



GARDNER
RESEARCH

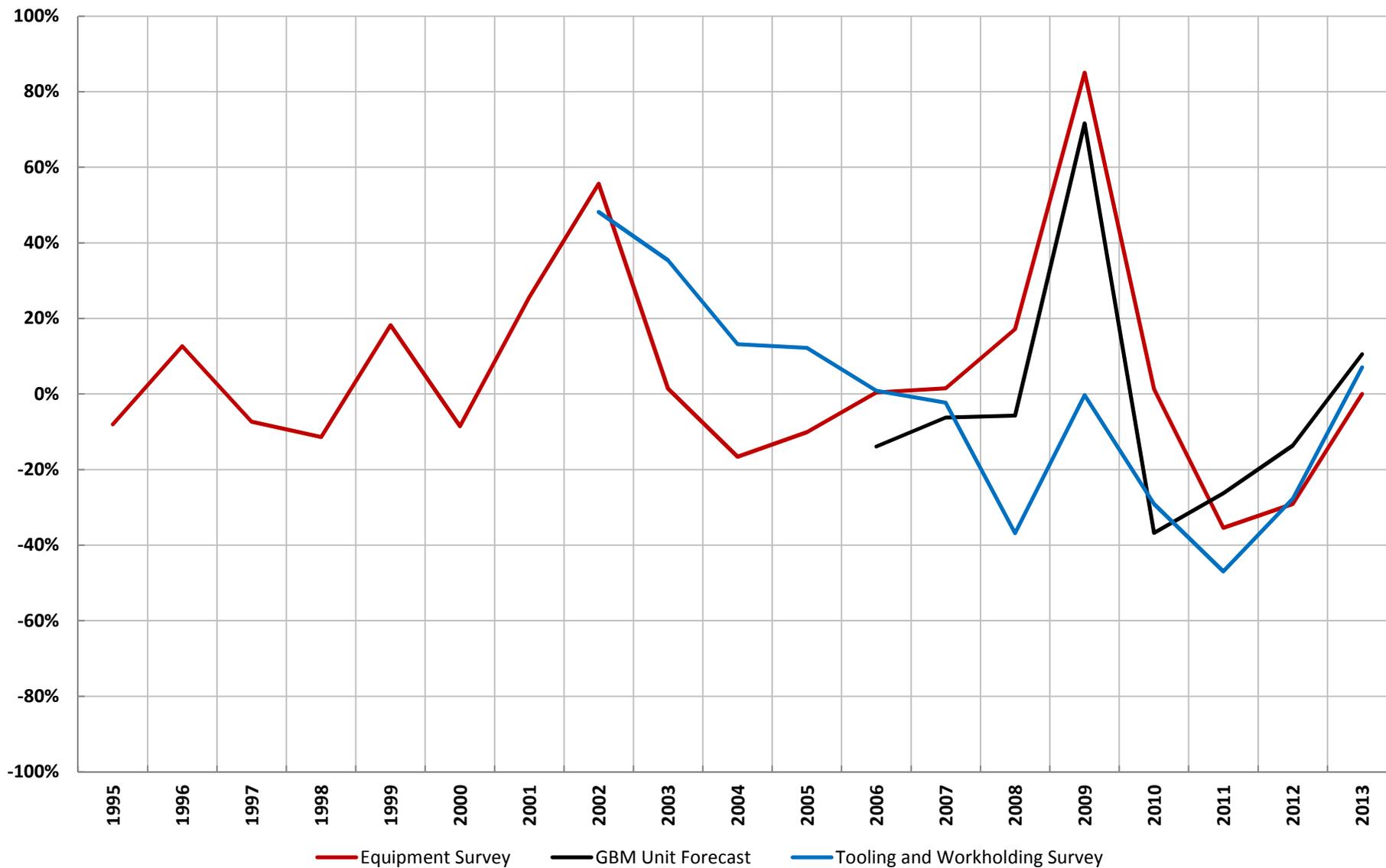


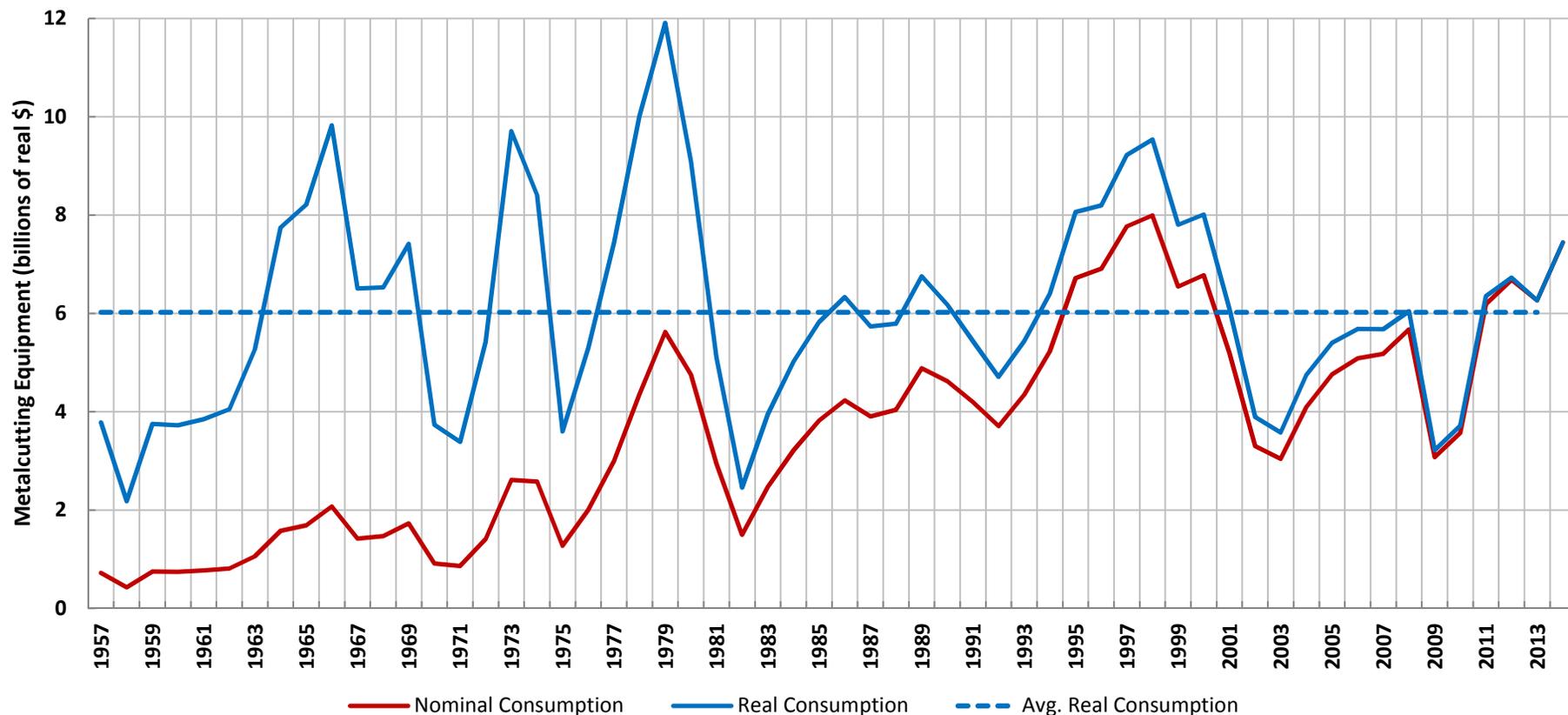
2014
METALWORKING
CAPITAL SPENDING
SURVEY AND FORECAST

PRESENTED BY: Steve Kline

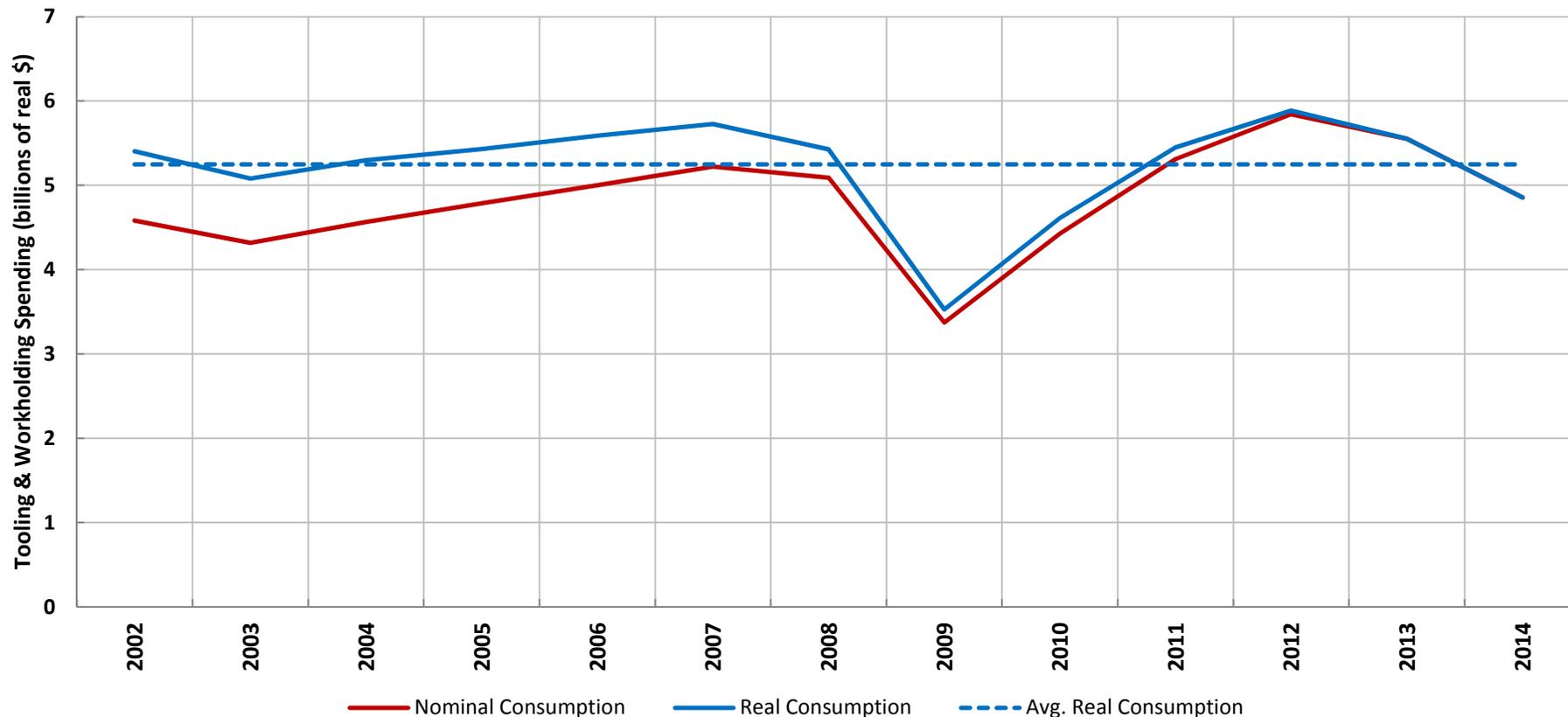


- Combined the Capital Equipment and Tooling and Workholding Surveys
- Sent out 28,000 surveys, which is nearly half of our metalworking facilities
- Added Production Machining and Moldmaking Technology magazines to the survey pool
- Eliminated categories such as fabricating equipment and assembly that our audience has less influence over
- Added categories for software





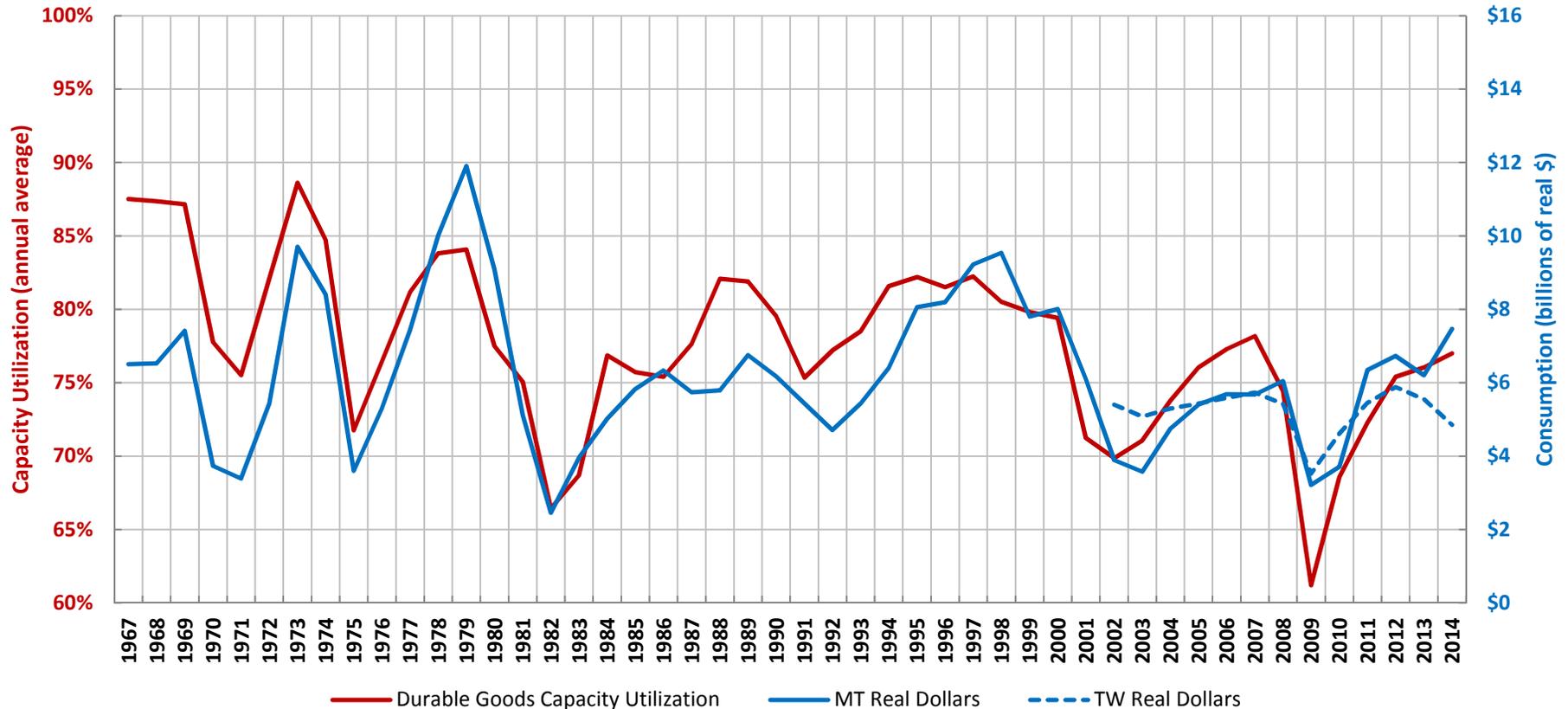
- 2014 projection is \$7.442 billion, which is up 19% from 2013 estimate and roughly 25% more than the historical average market
- Remain in the strongest machine tool market since the mid to late 1990s
- Leading indicators show that plants may be too optimistic



