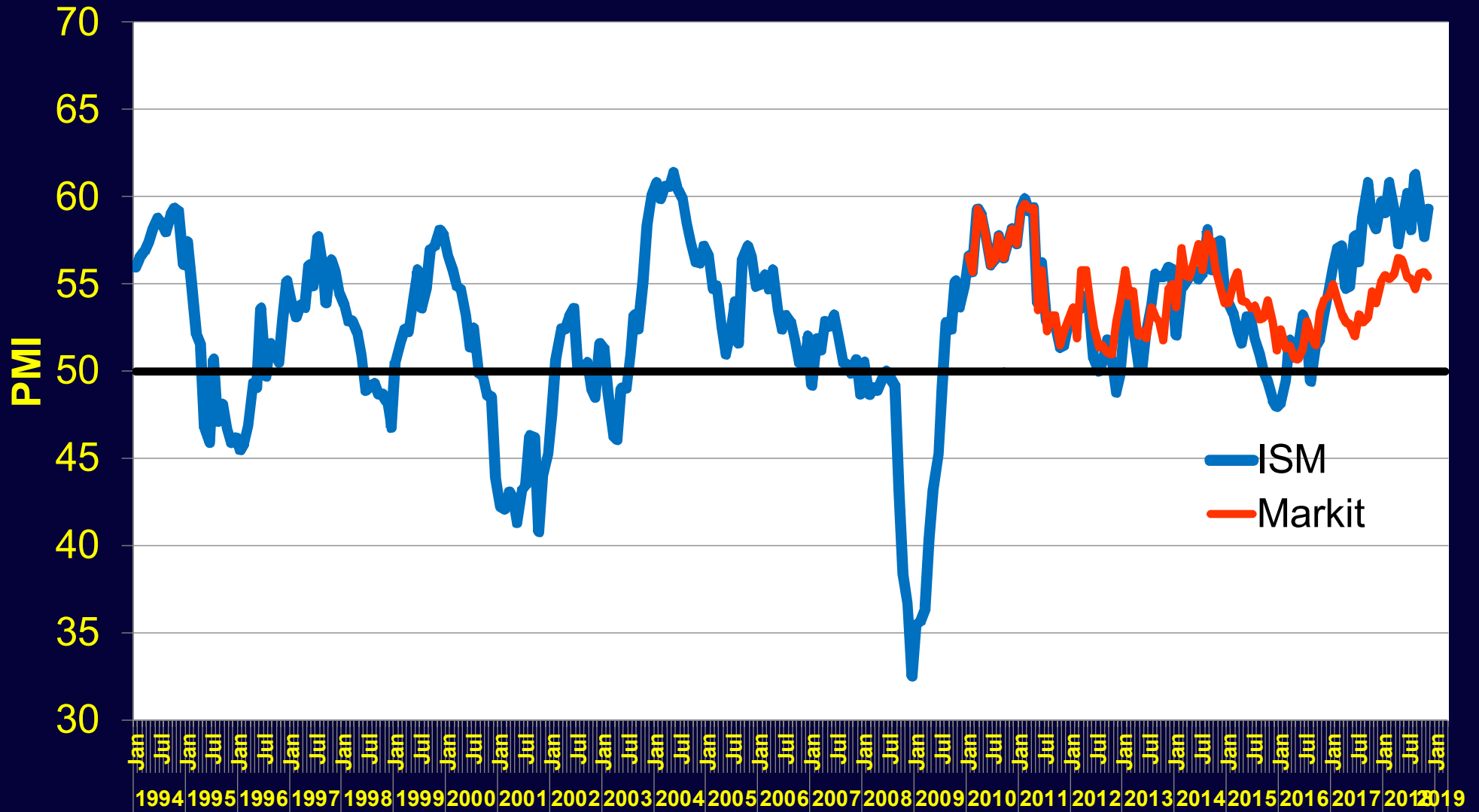
# Global Semiconductors & Semiconductor Capital Equipment 3-Month Shipment Growth Rates on \$ Basis



Sources: [www.semiconductors.org](http://www.semiconductors.org); [www.semi.org](http://www.semi.org)

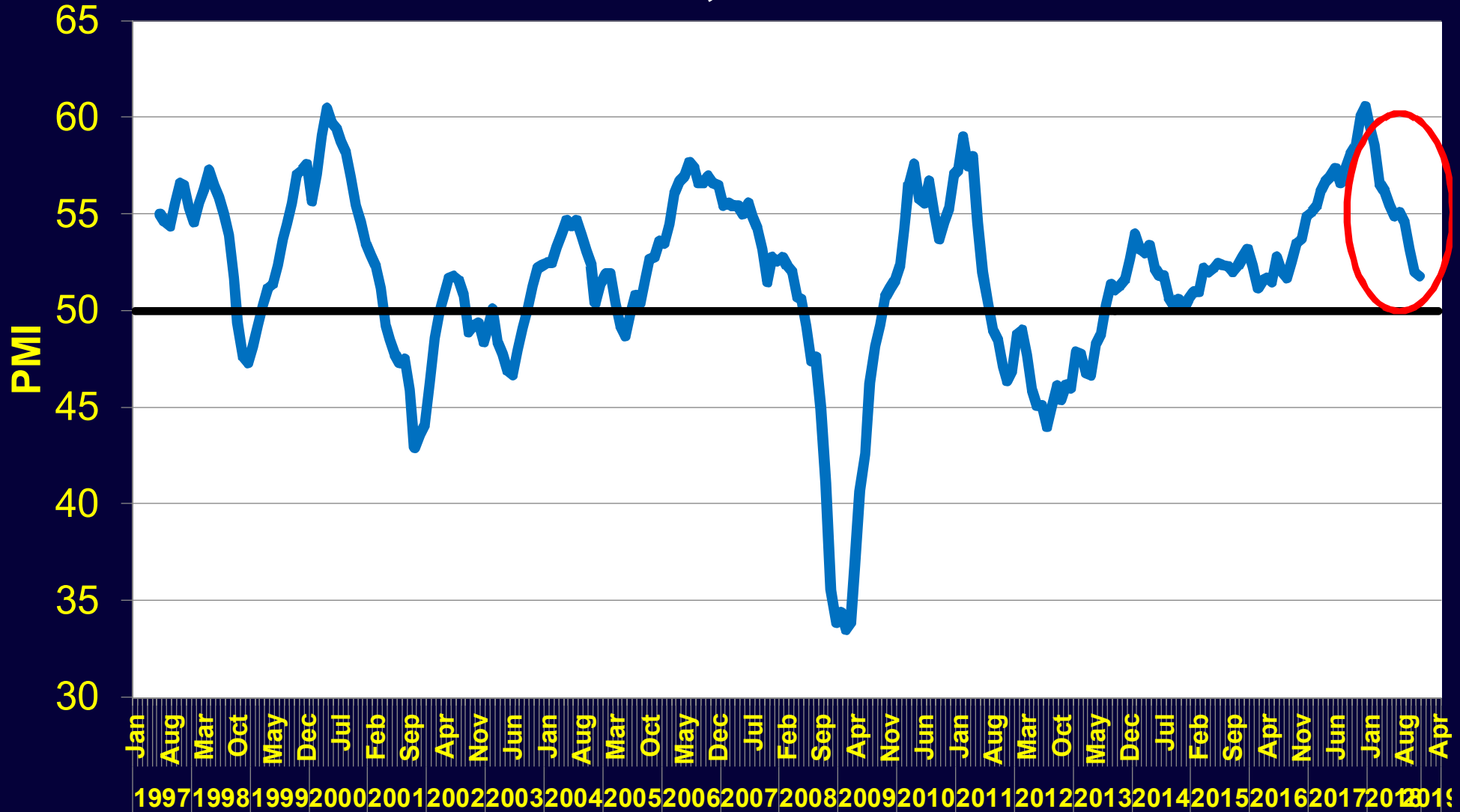
# U.S "Purchasing Managers" Indices ISM vs. Markit Economics