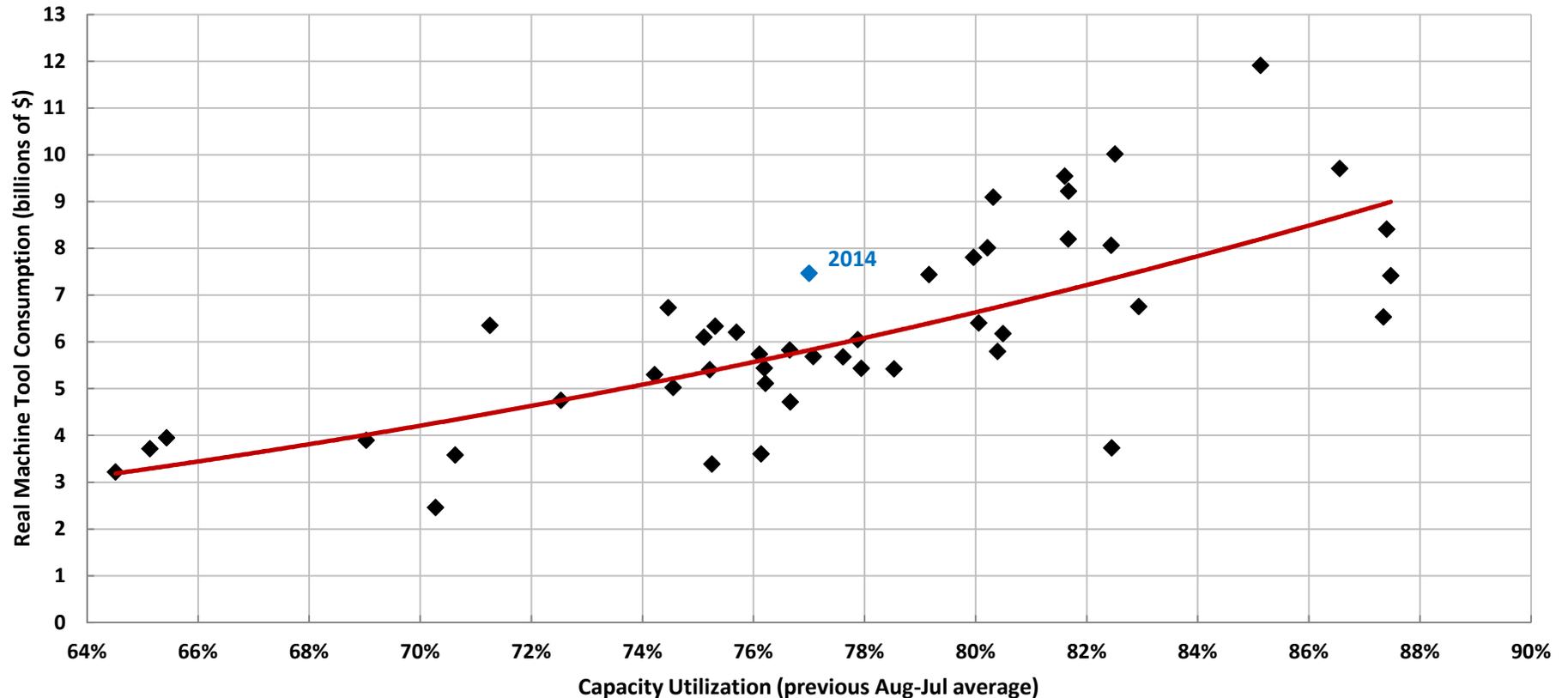
- 2014 projection is \$4.855 billion, which is down 13% from 2013 estimate and just slightly below the historical average market
- Tooling projection is \$3.446 billion, which is up 7%
- Workholding projection is \$1.411 billion, which is down 39%



CAPACITY UTILIZATION VS. CONSUMPTION



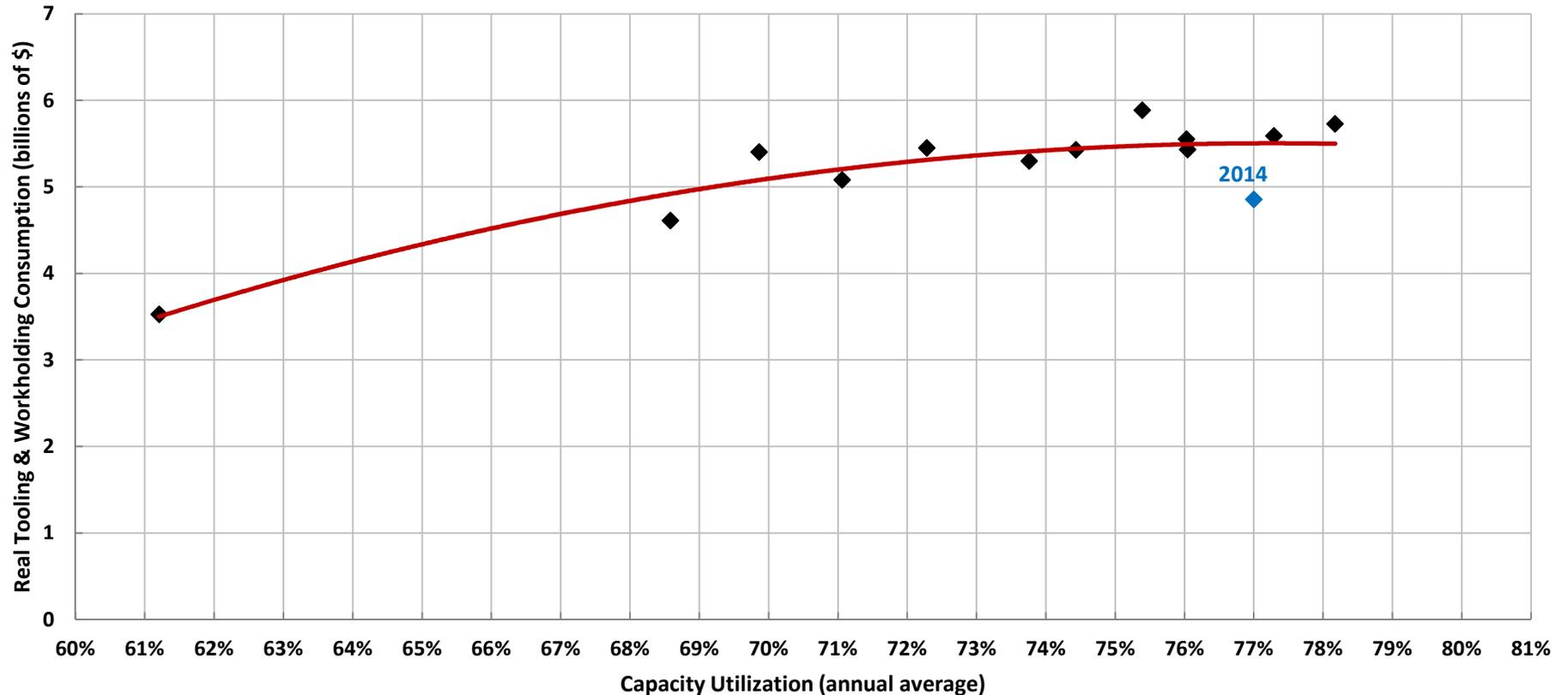
- Capacity utilization leads machine tool consumption by about one year while it is coincident with tooling and workholding spending
- According to our survey, current capacity utilization is 77%
- Capacity utilization is indicating that workholding forecast is too low



- 2014 capacity utilization of 77%, which equates to optimal demand of \$5.836 billion
- Shops tend to under buy or over buy optimal demand in 4-7 year cycles
- 2014 would be year five in this over buying cycle
- An indication that shops are too optimistic



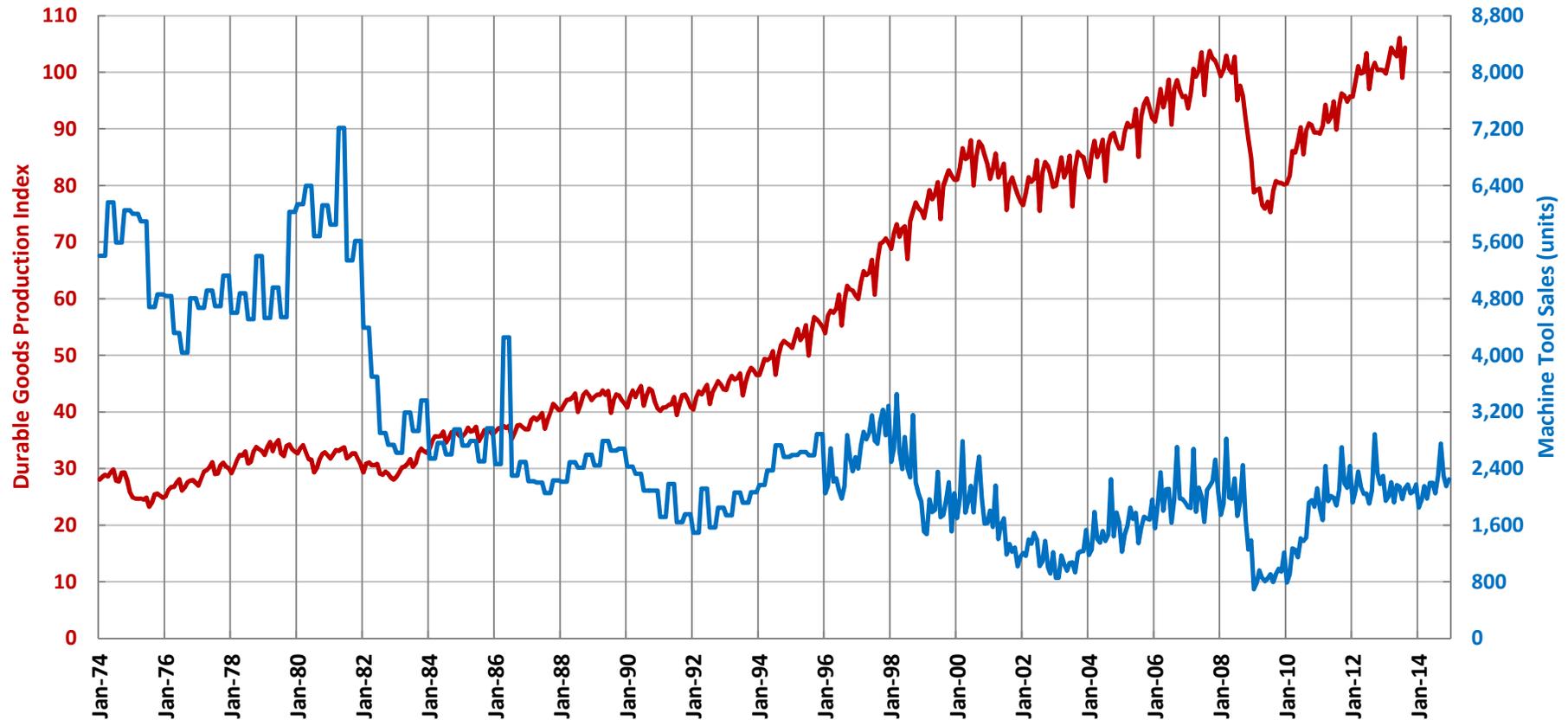
TOOLING & WORKHOLDING DEMAND CURVE



- Very high correlation between capacity utilization and tooling and workholding spending
- Based on 77% capacity utilization, optimal demand is \$5.624 billion
- 2014 is the furthest forecasted demand has been from optimal demand
- Indicates that workholding forecast is likely too low



DURABLE GOODS PRODUCTION VS. MACHINE TOOL ORDERS

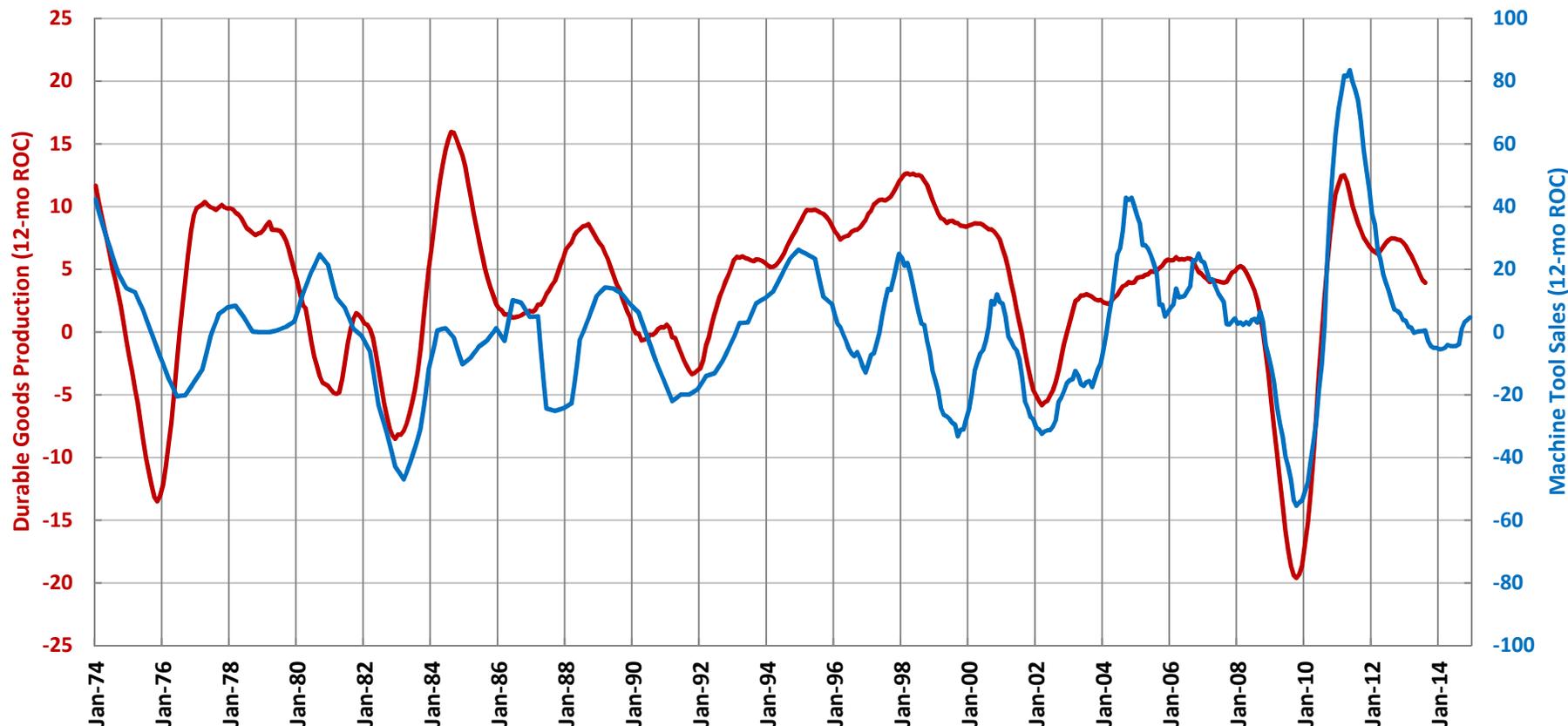


- Durable goods production has set a record high for that month every month of 2013
- Durable goods production is the highest it has ever been in U.S.
- Machine tool orders look to stay near the peak of the last 15 years



DURABLE GOODS PRODUCTION LEADS MACHINE TOOL ORDERS

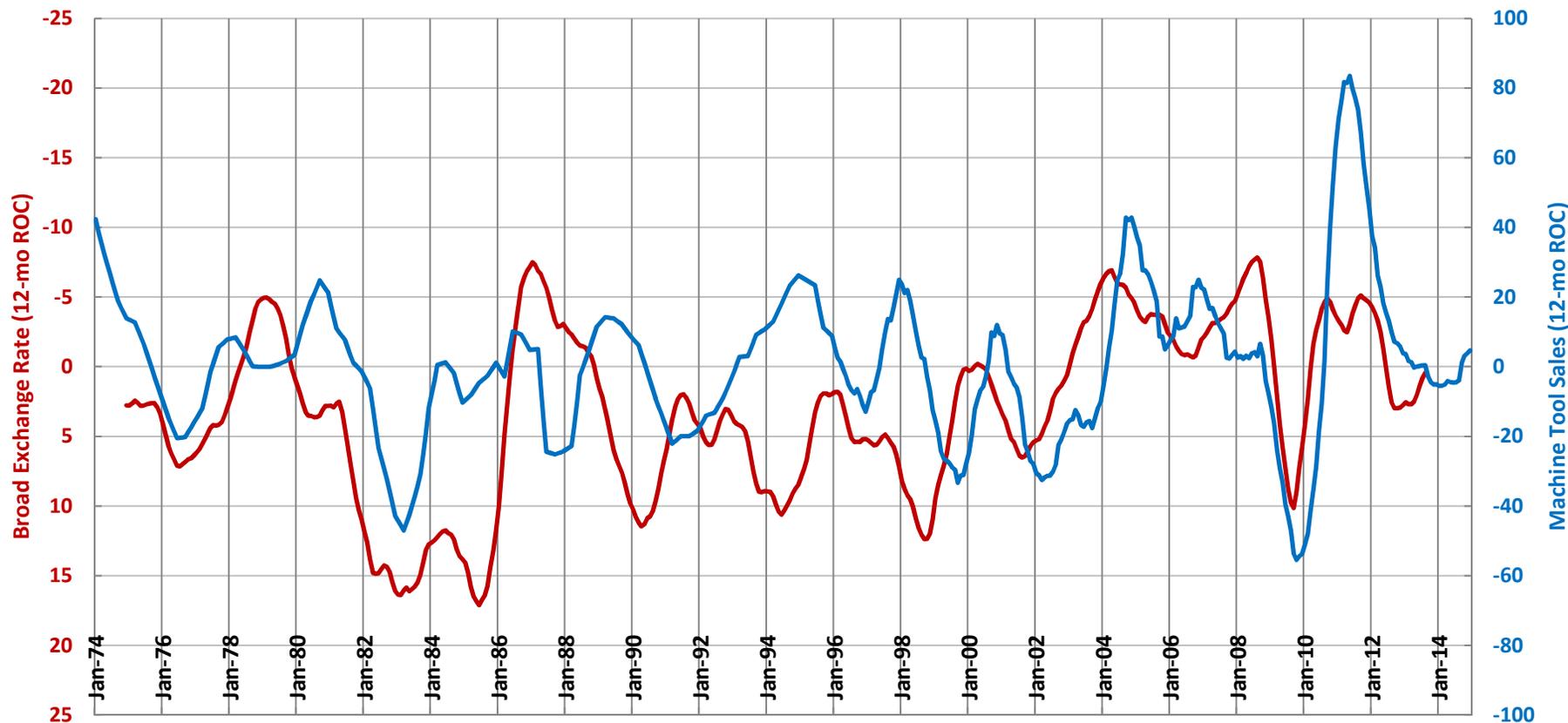
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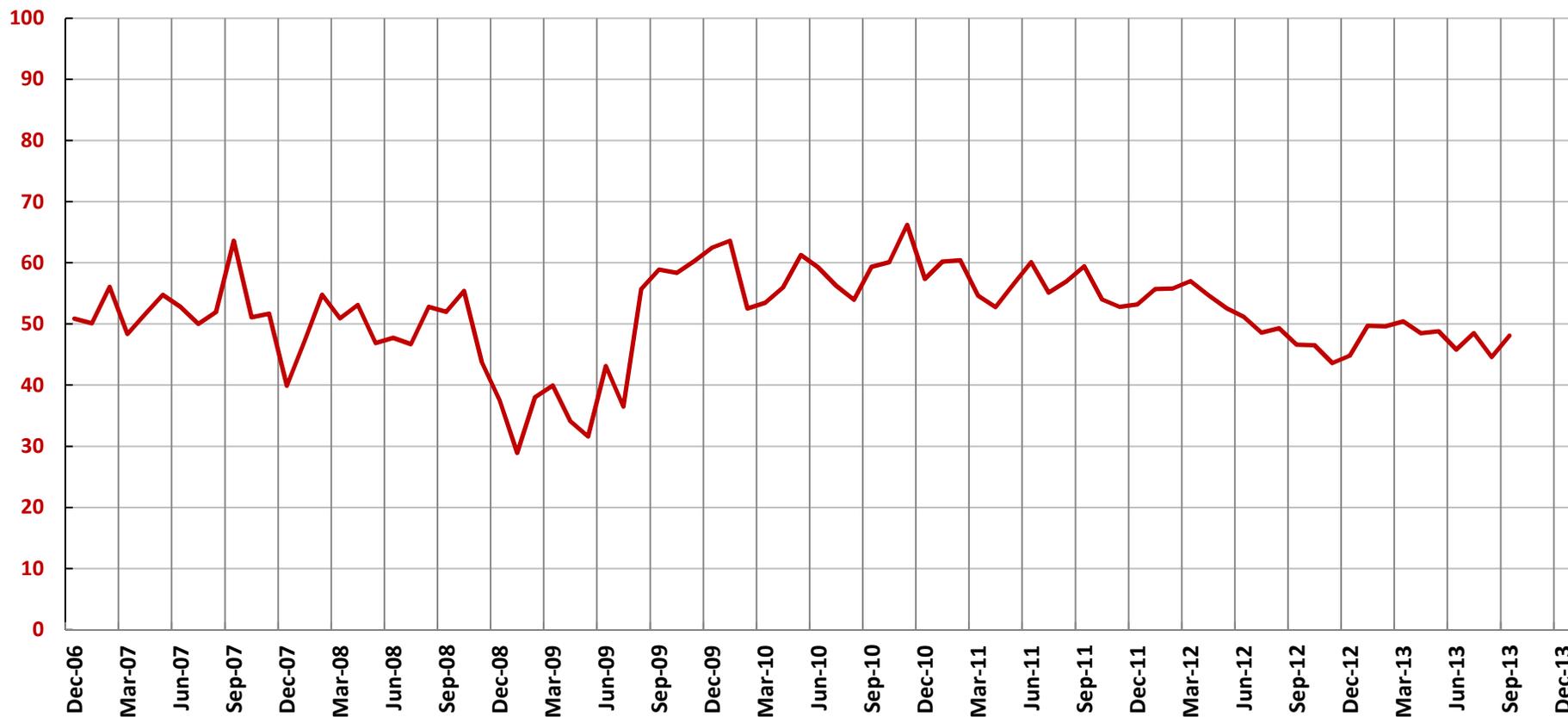
- Despite record highs, the growth rate of production has slowed for 12 months
- Historically the growth rate is still strong though
- The relatively strong growth rate of production combined with slightly increasing capacity utilization should boost machine tool orders



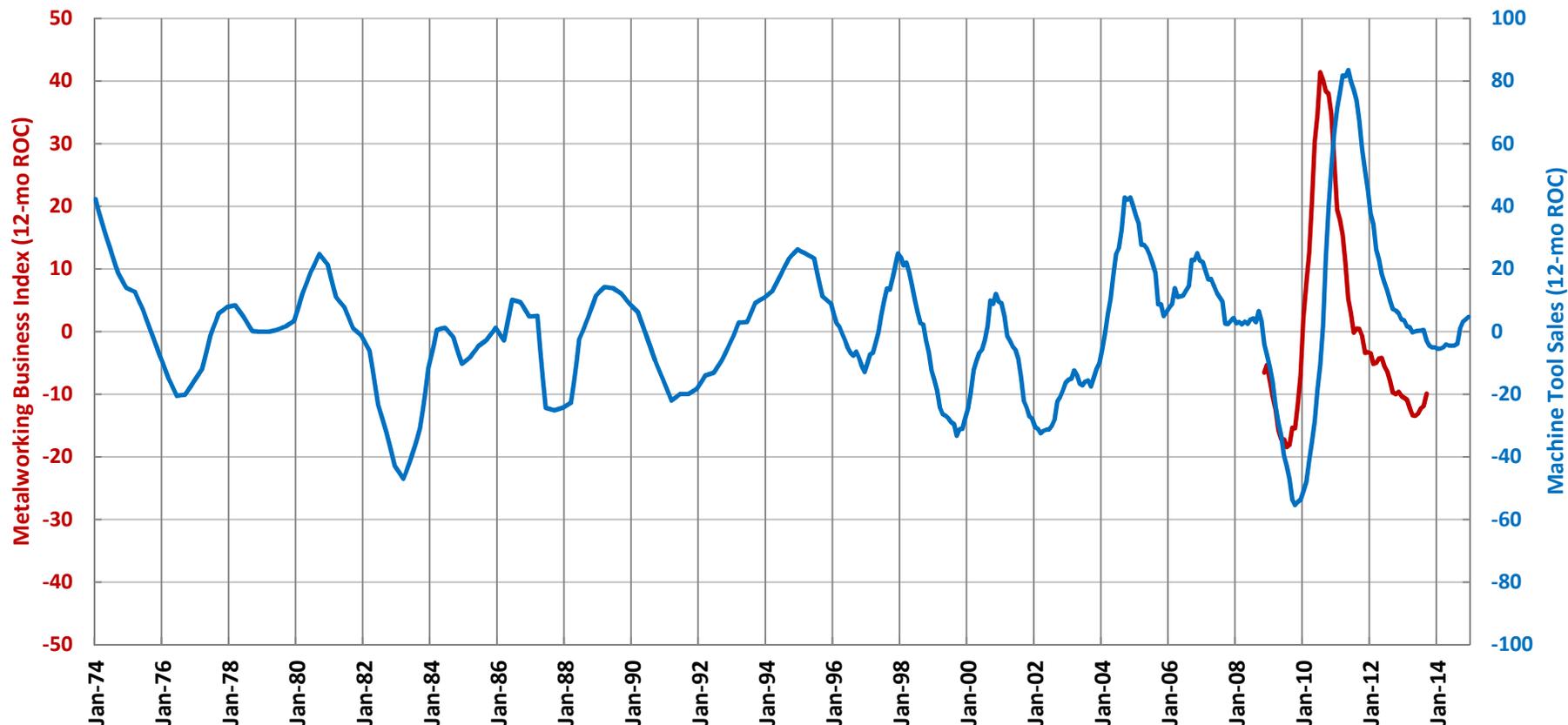
EXCHANGE RATE LEADS MACHINE TOOL ORDERS



- The U.S. dollar has been appreciating at a slower rate throughout 2013
- The Fed does not show any signs of slowing down the printing presses
- Exchange rates are indicating stronger machine tool sales in 2014



- Metalworking industry has been in a mild contraction for most of 2013
- The contraction is due to poor business conditions at facilities with fewer than 50 employees but plants with more than 50 employees have been growing in 2013
- Index in September 2013 was higher than in September 2012 for first time since April 2012

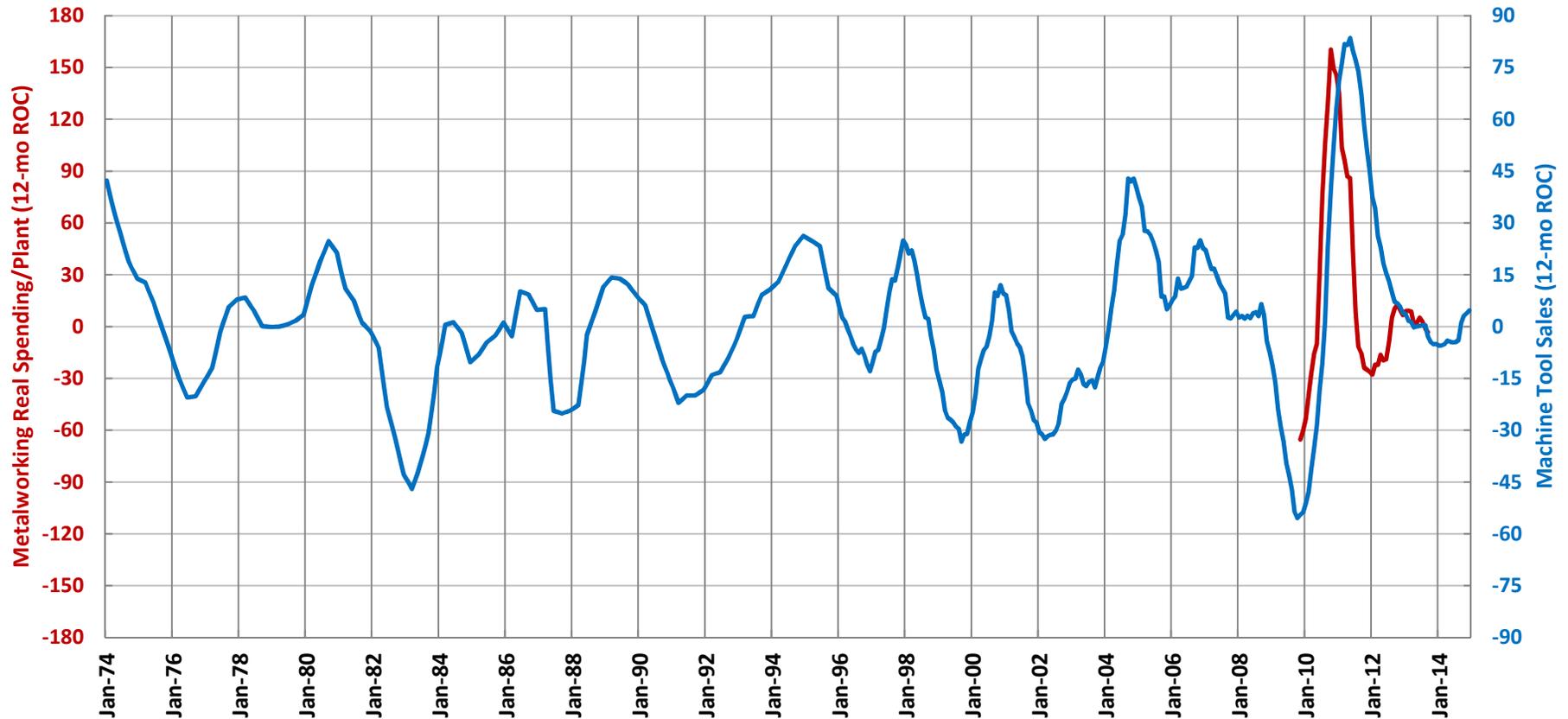


- The MBI leads USMTO spending by four to five months
- The MBI is contracting but it has been contracting at a slower rate since May
- Machine tool orders should bottom out this fall