Diffusion Index, >50 = Growth



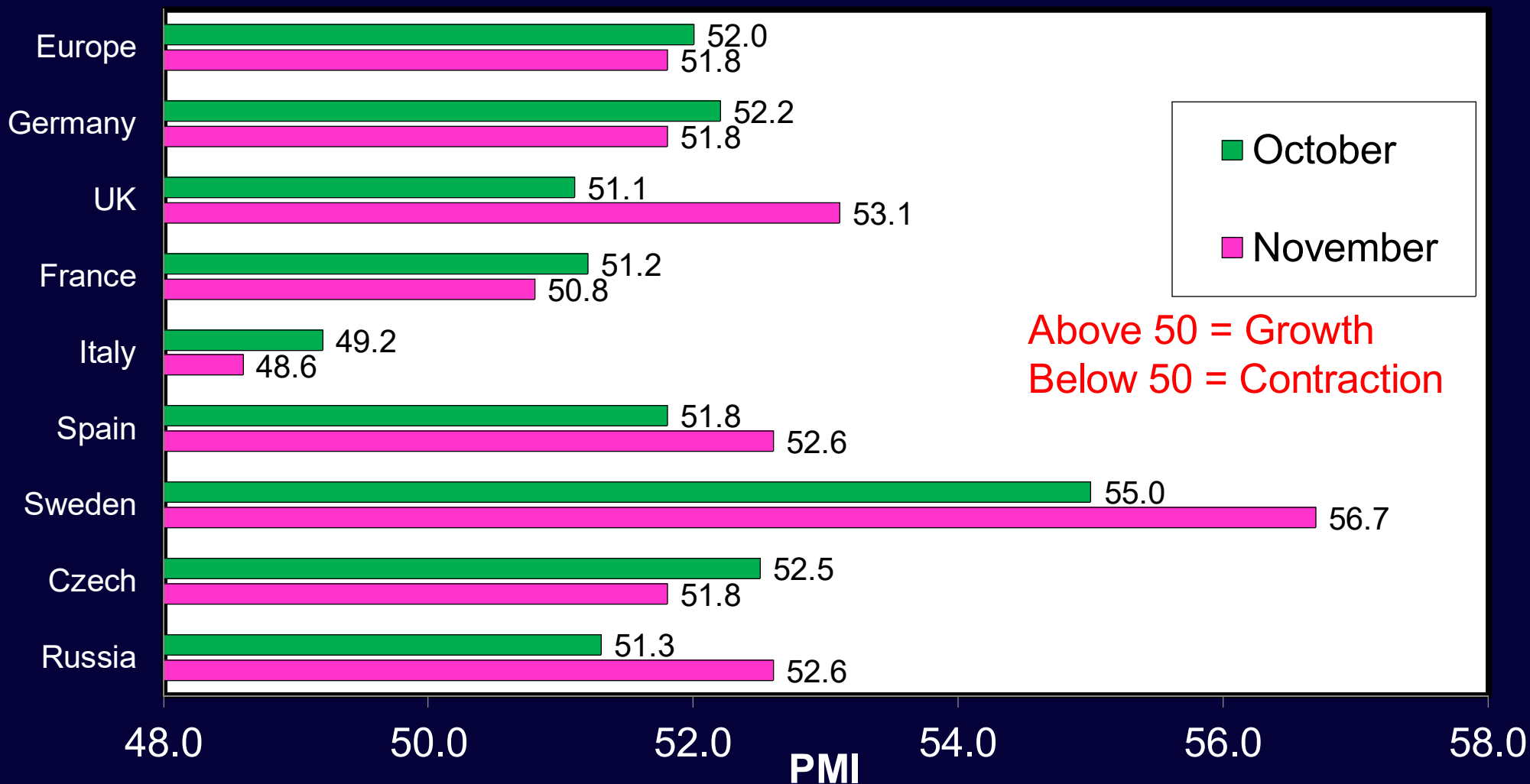
# Eurozone Manufacturing "Purchasing Managers" Index