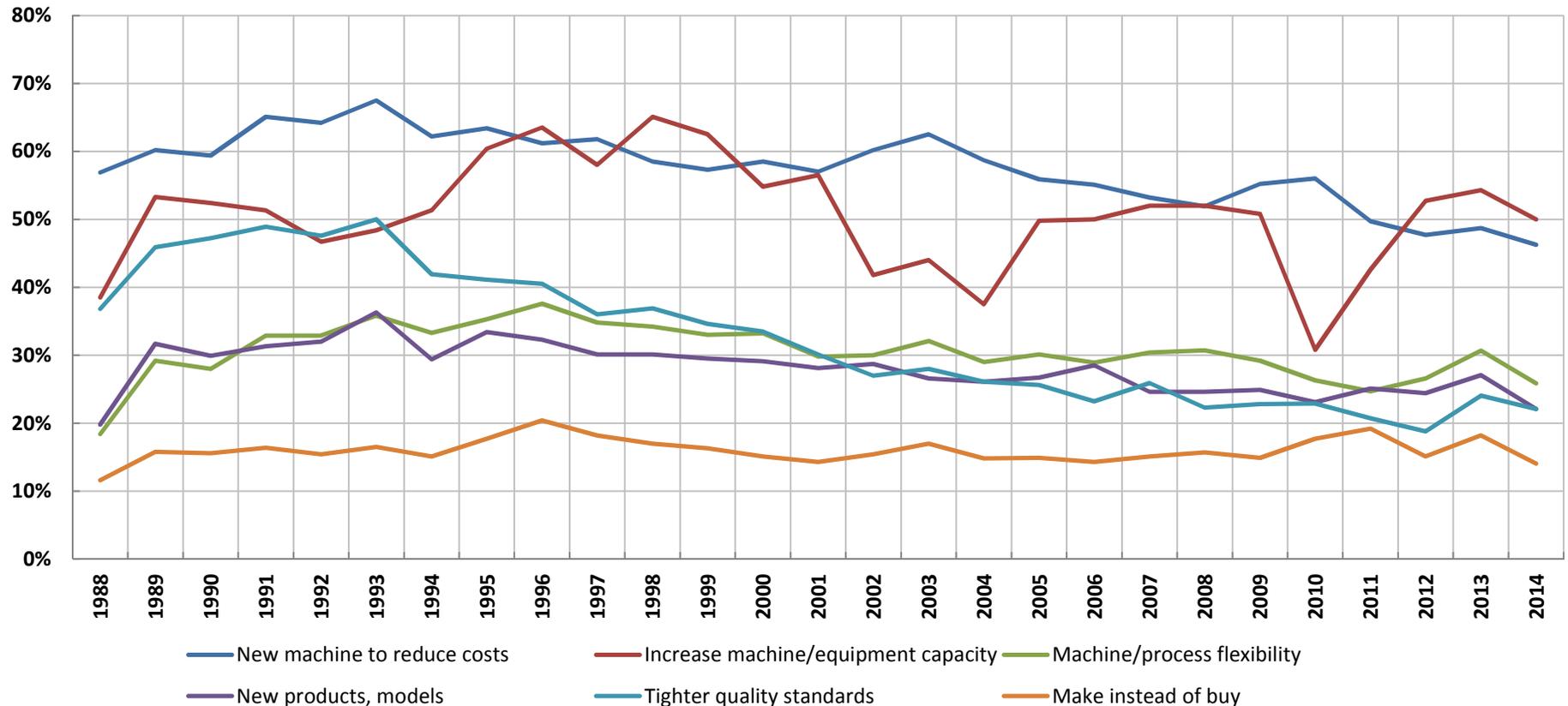


MBI FUTURE SPENDING/PLANT LEADS USMTO SPENDING

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- MBI future spending plans leads USMTO spending by six to eight months
- MBI future spending is contracting and is currently indicating more contraction in machine tool orders
- However, the one-month rate of change grew for the first time in five months



- Last year all motivations were up, but in 2014 all motivations are down
- When increasing capacity becomes less of a motivator it signals an end to the boom
- Still an uptrend in process flexibility and tighter quality standards
- Reshoring and lack of skilled labor are still supporting machine tool sales



MAJOR METALWORKING EQUIPMENT TYPES

Equipment Type	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
Machining Centers	1,370,263,514	1,692,451,742	2,798,197,458	2,657,677,070	3,028,744,260	3,625,578,078
Turning Centers	448,061,571	678,324,820	1,253,836,655	1,291,956,320	776,853,640	1,300,455,194
Lathes	708,698,880	498,577,646	1,315,722,068	1,511,390,345	1,113,576,132	1,116,383,396
Grinding	204,331,180	130,451,475	290,170,275	427,256,387	368,568,652	525,819,809
Screw Machines	76,327,403	103,345,524	72,384,306	74,951,959	83,795,656	174,873,860
EDM	35,438,192	49,422,750	53,327,120	97,800,715	94,427,191	154,210,548
Additive	0	0	0	45,128,326	43,324,990	42,450,701
Other Metalworking	369,699,073	556,601,368	538,000,481	690,274,384	753,785,923	502,441,361
Total Metalworking Equipment	3,212,819,813	3,709,175,324	6,321,638,363	6,796,435,506	6,263,094,444	7,442,212,948

- Machining centers will account for nearly 50% of all machine tool spending
- Turning centers and screw machines will nearly double
- Horizontal machines continue to be strongly preferred relative to vertical machines
- Grinding and EDM are up significantly over any previous year



MAJOR WORKHOLDING PROCESSES

<u>Workholding Process</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
Milling/Drilling	757,865,527	872,944,292	962,225,922	1,211,783,349	1,162,785,487	871,411,437
Turning	379,012,158	442,700,563	610,466,767	604,467,144	710,009,569	309,852,017
Grinding	100,487,650	111,680,766	103,178,736	104,567,004	136,626,818	62,921,759
EDM	16,611,757	17,754,761	21,755,874	25,874,020	57,013,911	33,972,567
Other Workholding	76,459,020	165,886,258	98,030,006	194,395,808	256,250,484	132,788,514
Total Workholding	1,330,436,112	1,610,966,640	1,795,657,304	2,141,087,325	2,322,686,269	1,410,946,295

- Grinding and turning chucks and other grinding and turning are down significantly (perhaps because of methodology)
- Fixture spending is down significantly



MAJOR TOOLING TYPES

Tooling Type	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
Milling Tools	342,637,033	422,536,801	573,195,760	596,804,173	460,704,008	1,116,979,334
Drills	284,663,193	317,409,774	419,533,173	490,824,047	382,350,073	606,733,733
Rotary Tool Inserts	398,899,706	654,321,424	760,205,356	668,131,629	514,044,564	287,028,969
Stationary Tool Inserts	452,568,873	670,283,640	804,290,333	879,574,372	651,131,274	284,577,890
Toolholders	185,543,512	171,120,646	258,207,845	285,278,120	280,800,199	255,681,614
Turning Tools	165,302,107	188,618,376	224,825,058	204,203,184	250,894,309	218,414,891
Grinding Wheels and Other Abrasives	61,358,304	200,036,821	148,395,385	99,512,432	126,130,053	182,307,880
Tool Presetters	0	0	0	0	46,256,906	35,038,604
Other Tooling	305,195,644	374,083,972	465,569,687	518,362,302	515,346,547	458,750,527
Total Tooling	2,196,168,373	2,998,411,454	3,654,222,597	3,742,690,258	3,227,657,933	3,445,513,531

- A major shift to milling tools and drills from rotary and stationary inserts
- Significant increase in grinding wheels and other abrasives



<u>Equipment Type</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
HMCs, <400 mm pallet	316,217,996	350,126,089	342,533,543	547,454,041	451,085,223	570,489,236
HMCs, 400-800 mm pallet	472,340,903	487,625,442	920,446,336	794,400,216	973,104,568	908,752,225
HMCs, >800 mm pallet	0	0	0	0	223,716,832	816,141,521
Total HMCs	791,558,899	837,751,531	1,262,979,879	1,341,854,256	1,647,906,623	2,295,382,983

- **HMCs, >800 mm pallet**
 - More than half of spending in job shops and more than 40% of that in industrial mold shops
 - Other key industries include forming and fabricating, machinery and equipment, and automotive
 - Four key regions – East North Central, Pacific, West North Central, and Middle Atlantic
 - Good spending in all plant sizes but more than 250 employees is the strongest
- **HMCs, <400 mm pallet**
 - Five industries with more than \$50 million forecast – metalcutting job shops, pumps, valves and plumbing products, primary metals, non-manufacturing, automotive
 - Significant increases in machinery and equipment and medical
 - East North Central nearly half of spending; big increases in East South Central, Mountain, and West North Central
 - More than 60% of spending in plants with more than 100 employees



<u>Equipment Type</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
VMCs, <20 in Y	314,102,395	458,078,821	811,281,559	602,650,918	868,138,996	634,691,298
VMCs, >20 in Y	264,602,220	396,621,389	723,936,020	713,171,895	512,698,641	695,503,798
Total VMCs	578,704,615	854,700,211	1,535,217,579	1,315,822,814	1,380,837,637	1,330,195,096

- VMCs, >20 in Y
 - 66% of spending from two industries – job shops and machinery and equipment
 - Other key industries include automotive, primary metals, other manufacturing, and forming and fabricating
 - More than 40% of spending from East North Central; East South Central much more than any other year
 - Half of spending at plants with fewer than 50 employees; huge increase at plants with more than 250 employees
- VMCs, <20 in Y
 - Job shops almost four times next largest industry, but job shops are down significantly from 2013
 - Construction machinery more than double any year since 2009; automotive and aerospace also key industries
 - Four important regions – East North Central, West North Central, Middle Atlantic, and Pacific
 - More than 55% of spending at plants with more than 100 employees; plants with fewer than 100 employees have dramatically lower spending



MILLING/DRILLING PROCESSES

Workholding Process	2009	2010	2011	2012	2013	2014
Automated Systems and Transfer Lines	72,195,629	62,268,733	67,567,994	67,716,909	74,039,423	154,108,146
Dedicated Fixtures	319,023,795	478,651,973	462,083,318	482,705,247	488,067,131	335,078,455
Flexible Fixtures	145,982,108	128,008,385	185,714,226	202,151,096	279,704,199	105,327,349
Indexing Devices	97,735,764	90,908,313	90,712,874	117,391,176	104,542,304	56,639,242
Other Milling/Drilling Processes (in. robots)	61,574,355	69,346,811	88,964,417	284,607,454	129,519,245	117,836,682
Pallets and Pallet-Handling Devices	61,353,876	43,760,078	67,183,092	57,211,468	86,913,185	102,421,564
Total Milling/Drilling	757,865,527	872,944,292	962,225,922	1,211,783,349	1,162,785,487	871,411,437

- **Automated Systems and Transfer Lines**

- Five industries count for nearly all the spending – automotive, forming and fabricating, medical, primary metals, and job shops
- East North Central about 67% of forecast
- Only other regions planning to spend are Pacific, West North Central, and Middle Atlantic
- 75% of the spending is in plants with more than 100 employees

- **Pallets and Pallet-Handling Devices**

- Job shops up significantly and account for 40% of the total
- Also up significantly are medical, automotive, and aerospace
- East North Central, Pacific, and Middle Atlantic have even spending and make up 60% of the total
- Plants with more than 100 employees are 60% of the spending



Tooling Type	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
HSK Toolholders	19,383,326	15,634,249	36,522,233	48,352,524	38,945,787	73,321,737
Other Milling Toolholders	21,733,248	13,150,967	27,698,561	13,313,921	29,754,127	92,085,189
Traditional V-Flange Toolholders	144,426,938	142,335,430	193,987,052	223,611,674	212,100,285	90,274,688
Total Milling Toolholders	185,543,512	171,120,646	258,207,845	285,278,120	280,800,199	255,681,614

- **Other Milling Toolholders**
 - Job shops and machinery and equipment are about 50% of the forecast
 - Other significant industries include aerospace, automotive, forming and fabricating and electronics
 - Five regions with more than \$10 million in spending – East North Central, Middle Atlantic, Pacific, East South Central, and South Atlantic
 - Spending evenly spread across plant sizes
- **HSK Toolholders**
 - Job shops, electronics, and forming and fabricating have equal spending and account for half of forecast
 - Other important industries are machinery and equipment and pumps, valves and plumbing products
 - Noteworthy growth in the top three regions – East North Central, Middle Atlantic, and East South Central
 - 80% of the spending in plants with more than 100 employees



<u>Tooling Type</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
Rotary Tool Inserts, carbide	333,068,652	555,479,345	645,331,870	574,692,500	413,314,500	201,273,051
Rotary Tool Inserts, CBN or diamond film	12,910,942	30,547,736	48,191,159	34,125,383	23,936,568	41,031,357
Rotary Tool Inserts, ceramic	32,234,532	29,569,772	29,544,026	30,693,049	34,126,555	20,408,459
Rotary Tool Inserts, cermet	8,061,758	18,193,383	9,728,222	13,092,803	18,373,184	5,796,847
Rotary Tool Inserts, other	12,623,823	20,531,188	27,410,080	15,527,894	24,293,758	18,519,255
Total Rotary Tool Inserts	398,899,706	654,321,424	760,205,356	668,131,629	514,044,564	292,403,484

- Rotary Tool Inserts, carbide
 - Job shops are more than 1/3 of the spending
 - Virtually every industry is contributing to the decline; aerospace and oil, gas-field and mining machinery are exceptions
 - East North Central more than 1/3 of the spending; every regions is down from 2013
 - Even spending across all plant sizes
- Rotary Tool Inserts, CBN or diamond film
 - Five industries with more than \$4 million in spending – job shops, machinery and equipment, custom processors, automotive, and oil, gas-field and mining machinery
 - East North Central and Middle Atlantic are 50% of the spending
 - Also good growth in South Atlantic and Pacific
 - Most spending and growth in plants with more than 100 employees



Tooling Type	2009	2010	2011	2012	2013	2014
High-Speed Steel Cutters	61,847,699	69,679,970	94,130,583	123,691,153	70,209,408	305,930,377
Indexable Cutters	116,698,890	113,786,607	191,614,117	159,987,670	162,589,877	202,874,619
Other Cutters	6,050,507	16,505,326	19,864,612	11,122,345	20,033,767	140,354,115
Solid Carbide Cutters	158,039,937	222,564,898	267,586,448	302,003,005	207,870,956	467,820,223
Total Milling Tools (ex. Inserts)	342,637,033	422,536,801	573,195,760	596,804,173	460,704,008	1,116,979,334

- **Solid Carbide Cutters**

- Job shops will account for 30% of spending
- Really strong growth in forming and fabricating, pumps, valves and plumbing products, aerospace, automotive, and electronics
- East North Central nearly double all other regions; strong growth in all regions except Mountain and West North Central
- Most significant and fastest growing plant sizes are less than 19 employees and more than 250 employees

- **High-Speed Steel Cutters**

- Job shops and aerospace nearly equal spending, more than half of the total, and huge growth
- Other important industries are machinery and equipment, automotive, pumps, valves and plumbing, and forming and fabricating
- Almost 80% of the spending is in the Pacific, East North Central, and Middle Atlantic regions
- Almost half of the spending at plants with more than 250 employees



Tooling Type	2009	2010	2011	2012	2013	2014
High-Speed Steel Drills	95,395,361	125,219,083	146,052,835	165,043,785	109,307,856	218,027,719
Indexable Drills	39,025,481	37,833,022	70,949,009	65,048,439	68,315,807	100,668,982
Other Drills	5,005,870	9,999,559	13,267,026	28,783,859	12,328,942	58,208,291
Solid Carbide Drills	128,475,090	119,658,530	161,902,734	207,315,246	164,037,587	183,047,861
Spade Drills (in. blades)	16,761,391	24,699,580	27,361,569	24,632,718	28,359,880	46,780,880
Total Drills	284,663,193	317,409,774	419,553,173	490,824,047	382,350,073	606,733,733

- **High-Speed Steel Drills**

- Job shops more than 33% of forecast and almost three times any year since 2009
- Automotive more than double any previous year since 2009
- Other key industries are primary metals, forming and fabricating, and machinery and equipment
- East North Central 33% of forecast; all regions growing except Mountain and West North Central
- Close to 60% of spending in plants with more than 100 employees; fastest growing segment too

- **Indexable Drills**

- Job shops almost 50% of spending and three times any year since 2009
- Pumps, valves and plumbing, machinery and equipment, and automotive also key
- Five regions account for bulk of spending – East North Central, West South Central, Middle Atlantic, West North Central and Pacific
- Fairly even spending across plant sizes but plants with fewer than 100 employees growing while larger plants are declining



<u>Equipment Type</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
TCs, horizontal, CNC, <10 in chuck	216,010,265	365,800,837	708,421,771	643,007,423	464,166,052	652,323,098
TCs, horizontal, CNC, >10 in chuck	153,064,814	143,609,148	352,342,897	532,133,234	250,007,950	535,687,818
TCs, vertical, CNC	78,986,491	168,914,836	193,071,987	116,815,663	62,679,638	112,444,278
Total Turning Centers	448,061,571	678,324,820	1,253,836,655	1,291,956,320	776,853,640	1,300,455,194

- **TCs, horizontal, CNC, >10 in chuck**
 - Job shops will nearly double to almost half of the projected spending
 - Oil, gas field and mining roughly five times any previous year; will make up a little more than 20% of spending
 - Growing industries include medical, automotive, and industrial motors, hydraulics and mechanical components
 - More than 85% of projected spending is in East North Central and West South Central; Middle Atlantic growing
 - Strong growth in every plant size except 20-49 employees
- **TCs, horizontal, CNC, <10 in chuck**
 - More than 33% of spending will be by job shops; spending will be about 20% more than any year since 2008
 - Other significant and growing industries are machinery and equipment, oil, electronics, medical, industrial motors, hydraulics and mechanical components, and military
 - Automotive and aerospace down significantly
 - Spending well distributed through all regions except East South Central
 - Spending well spread but strongest growth in shops with fewer than 50 employees

Equipment Type	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
Lathes, horizontal, CNC, <10 in chuck	248,644,865	263,785,868	544,044,437	642,318,668	601,911,422	685,975,219
Lathes, horizontal, CNC, >10 in chuck	264,062,192	112,844,820	444,497,841	475,050,881	407,319,689	276,295,074
Lathes, manual	52,816,083	60,272,570	106,684,713	105,594,408	64,699,419	39,553,422
Lathes, vertical, CNC	143,155,740	61,674,387	218,495,077	288,426,388	39,645,602	114,559,681
Total Lathes	928,852,674	607,451,047	349,822,424	1,026,943,488	1,039,112,972	963,131,996

- **Lathes, horizontal, CNC, <10 in chuck**
 - Job shops and automotive will be almost 45% of the market; both down slightly but still strong
 - Strong growth from electronics, computers and telecommunications, medical, custom processors, military, and pumps, valves and plumbing
 - Top three regions, East North Central, West North Central, and Pacific, will account for almost 75% of the spending
 - Most significant growth in plants with more than 250 employees and 20-49 employees
- **Lathes, vertical, CNC**
 - Aerospace (aircraft engine and engine parts) will be nearly 30% of the spending; industry is up significantly
 - Spending also strong in automotive, pumps, valves and plumbing, machinery and equipment, and primary metals; all have significant increases over 2013
 - Top three regions are West South Central, West North Central, and New England
 - Virtually all of the forecast is in plants with more than 100 employees



Equipment Type	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
Screw machines, Swiss-type, CNC						96,493,984
Screw machines, Swiss-type, automatic						19,439,555
Screw machines, multi-spindle, CNC						33,795,225
Screw machines, multi-spindle, CAM						12,041,997
Screw machines, single-spindle, CNC						12,939,378
Screw machines, single-spindle, CAM						163,719
Total Screw Machines	76,327,403	103,345,524	72,384,306	74,951,959	83,795,656	174,873,860

- Screw machines, Swiss-type, CNC
 - Nearly 55% of spending will be by job shops
 - Other significant industries include electronics, forming and fabricating, aerospace, and medical
 - East North Central, Pacific, New England, South Atlantic, and Middle Atlantic all with more than \$10 million
 - Spending is fairly well distributed throughout plant sizes
- Screw machines, multi-spindle, CNC
 - Virtually all spending will come from electronics and job shops
 - West South Central will be slightly more than 50% of all spending
 - Roughly 66% of spending will be in plants with more than 250 employees



Workholding Process	2009	2010	2011	2012	2013	2014
Bar Feeders	45,695,812	55,318,592	54,029,857	78,872,871	103,663,135	139,857,319
Chucks	135,331,405	172,066,113	236,948,729	222,147,540	252,712,247	79,123,584
Turning Work Load/Unload Devices (in. robots)	0	0	0	0	0	42,258,580
Other Turning Workholding	197,984,942	215,315,858	319,488,180	303,446,733	353,634,187	48,612,535
Total Turning	379,012,158	442,700,563	610,466,767	604,467,144	710,009,569	309,852,017

- **Bar Feeders**

- Job shops are a little more than 40% of the projected spending and are up 50% from 2013
- Significant and growing industries include medical, machinery and equipment, and forming and fabricating
- Electronics and automotive are also important
- Middle Atlantic and East North Central almost equal and more than 50% of projection
- West North Central and South Atlantic also important
- Spending evenly distributed across plant sizes



TURNING TOOLS (EX. INSERTS)

Tooling Type	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
Boring Tools	48,423,069	55,767,151	86,518,473	70,288,969	76,523,378	95,700,780
Form/Special Tools	41,010,626	47,820,759	34,013,845	44,430,860	39,432,414	53,093,122
OD/Facing Tools	75,868,412	85,030,466	104,292,740	89,483,354	134,938,518	69,621,079
Total Turning Tools (ex. Inserts)	201,388,011	154,990,859	168,128,507	186,204,307	187,037,813	268,609,940

- **Boring Tools**

- Job shops will more than double their spending to almost 50% of total
- Pumps, valves and plumbing will more than double their spending to almost 15% of total
- Automotive and machinery and equipment are also important
- Three regions to focus on are East North Central, Middle Atlantic, and West South Central; all up significantly
- Strongest spending and growth in plants with fewer than 100 employees

- **Form/Special Tools**

- Job shops will account for 60% of spending; nearly three times spending from previous three years
- Also focus on pumps, valves and plumbing and electronics
- Nearly half of projection is in East North Central and Middle Atlantic is almost 20% of projection
- Almost 50% of spending is in plants with 100-249 employees



Tooling Type	2009	2010	2011	2012	2013	2014
Stationary Tool Inserts, carbide	353,227,527	520,862,977	630,037,354	714,424,361	466,366,307	244,787,763
Stationary Tool Inserts, CBN or diamond film	26,903,785	55,084,097	79,818,255	63,108,895	67,238,212	15,247,938
Stationary Tool Inserts, ceramic	48,251,912	50,456,108	54,078,259	56,986,571	56,213,105	12,635,212
Stationary Tool Inserts, cermet	11,543,314	27,571,452	17,558,908	33,242,143	25,415,016	7,998,639
Stationary Tool Inserts, other	12,642,334	16,489,007	22,797,556	11,812,402	35,898,633	3,908,337
Total Stationary Tool Inserts	452,568,873	670,283,640	804,290,333	879,574,372	651,131,274	284,577,890

- Stationary Tool Inserts, carbide

- Job shops a little more than 33% of spending but only 33% of its total from two years ago
- Pumps, valves and plumbing more than double 2013; just over 15% of projected spending
- Aerospace, machinery and equipment, and industrial motors also important
- East North Central about 33% of forecast but down significantly
- Middle Atlantic and West South Central are significant and growing
- Spending relatively evenly distributed but all plant sizes are declining



Equipment Type	2009	2010	2011	2012	2013	2014
Grinding, centerless	14,616,375	17,507,899	22,472,650	66,462,149	35,719,563	33,505,564
Grinding, creep feed	1,853,081	0	1,531,145	76,181,557	54,883	53,341,253
Grinding, cylindrical/external	46,068,459	14,076,161	24,968,280	65,569,057	141,127,665	77,788,572
Grinding, flat/surface	50,868,769	17,714,260	103,028,242	98,781,548	81,742,428	77,177,930
Grinding, ID/OD	48,377,449	41,682,481	98,335,899	59,655,939	73,663,599	85,171,713
Grinding, internal	7,459,414	22,081,873	10,076,877	7,053,805	14,021,080	31,185,550
Grinding, other	35,087,634	17,388,801	29,757,183	53,552,331	22,257,434	167,649,228
Total Grinding	204,331,180	130,451,475	290,170,275	427,256,387	368,586,652	525,819,809

- Grinding, other
 - Just over half of spending from machinery and equipment; HVAC and job shops also important
 - East North Central more than half of spending; West North Central and Middle Atlantic also important
 - Nearly half of spending in plants with more than 250 employees
- Grinding, ID/OD
 - Virtually all spending in job shops and machinery and equipment
 - Virtually all spending in East North Central and New England
 - Spending split between shops with 20-49 employees and more than 100 employees
- Grinding, creep feed
 - Virtually all spending from machinery and equipment
 - Virtually all spending from East North Central
 - Virtually all spending in plants with 20-49 employees



GRINDING WORKHOLDING AND TOOLING

<u>Workholding Process/Tooling Type</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
Grinding Work Load/Unload Devices	33,346,009	21,581,502	18,453,988	21,629,714	34,042,566	22,320,047
Other Grinding Workholding	46,922,695	64,013,510	53,181,864	59,856,397	68,616,502	33,906,020
Rotating Chucks	20,218,946	26,085,754	31,542,884	23,080,892	33,967,750	6,695,693
Total Grinding Processes	100,487,650	111,680,766	103,178,736	104,567,004	136,626,818	62,921,759
Grinding Wheels and Other Abrasives	61,358,304	200,036,821	148,395,385	99,512,432	126,130,053	182,307,880

- **Grinding Wheels and Other Abrasives**

- Roughly half of spending by job shops and machinery and equipment; both up significantly from last three years
- Pumps, valves and plumbing and industrial motors also strong and nearly double any previous year
- Close to half of spending from East North Central and close to three times previous three years
- Other regions are relatively evenly distributed
- Spending nearly perfectly distributed across plant sizes but plants with 20-249 employees significantly increasing



<u>Equipment/Tooling Type</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
EDM, ram type	6,312,952	6,053,973	6,804,553	19,290,459	13,305,783	41,006,240
EDM, small hole	9,559,366	9,811,909	4,360,173	5,300,387	32,400,200	21,945,109
EDM, wire type	19,565,874	33,556,868	42,162,394	73,209,869	48,721,208	91,259,199
Total EDM	35,438,192	49,422,750	53,327,120	97,800,715	94,427,191	154,210,548
EDM Tooling	16,611,757	17,754,761	21,755,874	25,874,020	57,013,911	33,972,567

- EDM, wire type
 - Job shops will be half of all spending, which is more than double 2013
 - Other important and growing industries include oil, gas field and mining, electronics, and aerospace
 - More than 66% of spending will be in West South Central, East North Central, and South Atlantic
 - Most spending and growth will be at plants with less than 19 employees and more than 250 employees
- EDM, ram type
 - Job shops will account for more than 60% of the spending, which is about three times any year since 2008
 - Other industries to watch include oil, gas field and mining, electronics, aerospace, and medical
 - More than 80% of spending will be East North Central, New England, and West South Central
 - Good spending in all plant sizes except 50-99 employees



OTHER METALCUTTING EQUIPMENT

Equipment Type	2009	2010	2011	2012	2013	2014
Broaching	2,125,138	4,282,071	3,369,151	3,952,840	7,399,761	5,564,283
Drilling/Tapping	63,296,892	102,963,543	90,386,175	99,153,886	98,527,296	175,015,411
Gear Cutting	14,072,954	22,179,579	82,287,954	22,899,409	106,559,964	6,239,045
Laser Cutting	15,981,774	18,546,194	9,110,269	63,577,318	13,061,811	66,154,596
Rotary Transfer	936,169	2,207,430	27,091,417	14,752,512	27,949,160	1,431,811
Sawing/Cutoff	69,003,794	40,509,780	72,117,282	71,169,175	89,572,416	100,470,985
Transfer & Special Purpose	23,410,245	17,389,338	34,787,834	69,719,756	57,673,867	129,113,967
Waterjet Machines	4,347,747	10,061,804	19,147,721	24,875,266	12,000,912	13,493,055
Total Other Metalcutting	369,699,073	556,601,368	538,000,481	690,274,384	753,785,923	502,441,361

- **Drilling/Tapping**
 - Nearly 50% of the spending will be in job shops and pumps, valves and plumbing; both are up from virtually nothing in 2013
 - Also noteworthy spending in medical and automotive
 - Almost 66% of the spending will be in East North Central and West South Central; South Atlantic and New England up
 - Spending up significantly in plants with more than 100 employees
- **Transfer & Special Purpose**
 - More than 50% of the forecast is from automotive, which is up significantly from previous years
 - Noteworthy spending in custom processors, job shops, and medical
 - Almost half of the spending is from the South Atlantic and the East North Central is just over 25%
 - Approximately 80% of the spending will be in plants with more than 250 employees



METALCUTTING SPENDING — TOP INDUSTRIES

Industry	2009	2010	2011	2012	2013	2014
Metalcutting Job Shops	902,698,085	1,110,440,333	1,914,405,085	1,781,051,769	1,887,817,581	2,573,335,023
Machinery and Equipment Manufacturing	407,182,583	186,576,853	977,477,545	840,735,182	548,100,804	821,154,914
Automotive	439,026,196	249,024,726	487,495,759	770,078,513	1,051,500,292	646,501,020
Electronics, Computers, and Telecommunications	165,112,306	133,686,490	350,769,182	346,440,572	195,367,399	442,468,806
Pumps, Valves, and Plumbing Products	159,266,777	298,401,312	163,816,071	932,065,553	187,951,451	420,125,230
Medical	119,876,218	35,748,927	214,375,694	137,207,294	99,224,330	304,419,609
Forming and Fabricating (non-auto)	161,333,859	468,025,454	473,082,142	554,571,878	430,390,901	281,868,908
Oil, Gas-Field and Mining Machinery	110,622,485	263,326,894	34,715,045	35,297,293	111,149,848	270,933,249
Primary Metals	7,598,626	917,663	2,311,038	0	260,976,691	265,085,795
Aerospace	160,032,758	353,986,366	905,773,618	378,310,496	560,756,731	193,018,361
Industrial Motors, Hydraulics, and Mechanical Comp.	97,809,835	159,425,608	464,568,316	378,612,536	30,739,450	169,153,413
Off-Road and Construction Machinery	110,718,170	81,846,531	60,237,438	217,125,250	97,505,064	141,381,922
Custom Processors	0	7,961,906	0	0	23,561,254	133,875,272
Military	12,777,740	14,429,931	93,621,176	10,555,995	111,237,192	78,157,106
Petrochemical Processors	0	1,706,123	0	0	8,902,744	68,023,446
HVAC	38,056,961	11,645,682	42,193,567	81,181,899	12,471,516	58,679,353
Plastics and Rubber	0	0	1,124,628	0	27,973,334	28,808,041
Power Generation	133,990,199	110,790,734	5,416,786	193,445,651	0	14,287,235