Diffusion Index, >50 = Growth



# European Purchasing Managers' Indices November vs October 2018

Chart 12



# Asian Purchasing Managers Indices November vs. October 2018

Chart 13

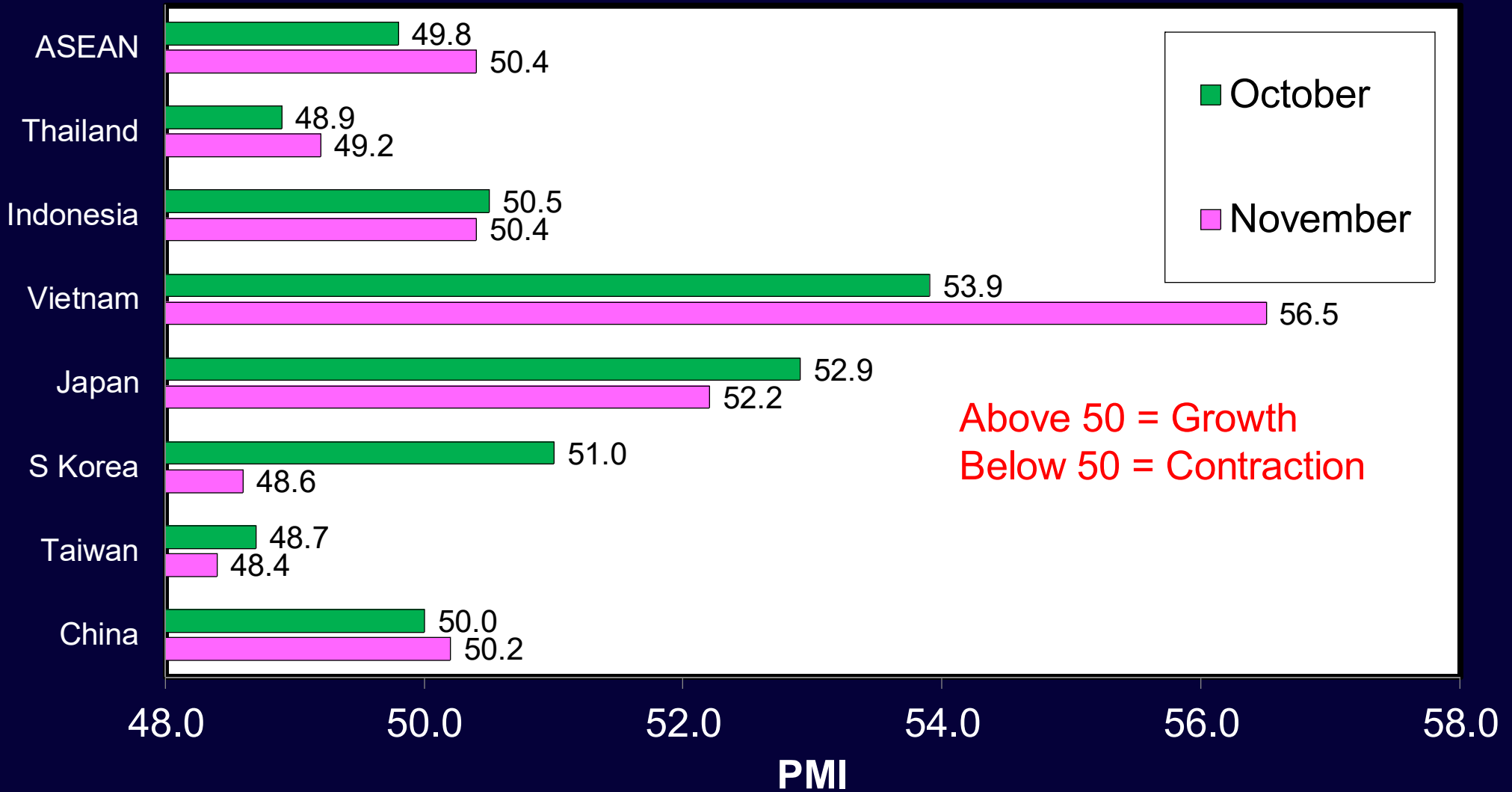


Chart 14

# China "Purchasing Managers" Indices

>50 = Growth

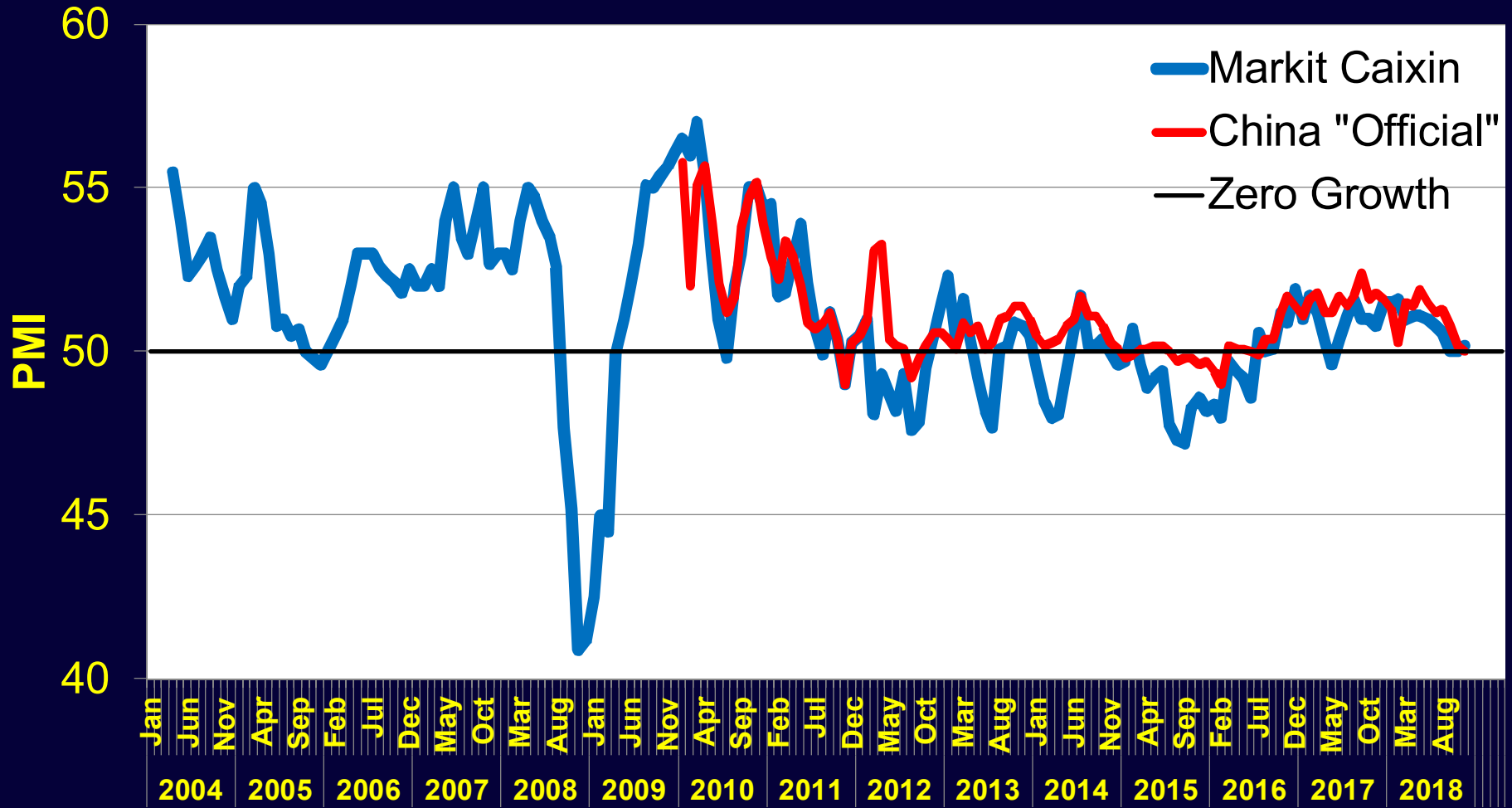


Chart 15

# Taiwan "Purchasing Managers" Index

>50 = Growth

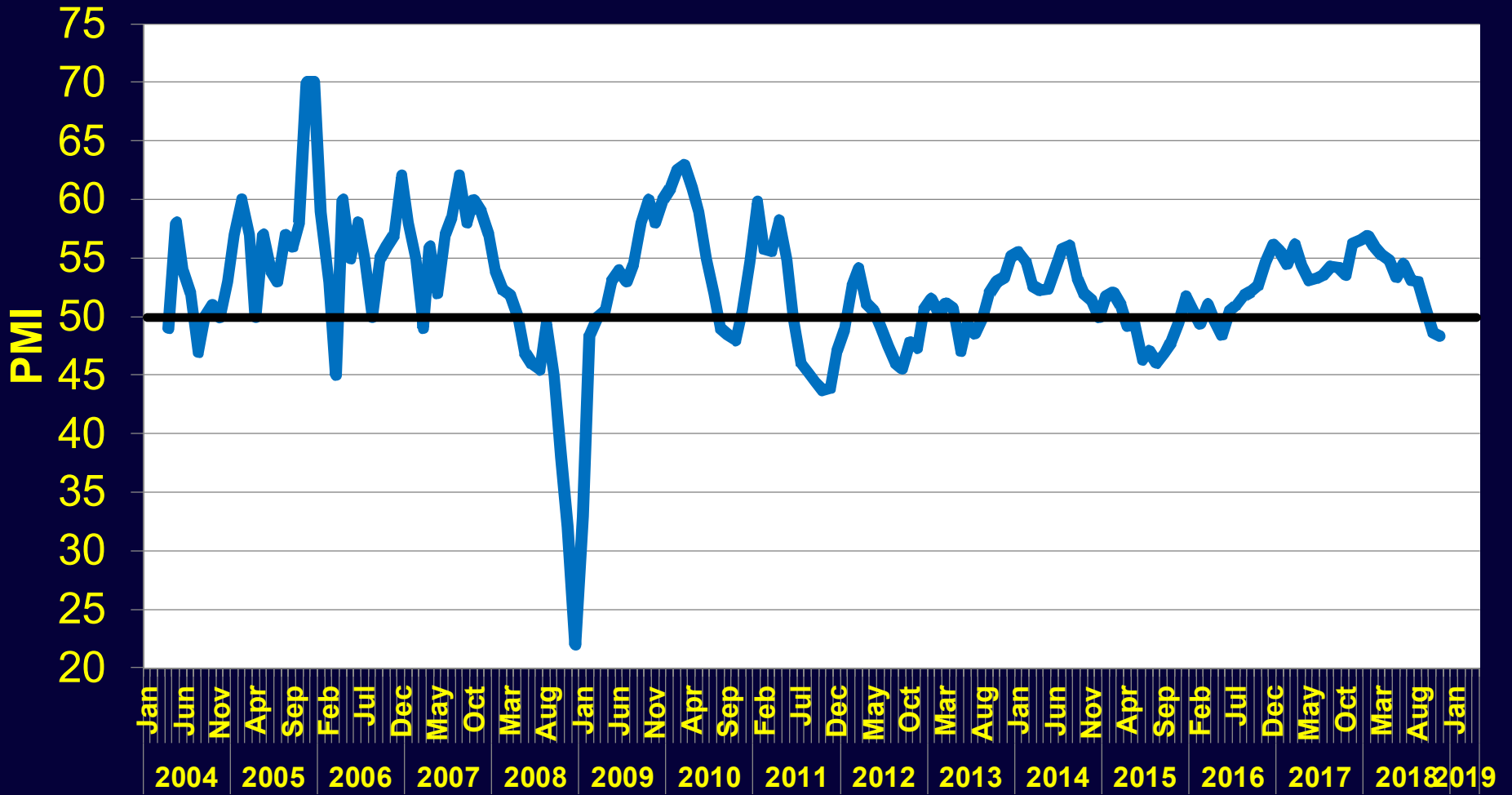
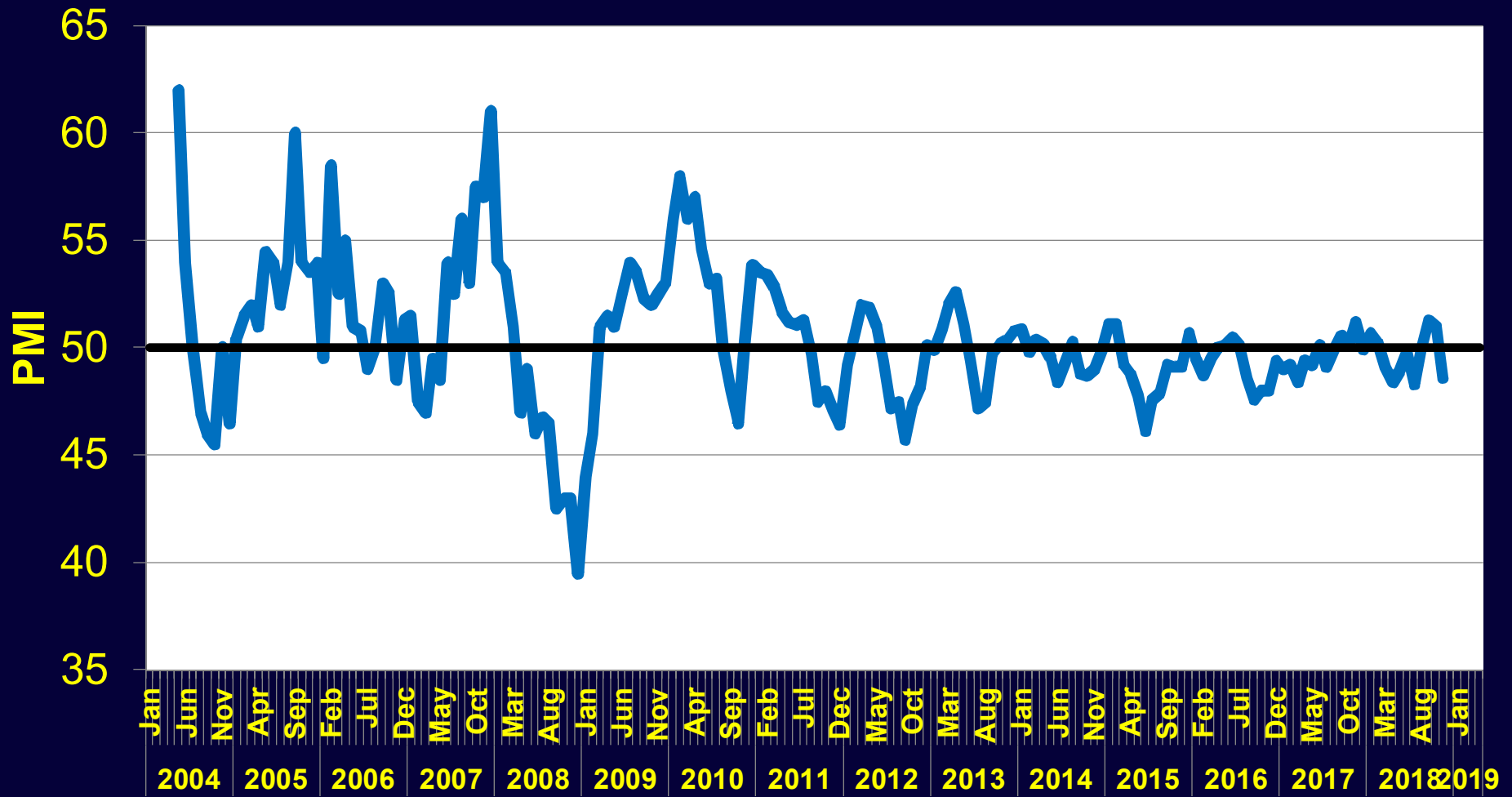