WORKHOLDING SPENDING — TOP INDUSTRIES

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Industry	2009	2010	2011	2012	2013	2014
Metalcutting Job Shops	256,171,775	409,097,655	390,362,408	474,292,815	755,275,444	369,725,870
Automotive	174,538,178	117,756,099	131,498,649	269,471,507	160,571,374	198,072,568
Medical	15,818,151	109,464,032	40,145,315	283,092,637	62,218,763	124,703,102
Electronics, Computers, and Telecommunications	96,021,043	37,080,624	93,243,491	19,761,663	523,432,804	110,171,410
Machinery and Equipment Manufacturing	313,456,392	204,270,922	112,355,083	423,026,937	242,037,101	97,510,475
Forming and Fabricating (non-auto)	87,144,541	42,425,757	66,542,654	49,833,817	119,234,875	90,401,438
Off-Road and Construction Machinery	33,307,981	35,404,864	95,470,594	51,856,016	24,854,857	67,884,044
Primary Metals	25,770,561	13,630,079	100,030,384	14,388,267	627,605	54,655,655
Pumps, Valves and Plumbing Products	85,027,209	57,369,641	93,843,567	37,910,233	107,138,969	48,599,112
Aerospace	86,668,427	97,647,102	177,503,285	297,053,028	105,945,033	44,353,679
Oil, Gas-Field, and Mining Machinery	9,039,546	127,588,483	22,794,135	8,589,143	8,220,255	38,803,705
Industrial Motors, Hydraulics, and Mechanical Comp.	29,837,861	101,821,231	116,777,773	66,938,578	63,519,608	30,315,815
Custom Processors	37,239,591	17,258,201	63,741,013	49,249,413	553,861	9,197,810
HVAC	5,617,788	91,787,754	6,907,853	7,971,197	14,334,497	8,905,892
Hardware	4,498,366	65,793,313	43,632,510	14,701,111	22,005,106	7,889,607
Power Generation	17,984,017	13,724,489	5,264,409	20,071,332	27,722,517	7,811,839
Appliances	62,438	5,169,912	22,243,550	718,094	0	3,863,991
Petrochemical Processors	7,883,713	12,257,013	4,615,053	20,211,289	12,795,146	3,647,986

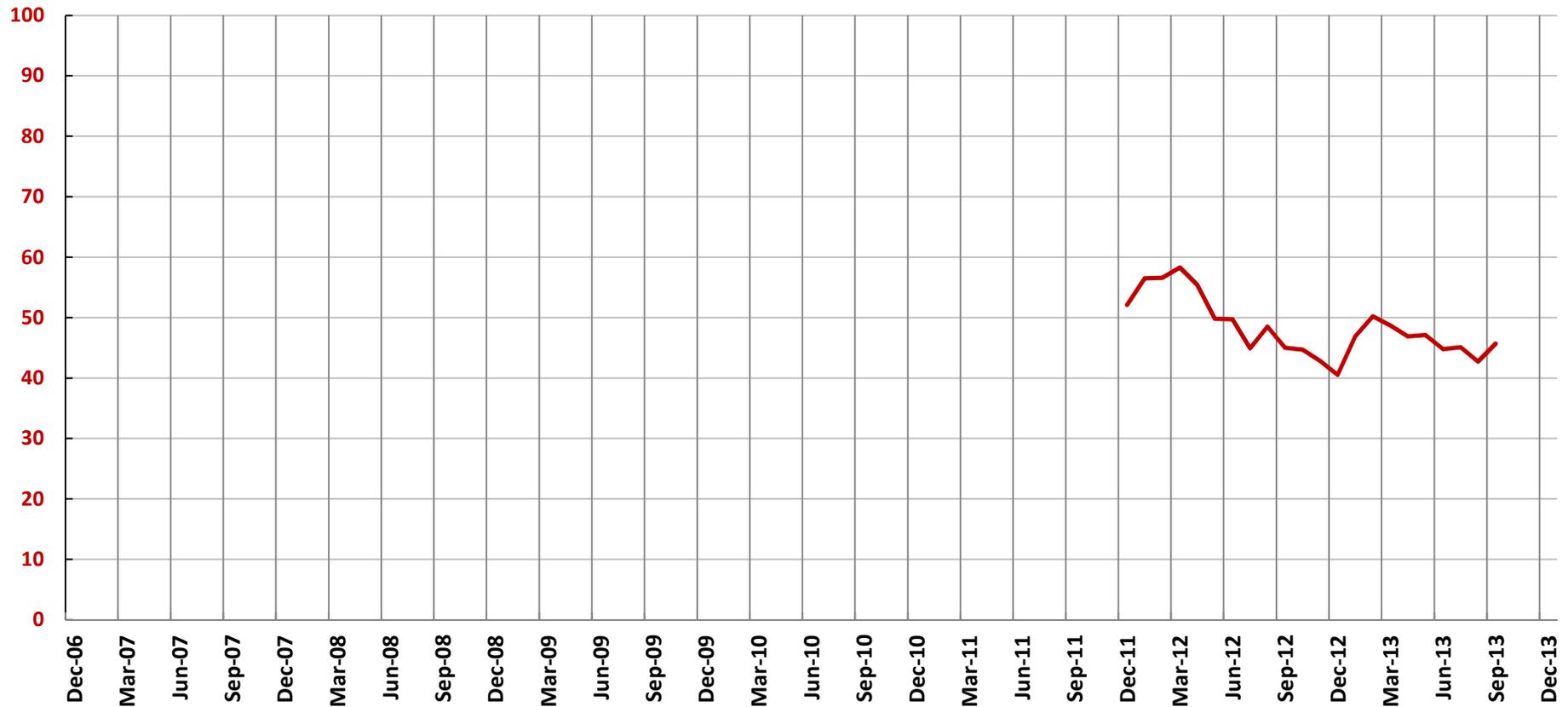


TOOLING SPENDING — TOP INDUSTRIES

Industry	2009	2010	2011	2012	2013	2014
Metalcutting Job Shops	574,666,167	787,785,132	694,962,816	1,092,709,190	940,593,951	1,179,656,795
Machinery and Equipment Manufacturing	203,874,619	408,431,580	359,109,327	598,698,248	470,985,059	304,013,855
Pumps, Valves, and Plumbing Products	186,006,223	123,062,342	368,342,926	187,300,794	158,687,019	262,258,086
Aerospace	110,227,262	144,939,281	451,042,998	415,218,555	157,936,508	254,011,276
Automotive	292,374,900	263,061,476	251,552,948	354,165,196	243,486,026	247,886,976
Forming and Fabricating (non-auto)	129,460,659	176,760,869	182,541,647	162,687,348	132,798,719	213,275,740
Electronics, Computers, and Telecommunications	134,207,457	176,804,878	204,600,444	87,677,550	347,221,142	132,251,548
Industrial Motors, Hydraulics, and Mechanical Comp.	71,906,615	154,208,322	224,041,075	75,907,807	175,082,853	120,247,441
Medical	27,932,553	154,368,175	47,011,961	213,270,570	224,568,997	99,070,477
Oil, Gas-Field, and Mining Machinery	76,825,058	106,021,156	124,672,698	23,800,100	30,369,900	71,228,597
Primary Metals	33,915,333	43,496,165	32,200,523	25,574,627	612,856	51,788,416
Off-Road and Construction Machinery	15,621,869	103,681,389	148,836,080	81,321,812	88,574,311	49,079,273
Custom Processors	131,334,810	66,433,884	64,600,866	65,976,225	359,900	27,829,393
Printing	1,444,621	0	0	0	1,150,608	19,214,526
HVAC	14,495,491	47,333,748	3,007,205	40,734,579	37,570,411	16,732,959
Hardware	12,359,648	99,914,013	100,370,366	23,650,955	30,921,972	15,131,503
Plastics and Rubber	13,667,867	22,548,241	15,845,643	16,223,954	8,296,522	14,715,091
Petrochemical Processors	8,124,563	10,046,918	10,561,086	43,256,767	69,626,232	10,378,884



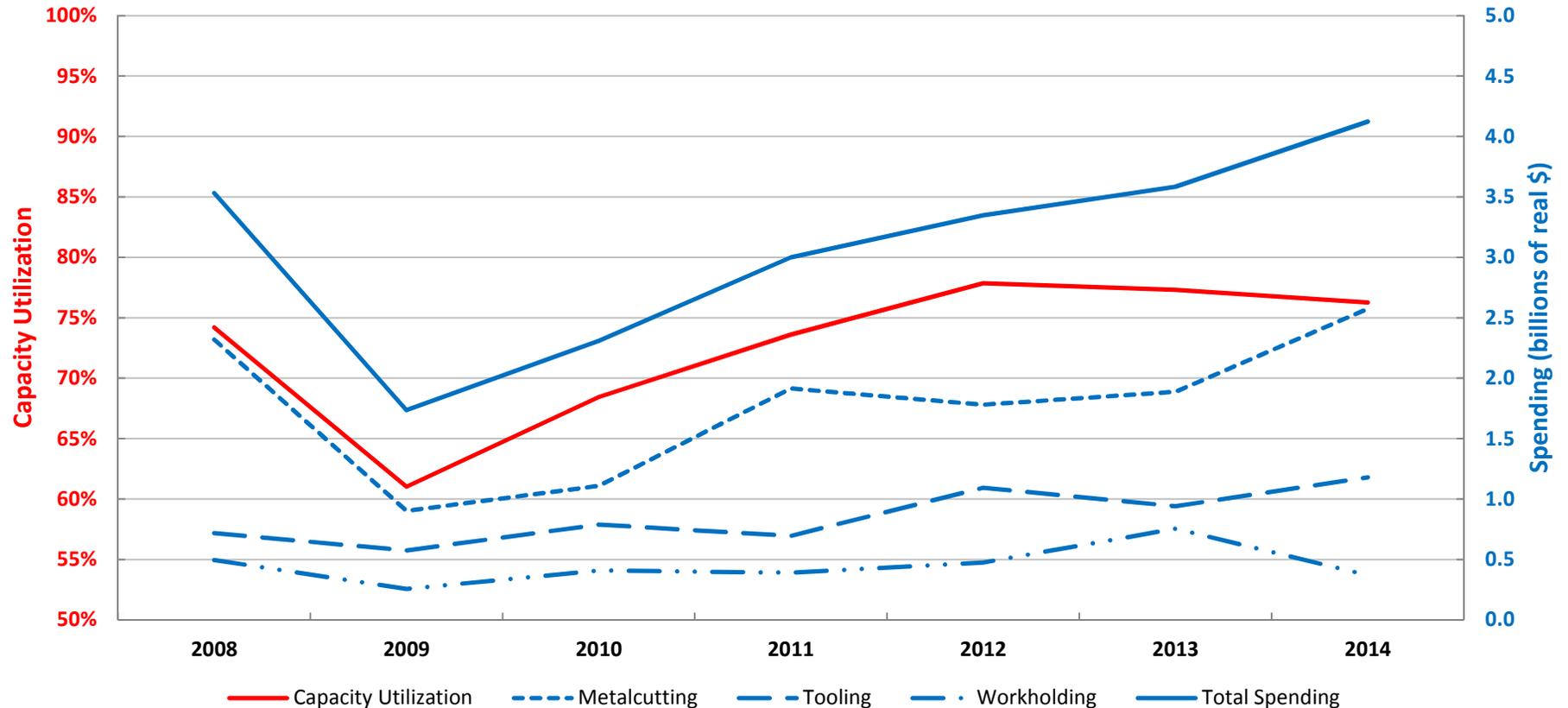
METALCUTTING JOB SHOPS BUSINESS INDEX



- Job shops have had tougher business conditions than dedicated manufacturers throughout 2013
- Smaller shops have contracted faster than larger shops



JOB SHOPS – CAPACITY UTILIZATION VS. SPENDING



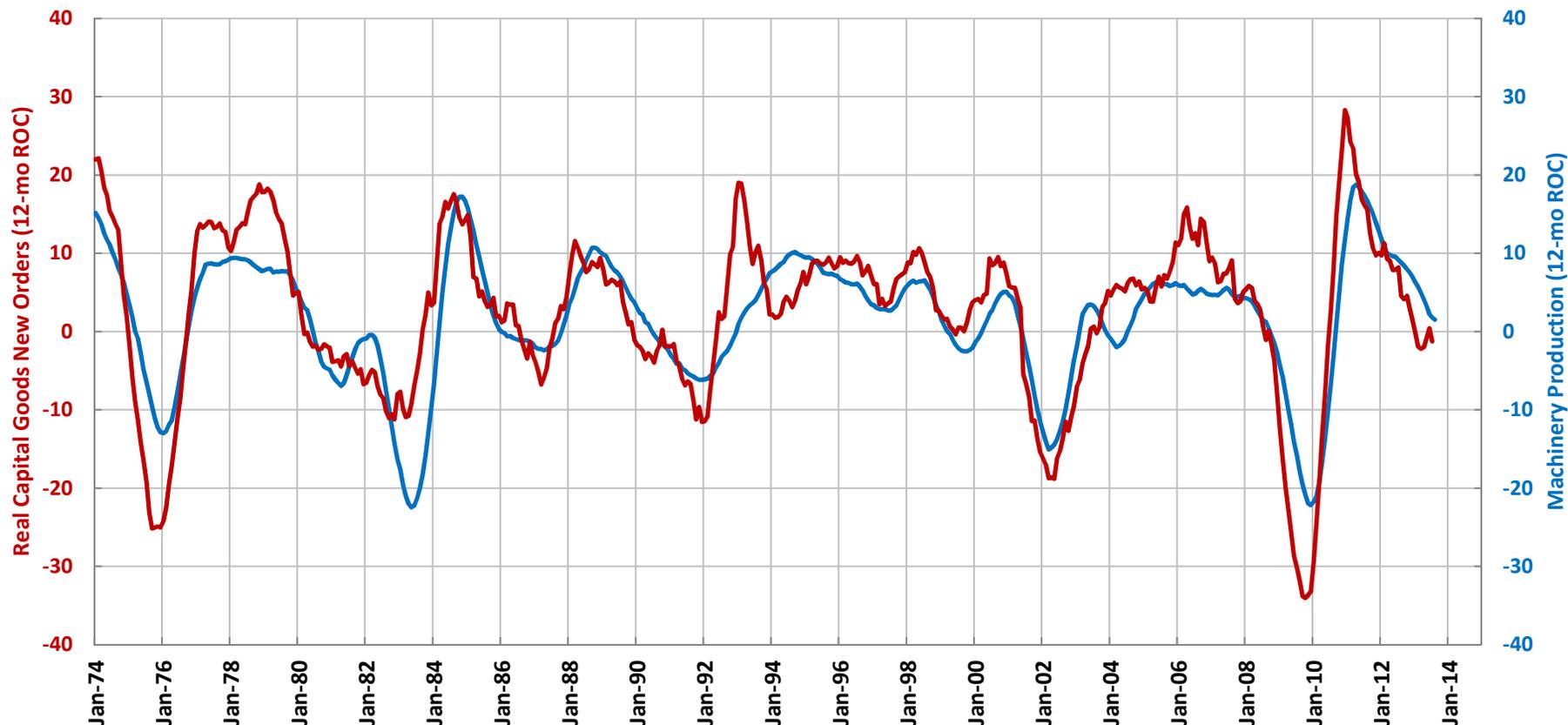
- General machine shops make up slightly more than 70% of spending
- Spending by industrial mold shops will be almost three times higher than 2013
- 60% of spending will be in shops with fewer than 50 employees
- Nearly 50% of the spending will be in the East North Central