Chart 16

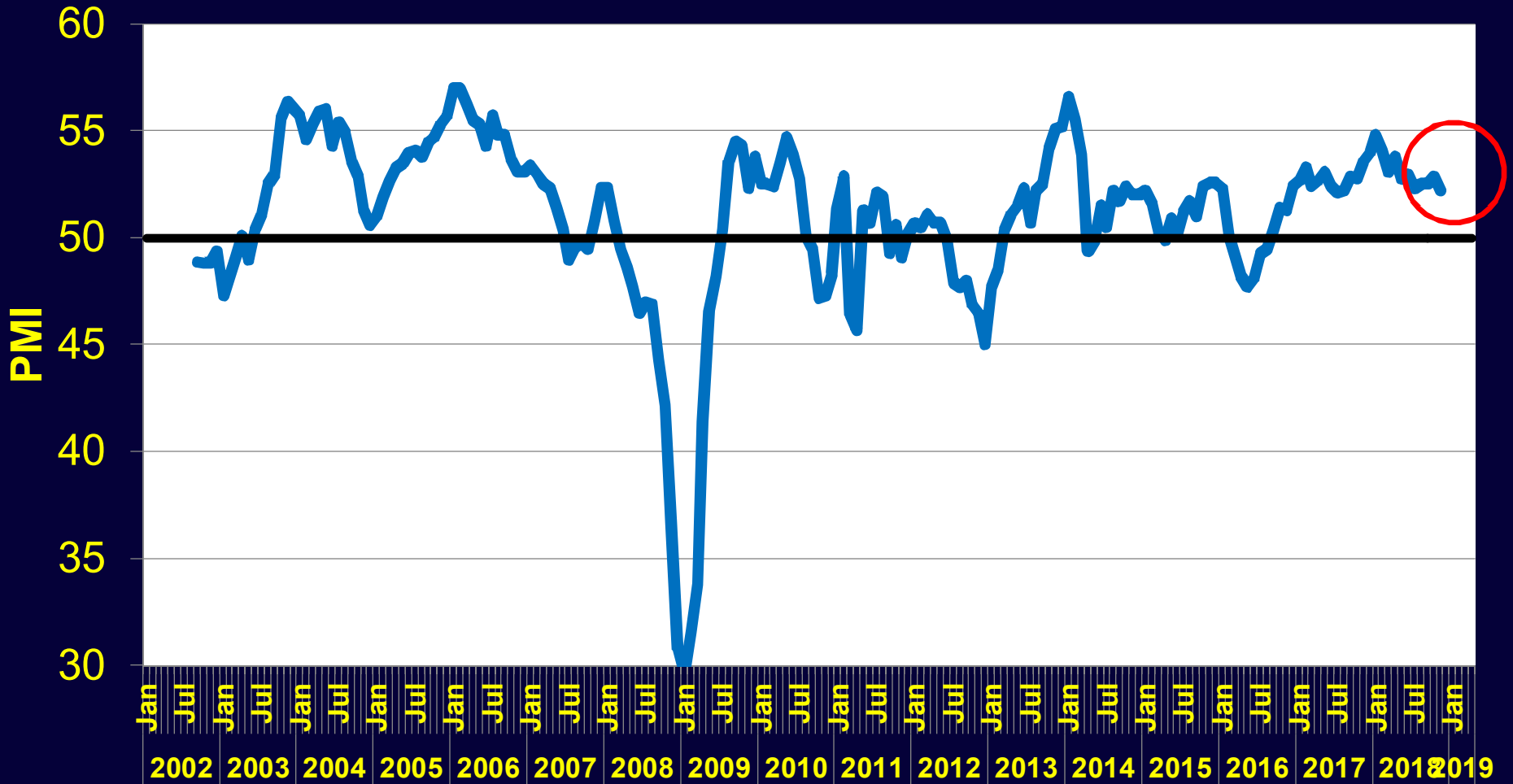
# S Korea "Purchasing Managers" Index

>50 = Growth



# Japan "Purchasing Managers" Index

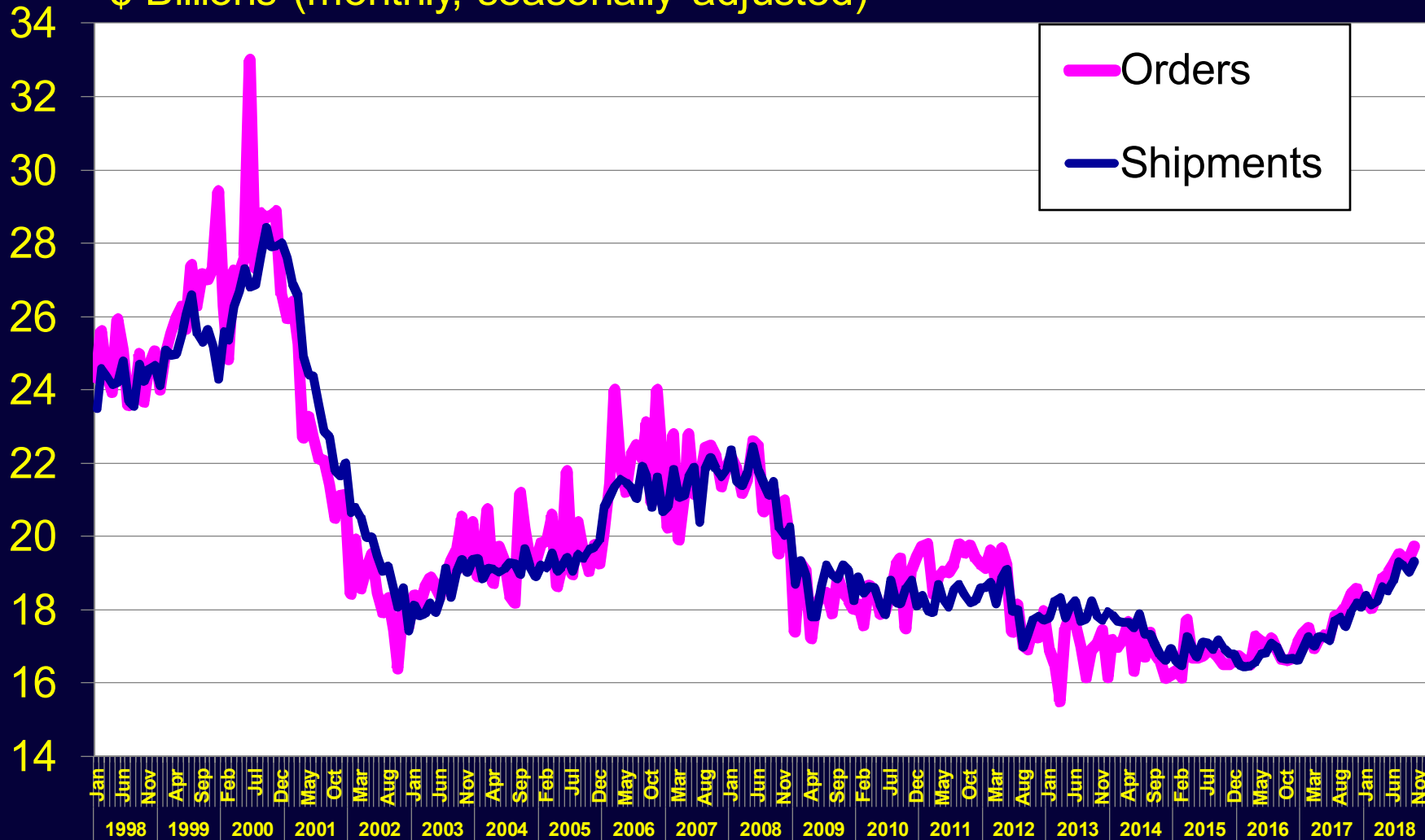
>50 = Growth



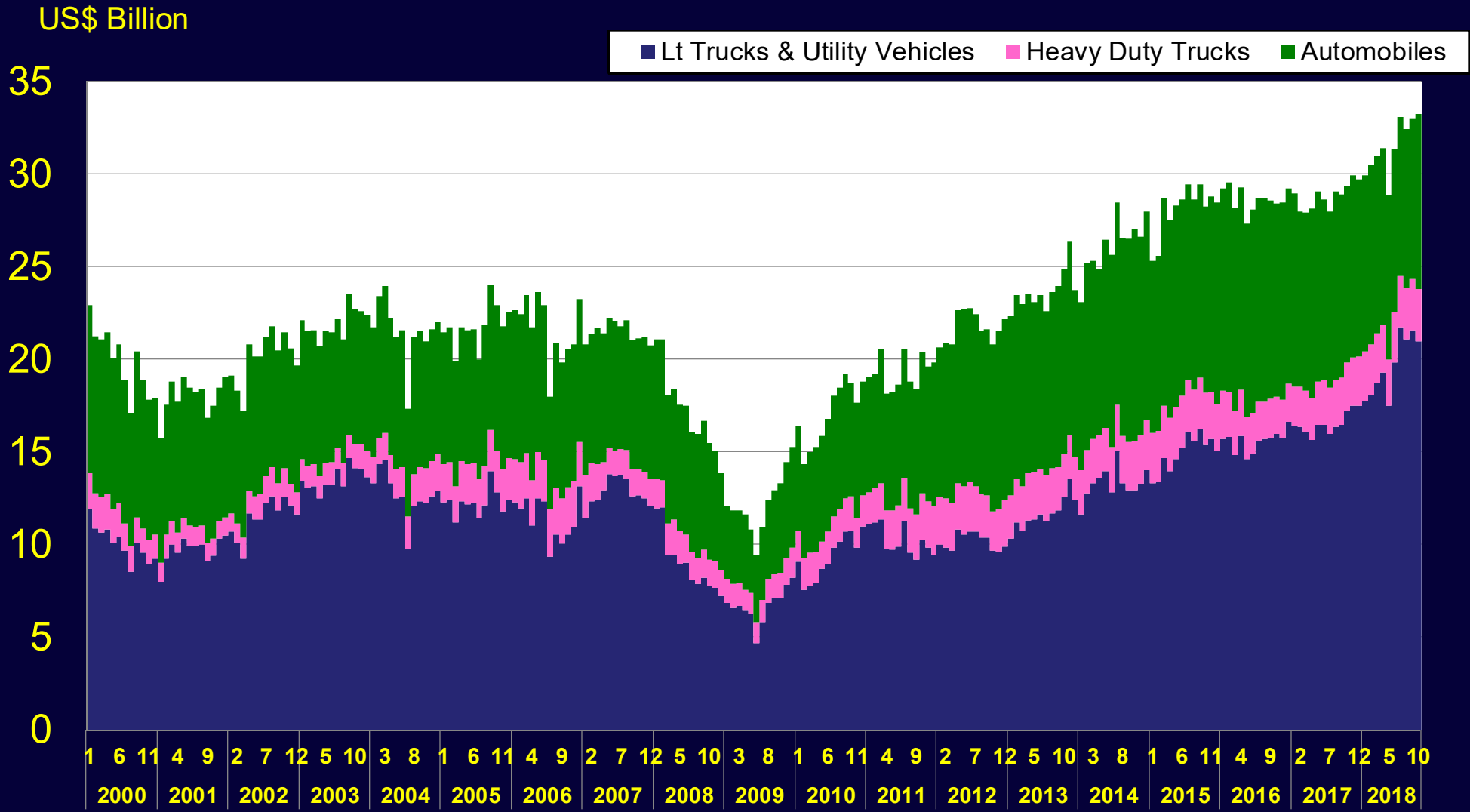
# U.S. Electronic Equipment Orders & Shipments

Computer, Communications, Measurement & Control and Military

\$ Billions (monthly, seasonally adjusted)

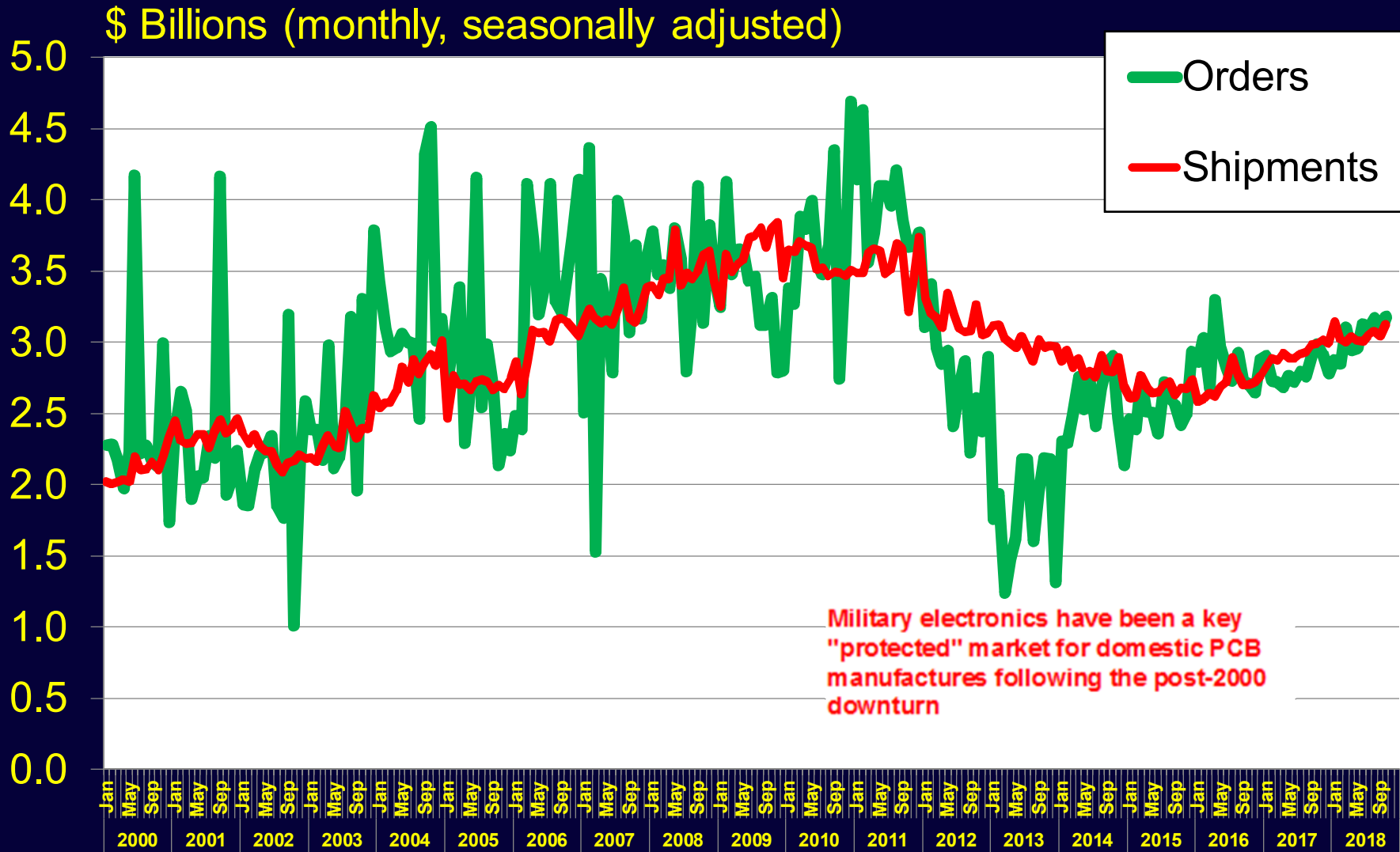


# U.S. Vehicle Shipments

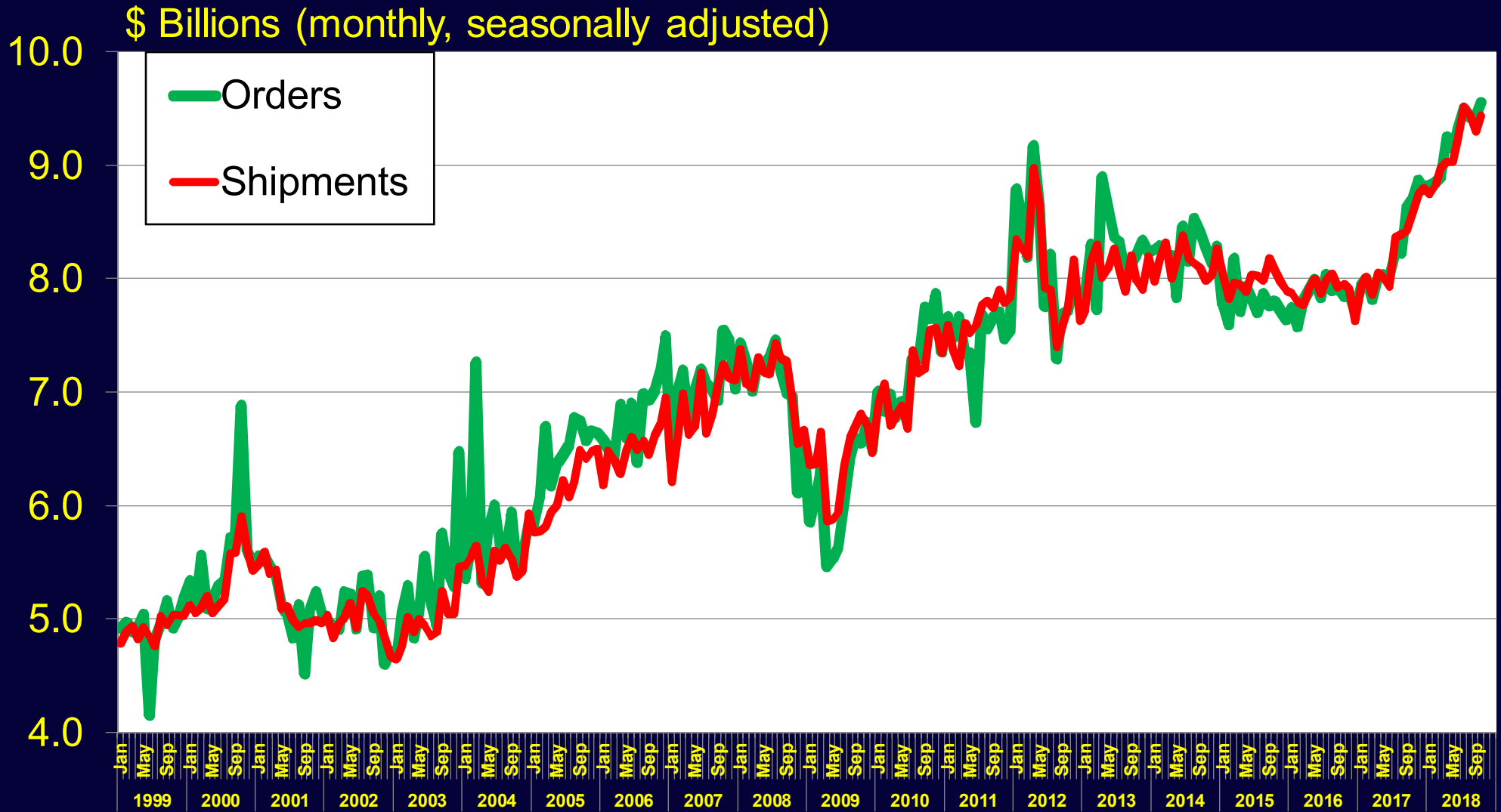


# U.S. Military Electronics Orders & Shipments

## Defense Communication & Search & Navigation Equipment



# U.S. Electromedical, Measurement & Control Equipment Orders & Shipments



# U.S. Passive Component Orders & Shipments

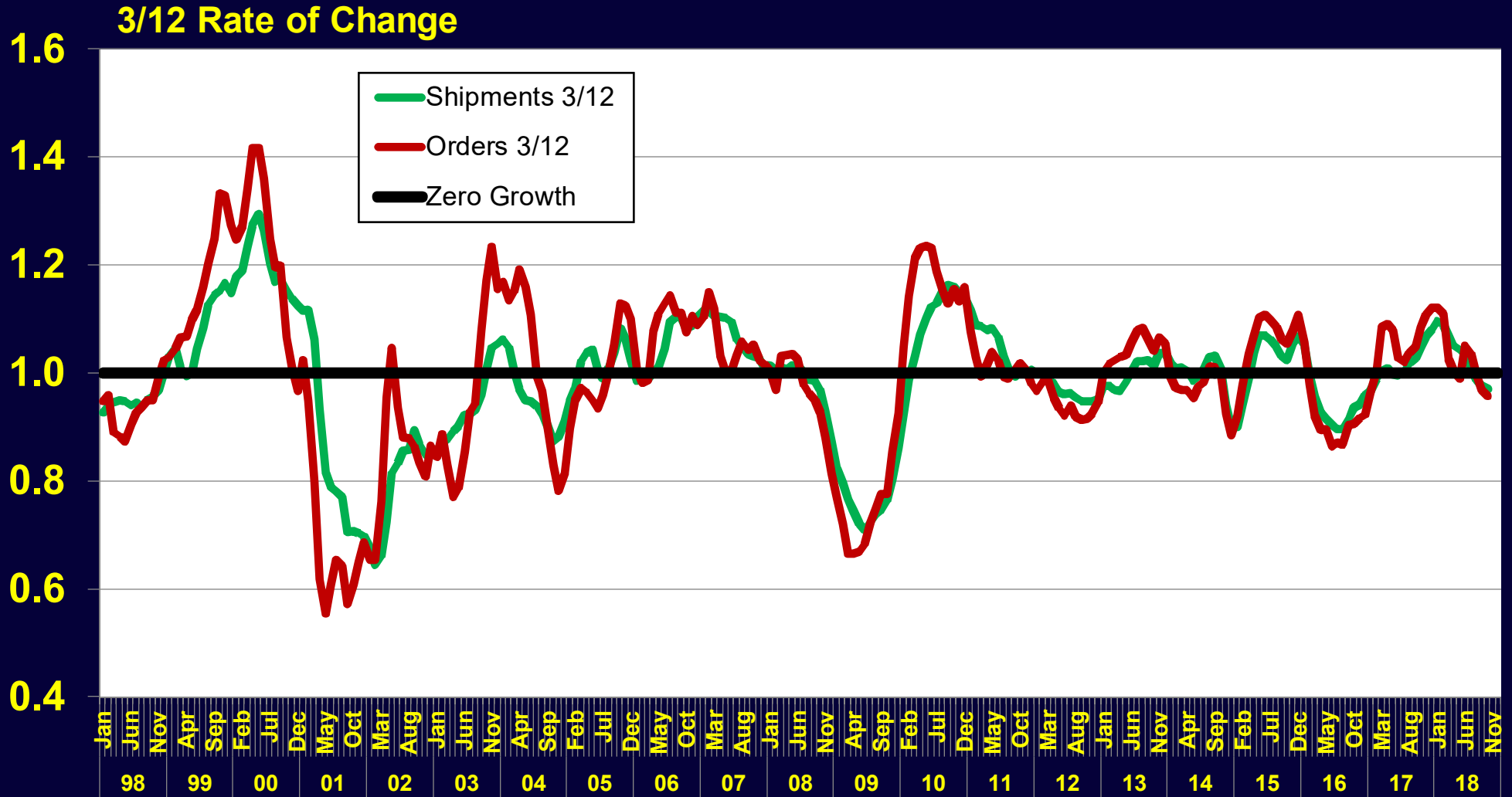


Chart 23

# Present Growth Rates (%)

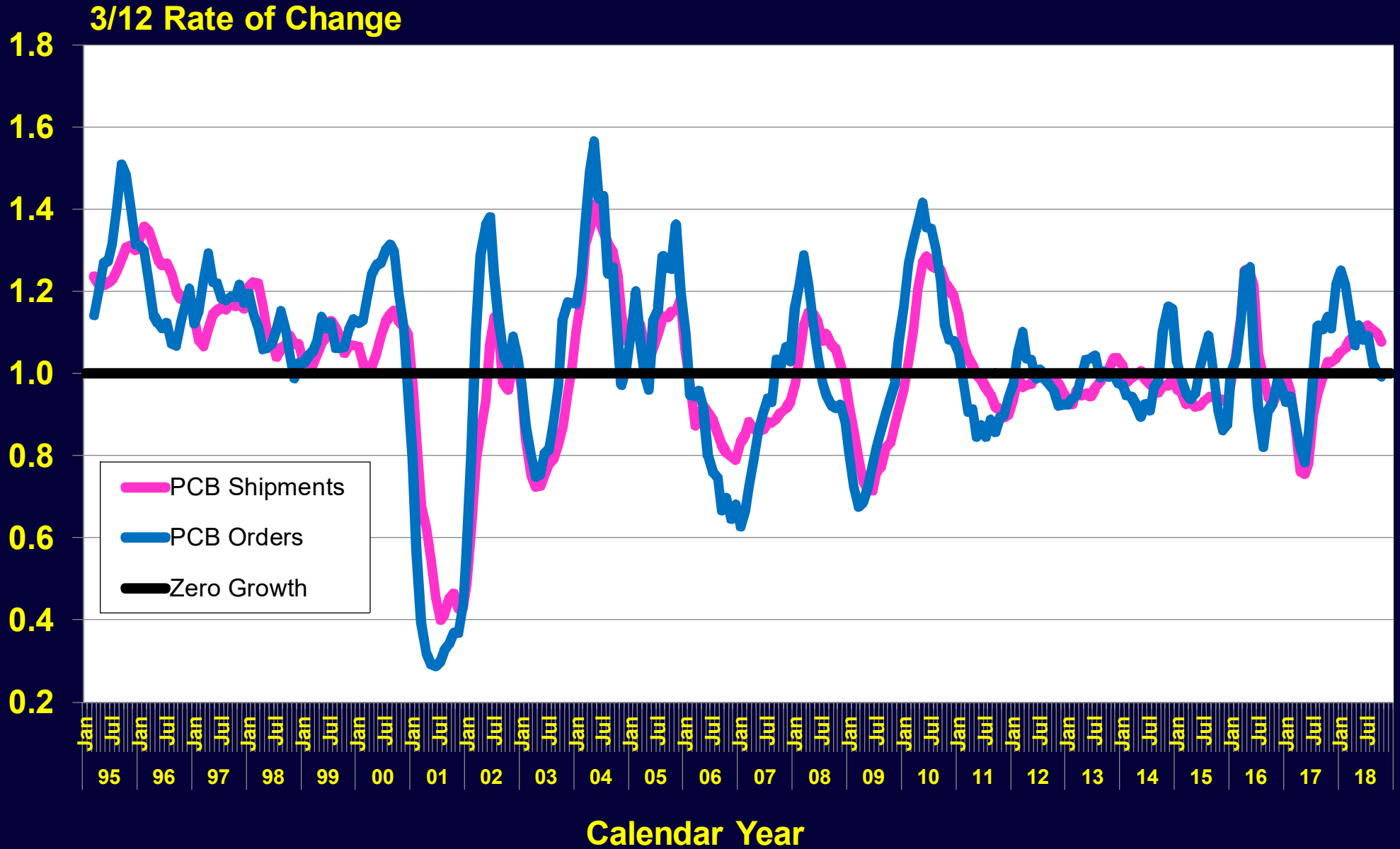
## U.S. Economy & Electronics Industry

	Latest Month	Annualized Growth Rate	3-Month Growth Rate
<b>Electronic Component \$</b>			
Rigid & Flex PCB Orders (N Amer)	10/18	9.7	-0.6
Rigid & Flex PCB Shipments (N Amer)	10/18	8.3	7.9
Electronic Component Orders	10/18	2.7	-4.3
Electronic Component Shipments	10/18	3.1	-3.0
Semiconductor Shipments to N America	10/18	26.0	14.2
SEMI Capital Equipment	10/18	3.1	-9.9
<b>U.S. Electronic Equipment Orders \$</b>			
Computer & Related	10/18	-10.3	0.2
Communication	10/18	9.7	5.4
Medical, Measurement & Control	10/18	13.1	11.2
Search & Navigation	10/18	6.4	5.8
Defense Capital Goods	10/18	13.5	17.9
Military Electronics	10/18	7.7	8.8
Total Electronic Equipment	10/18	8.2	7.7
<b>U.S. Industrial Production</b>	10/18	3.8	5.0

NOTE: 3 month growth rates compare most recent 3 months to same 3 months one year earlier.