- **Equipment**
 - HMCs (particularly >800 mm pallet) will increase nearly 100% and account for roughly 35% of projected spending on machine tools
 - Turning centers will more than double from 2013; most spending on horizontals
 - Screw machines will be almost three times higher in 2014; more than half of the spending will be on Swiss-type CNC
 - Horizontal CNC lathes with a greater than a 10 in chuck will nearly double
 - Grinding will nearly double with about 40% of the spending on ID/OD
 - EDM is on a noticeable uptrend – emphasis on wire type EDM in 2014
 - Laser sintering machines for additive manufacturing still small but three times higher than 2013
- **Workholding**
 - Spending on automated systems and pallets and pallet handling devices up significantly
 - Bar feeders will nearly double
- **Tooling**
 - Spending on milling tools such as solid carbide cutters will more than double any year since at least 2008
 - Drill spending will be almost three times higher than any other year since at least 2008
 - Inserts spending down somewhat from 2013 and less than half of 2012



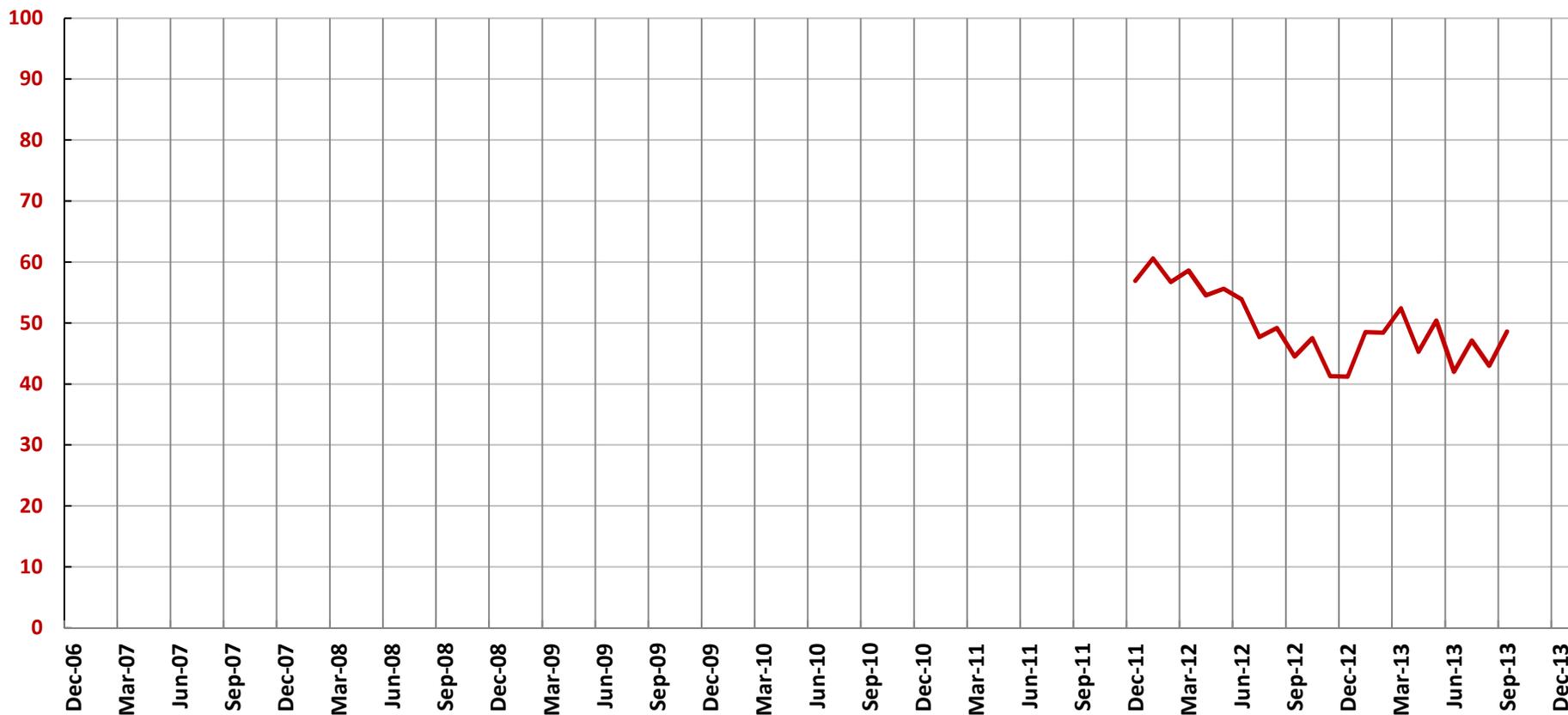
CAPITAL GOODS NEW ORDERS LEADS MACHINERY PRODUCTION



- Capital goods new orders have grown three of the last four months
- Continued improvement in capital goods new orders could signal faster growth in machinery production



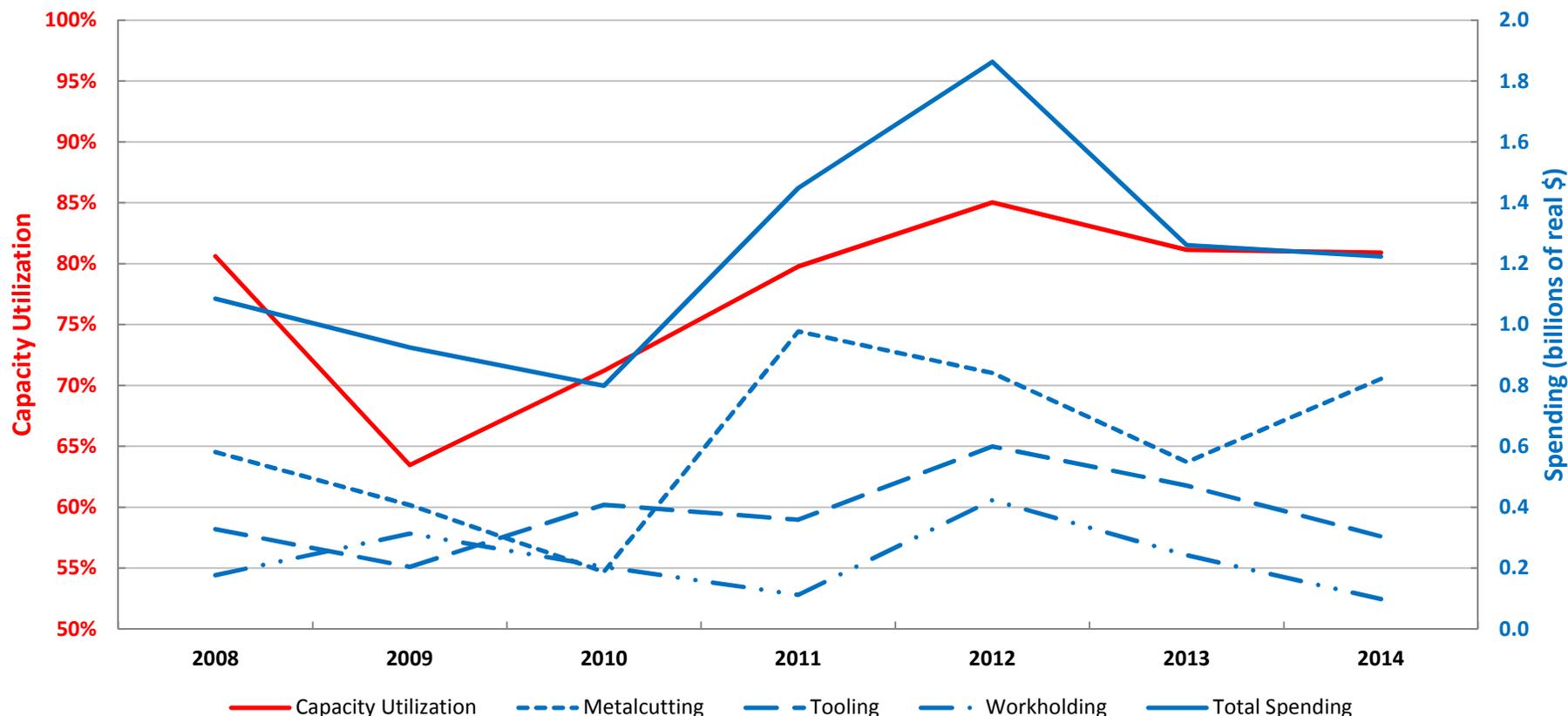
MACHINERY AND EQUIPMENT BUSINESS INDEX



- Since June, the contraction at machinery and equipment manufacturers has slowed
- New orders improved significantly in September



MACHINERY & EQUIPMENT – CAPACITY UTILIZATION VS. SPENDING



- Equipment spending remains strong as capacity utilization has leveled off
- Growth is in metal forming machines and cutting tool manufacturers
- Almost half of spending will be in plants with more than 100 employees
- Regional focus on East North Central, Middle Atlantic, and West South Central

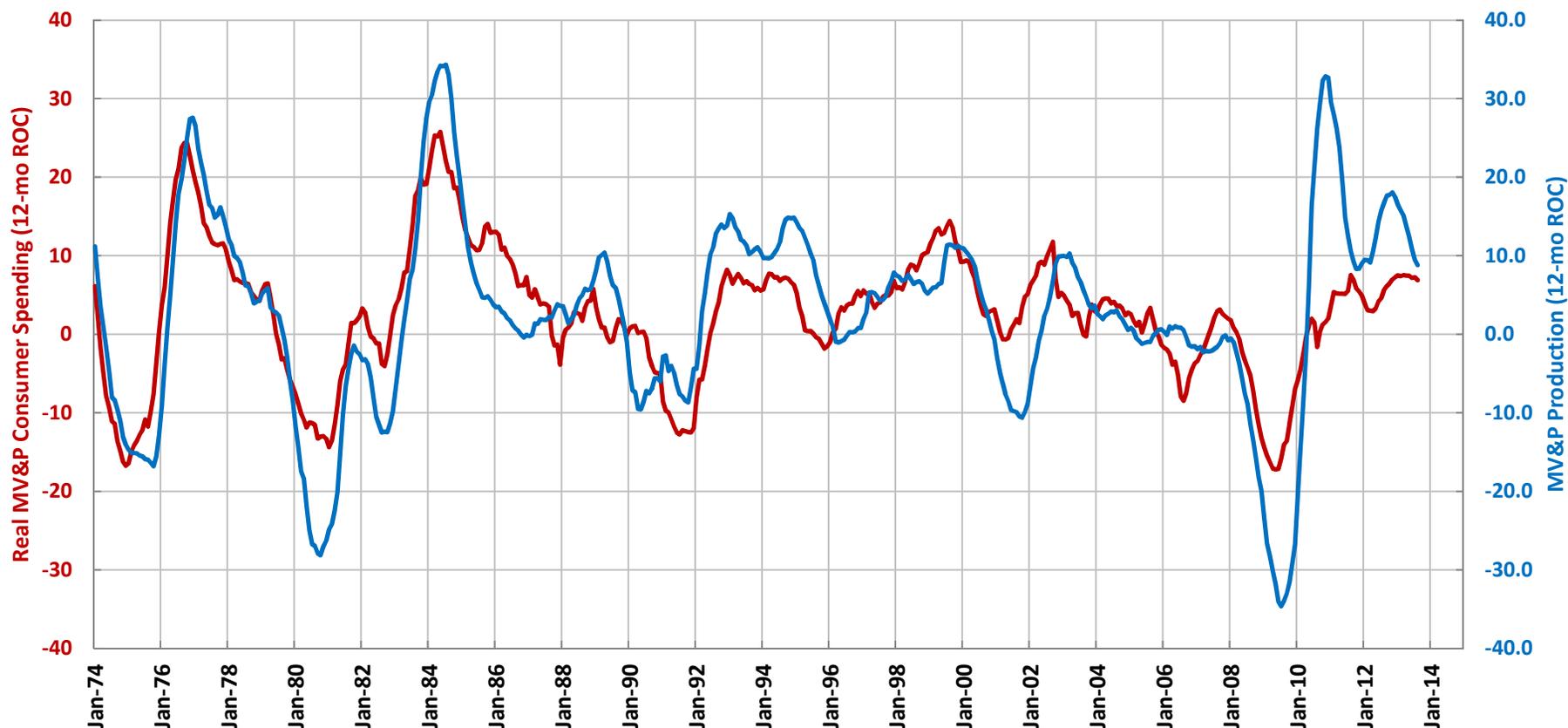


- **Equipment**
 - Spending on machining centers will double in 2014; strong growth in all HMCs and large VMCs
 - Grinding up nearly three times over 2013 and most in any year since at least 2008; strong growth in creep feed and ID/OD
 - Horizontal turning centers up about 33%
 - Significant spending in small hole EDM
- **Workholding**
 - Still strong spending on flexible fixtures
 - Relatively good spending on bar feeders and load/unload devices for turning
- **Tooling**
 - Grinding wheels and other abrasives spending will double in 2014; most in any year since at least 2008
 - Toolholder spending is up 50% from 2013 and the most in any year since at least 2008
 - Growth in toolholders is in HSK and other; traditional v-flange toolholders are flat
 - Milling tools up slightly with growth coming from high-speed steel cutters while indexable cutters and solid carbide cutters remain flat
 - CBN or diamond-film inserts for rotary tools highest since at least 2008