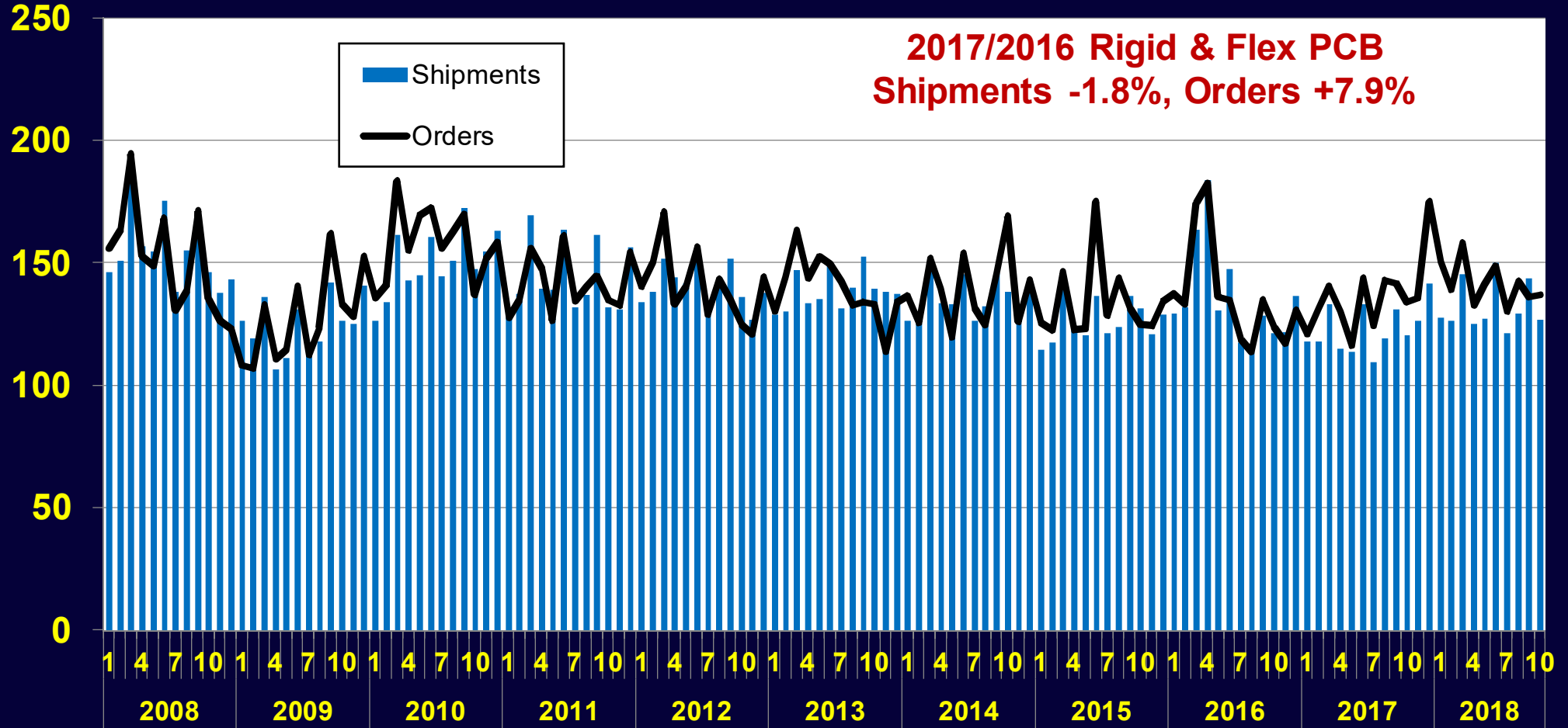
Also called 3/12 growth

# N. America Rigid & Flexible PCB Orders & Shipments



# N American Rigid & Flexible PCB Shipments & Orders

\$M (statistical sample of about 50% of producers)



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

# Global 5G Adoption to Take Off in 2021

Forecast of 5G smartphone subscriptions by region

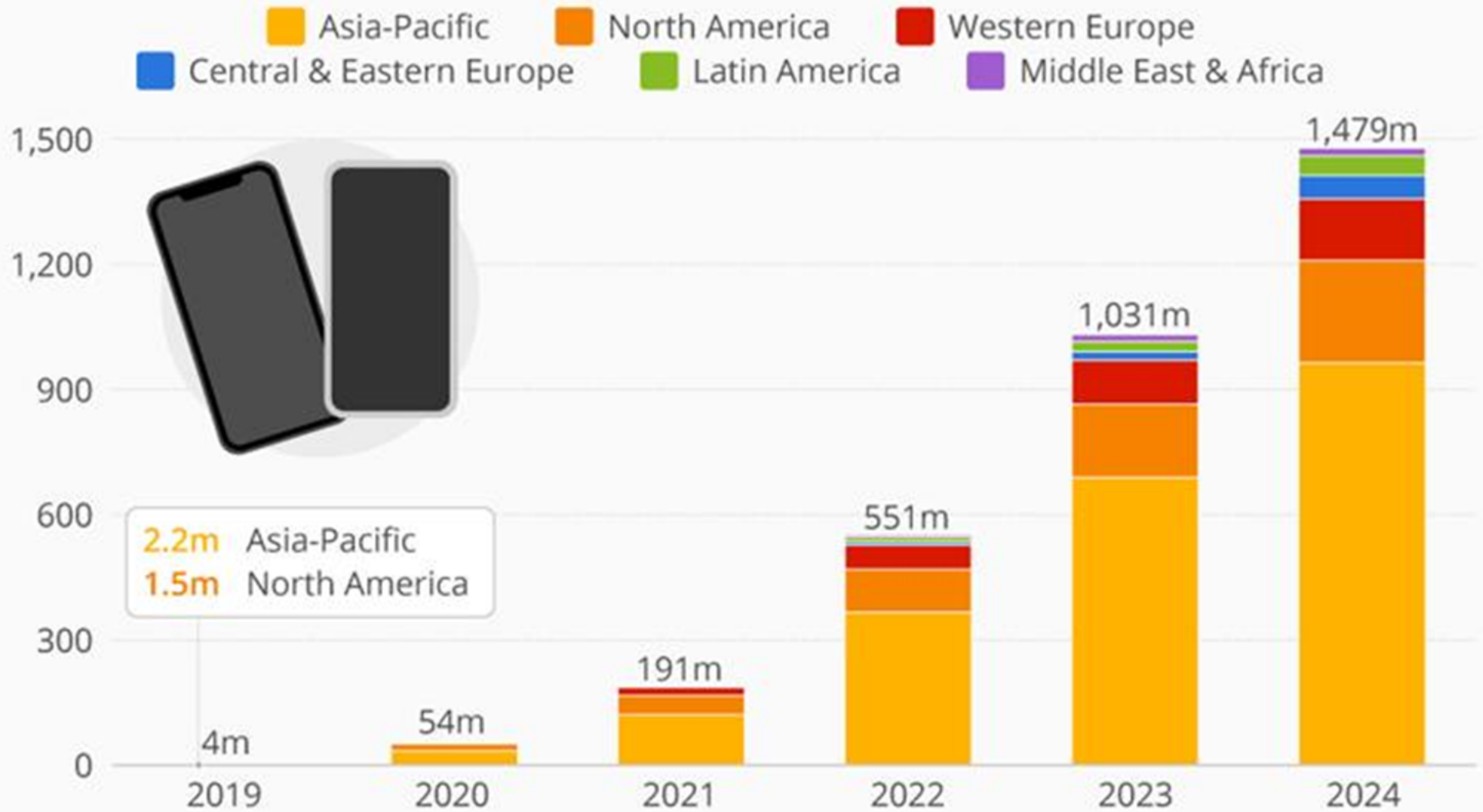
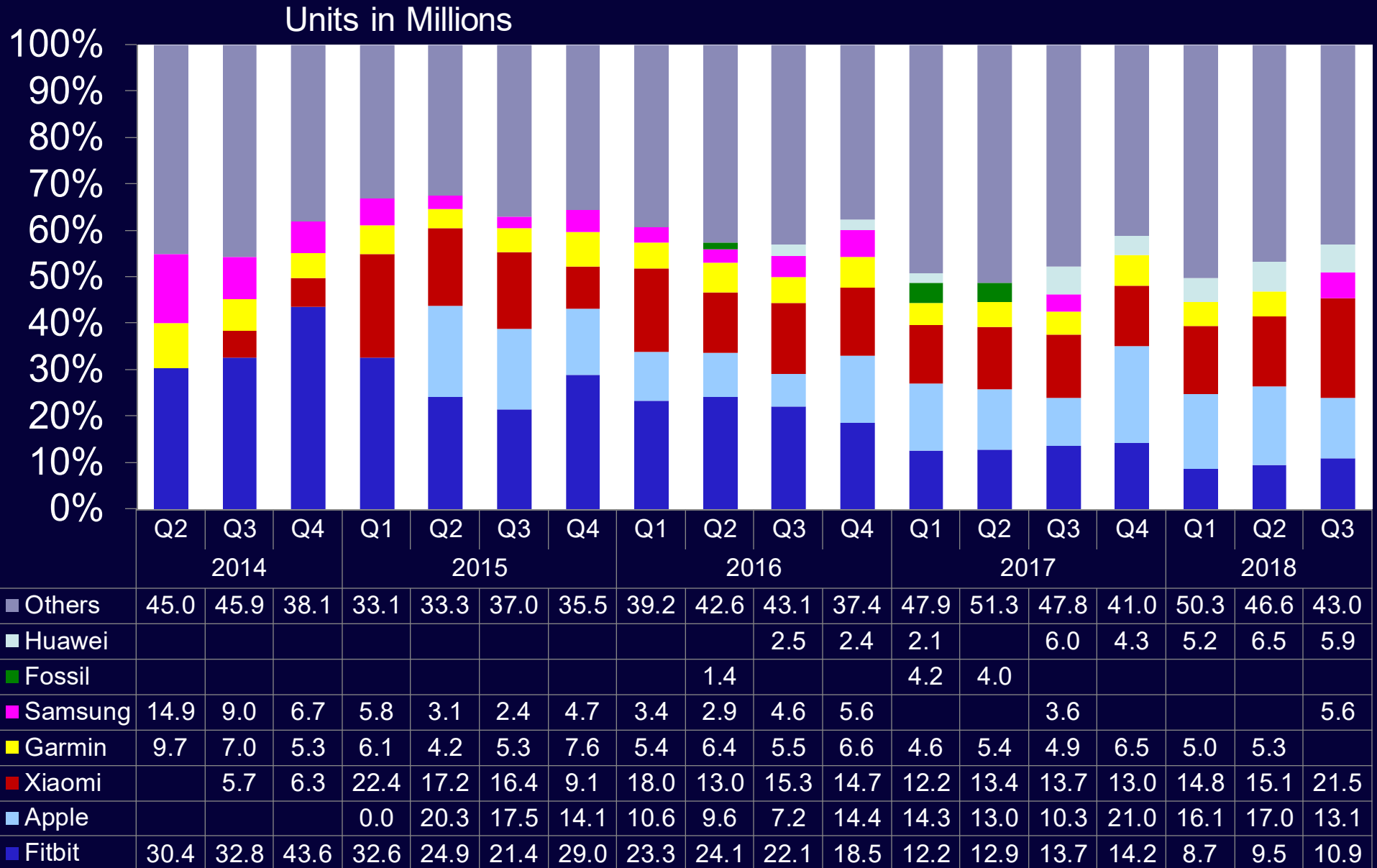


Chart 27

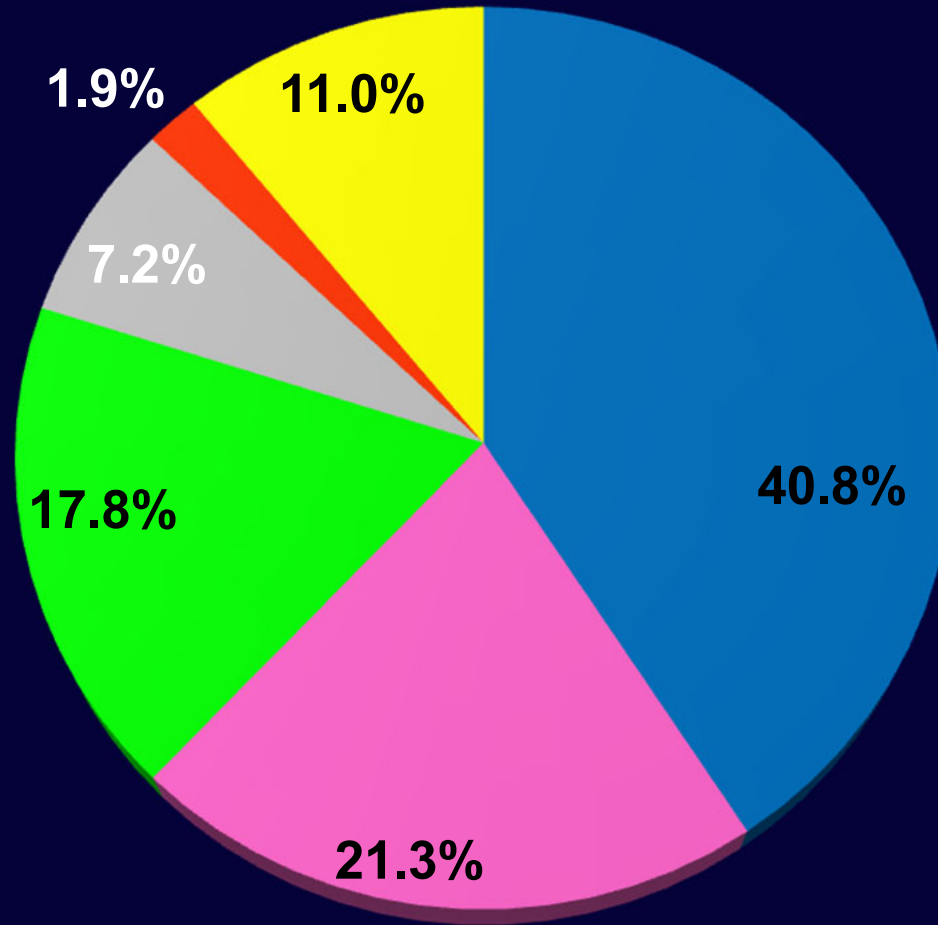
# Wearable Vendors

## Global % Share of Largest Suppliers



**IDC 12/18 & prior reports**

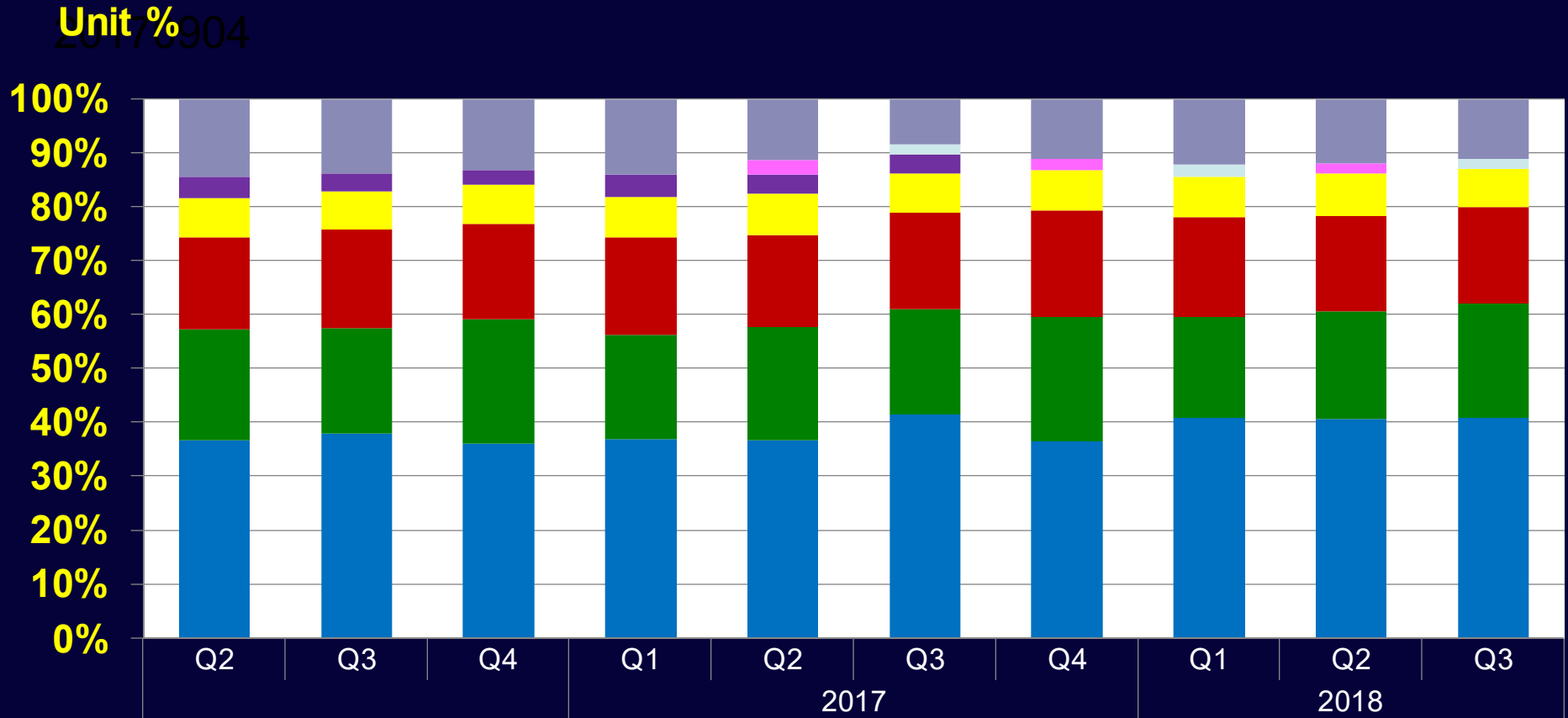
# World Hard Copy Peripherals Market 3Q'18



- HP Inc
- Canon Group
- Epson
- Brother
- Kyocera
- Others

3Q'18 Total: 24,962 Units

# World Hard Copy Peripherals Market Unit Share



	2017 Q2	2017 Q3	2017 Q4	2017 Q1	2017 Q2	2017 Q3	2017 Q4	2018 Q1	2018 Q2	2018 Q3
Others	14.4	13.8	13.1	13.9	11.4	8.3	11.0	12.2	11.9	11.0
Kyocera						1.9		2.3		1.9
Xerox					2.5		2.1		2.0	
Samsung	3.9	3.3	2.8	4.2	3.7	3.5				
Brother	7.3	7.1	7.2	7.6	7.6	7.3	7.5	7.5	7.8	7.2
Epson	17.0	18.3	17.8	18.0	17.0	17.9	19.8	18.5	17.6	17.8
Canon Group	20.6	19.6	23.0	19.4	21.0	19.6	23.1	18.7	20.0	21.3
HPI	36.6	37.9	36.1	36.9	36.8	41.5	36.5	40.9	40.8	40.8