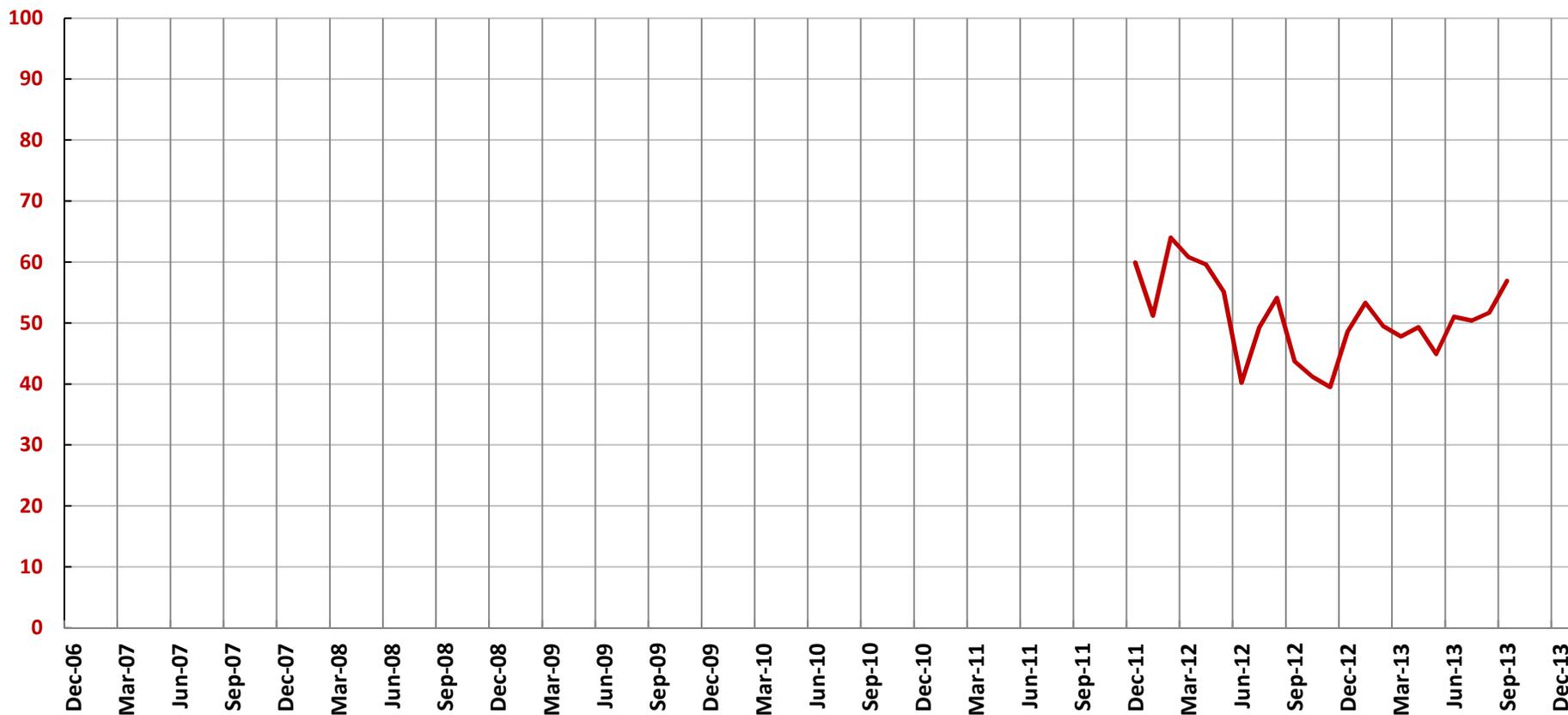


AUTOMOTIVE VEHICLE & PARTS SPENDING LEADS PRODUCTION

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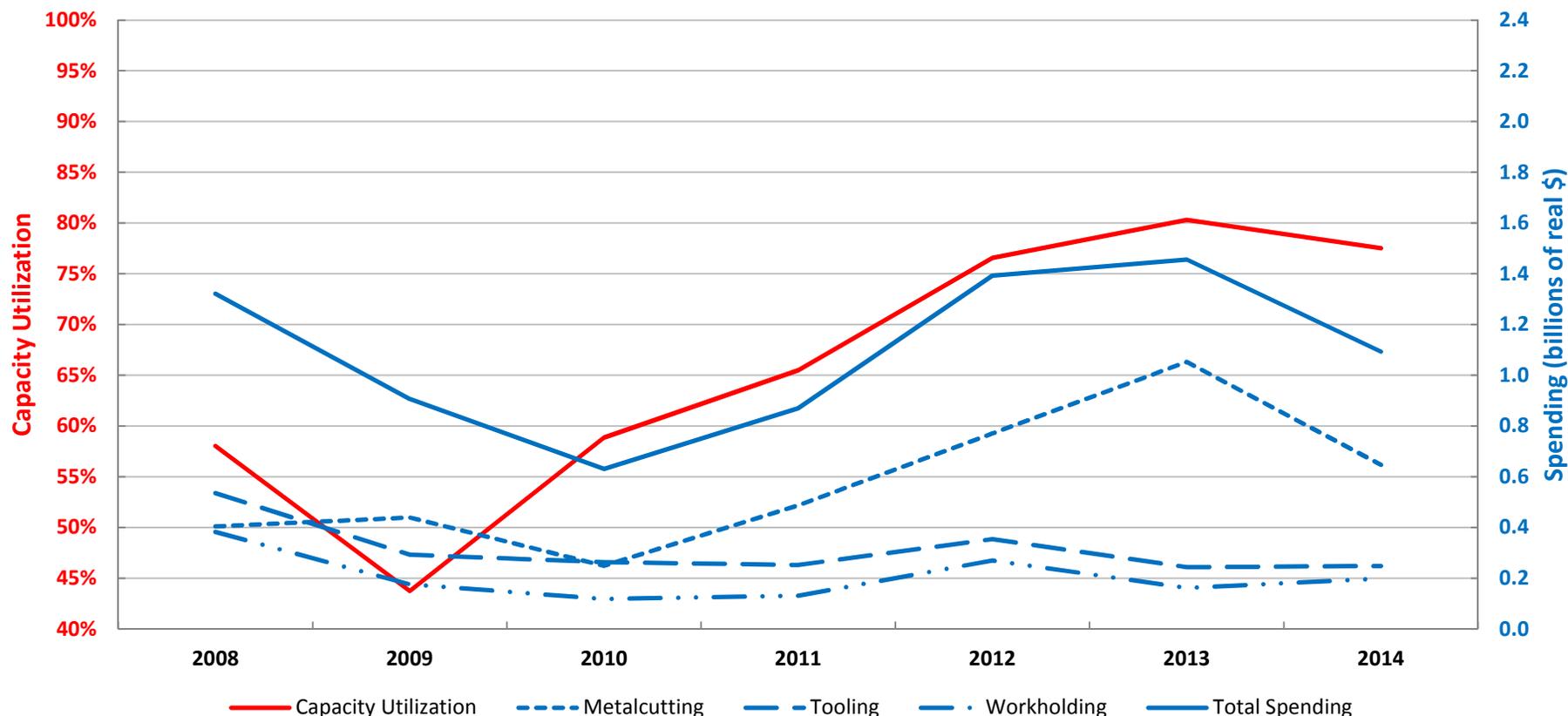
- MV&P spending is starting to slow
- Production levels are near all-time highs
- Production still growing at a historically faster rate even though it is slowing down
- Slowing growth in production is leading to lower capital investment



- Automotive industry has grown for four consecutive months and has grown at a faster rate each of the last three months
- New orders, production, and exports all improved significantly in September
- Future business expectations at second highest level since fall of 2012



AUTOMOTIVE – CAPACITY UTILIZATION VS. SPENDING



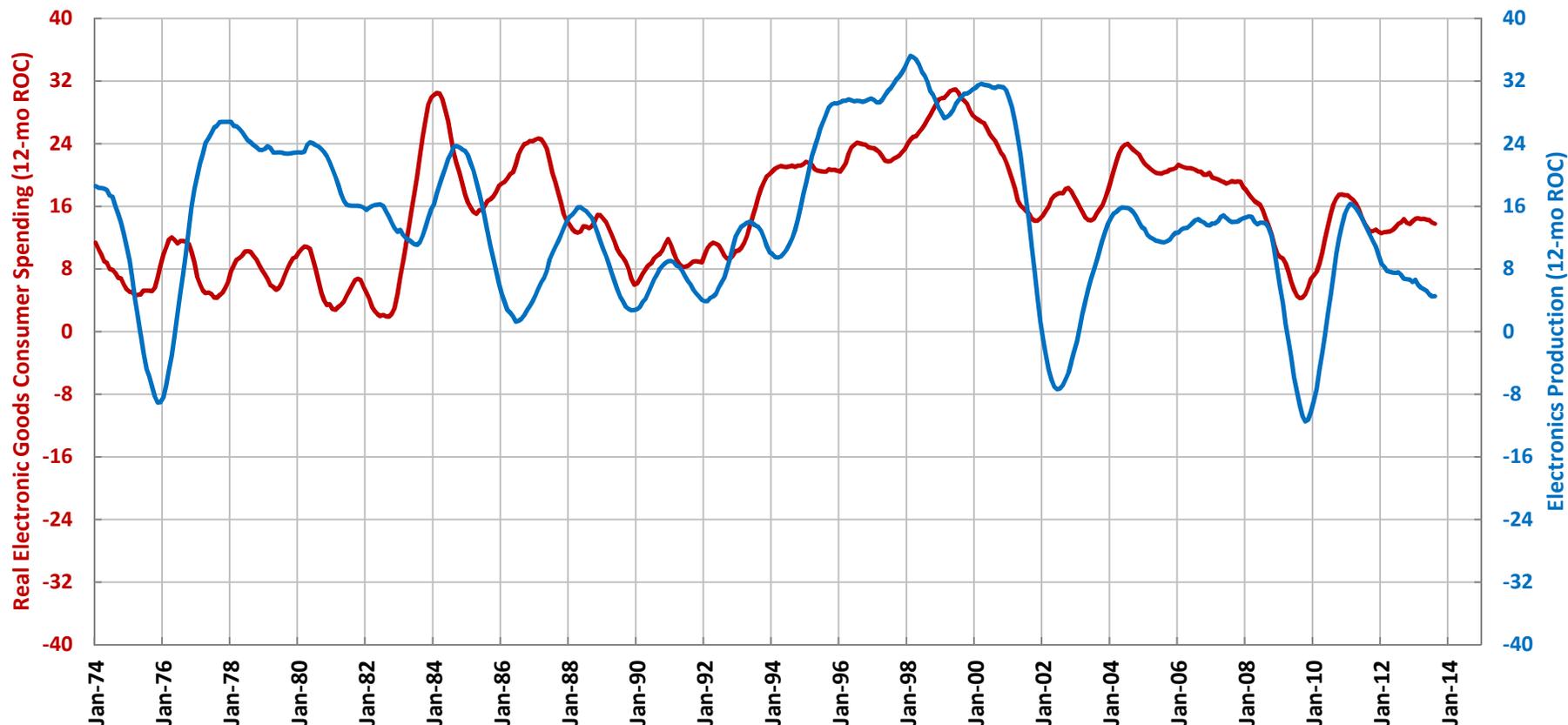
- Notable spending at carburetor, piston, piston ring and valve manufacturers, electrical and electrical equipment, and steering and suspension components
- Spending remains strong in the East North Central but significant growth in the South Atlantic
- About 66% of the spending will be in plants with more than 100 employees



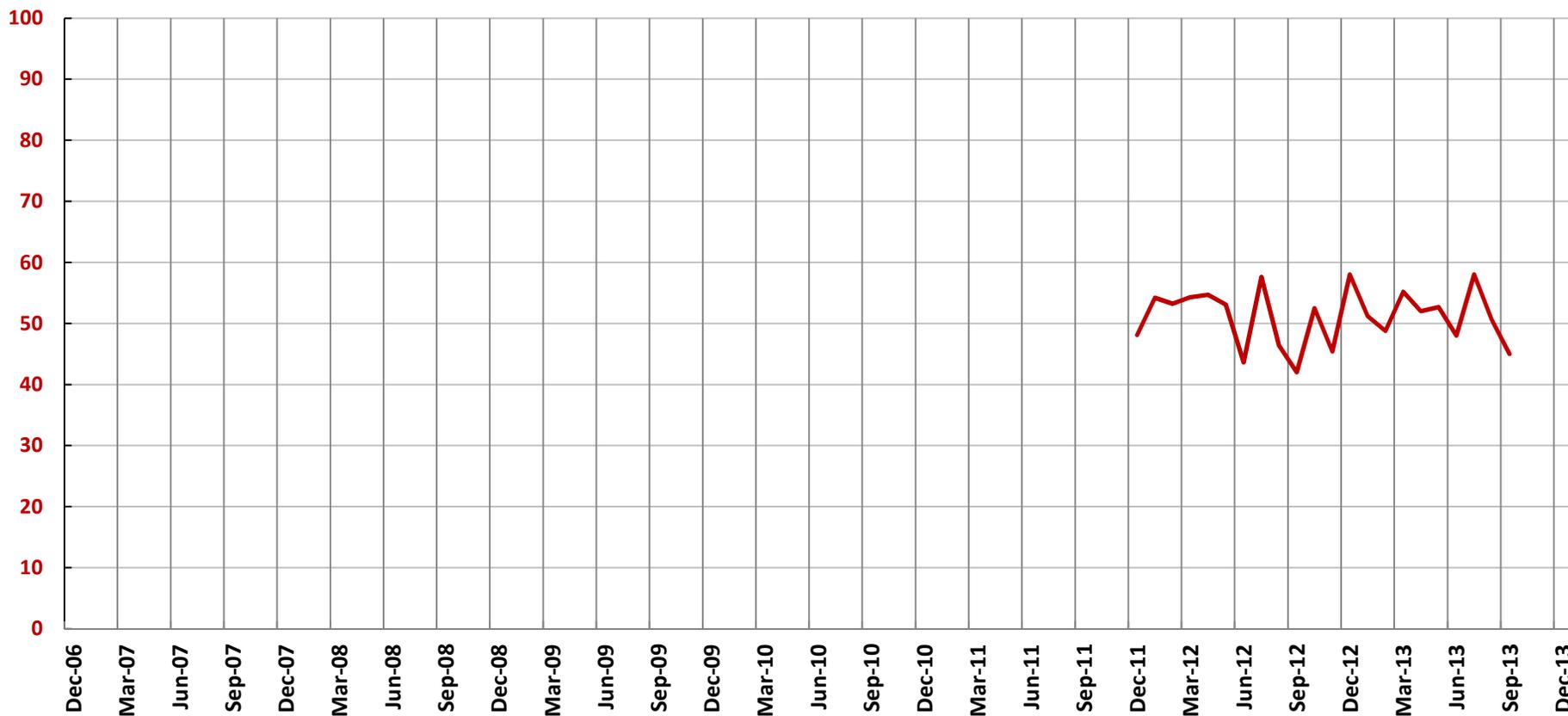
- **Equipment**
 - Machining center spending is down but still reasonably strong
 - VMC spending will increase by a little more than 50% with most of the growth in machines with a greater than 20-in Y
 - Spending on transfer and other special purpose machines will more than double
 - Sawing/cutoff machines more than any year since at least 2008
 - Turning centers down overall but spending on machines with a greater than 10-in chuck up significantly from 2013 and back to more normal levels
 - Spending on lathes down overall but lathes with a less than 10-in chuck remain strong
- **Workholding**
 - Spending on dedicated fixtures up significantly and more than any year since at least 2008
 - Automated systems and transfer lines will be more than twice as much as any year since at least 2008
 - Spending on pallets and pallet-handling devices up significantly
 - Bar feeders will almost double from 2013 and near 2008 levels
- **Tooling**
 - Significant increase in all milling cutters
 - Strong growth in drills due to high-speed steel drills and spades
 - HSK and other toolholders up noticeably
 - Boring tools at highest level since at least 2008



ELECTRONIC GOODS SPENDING LEADS PRODUCTION



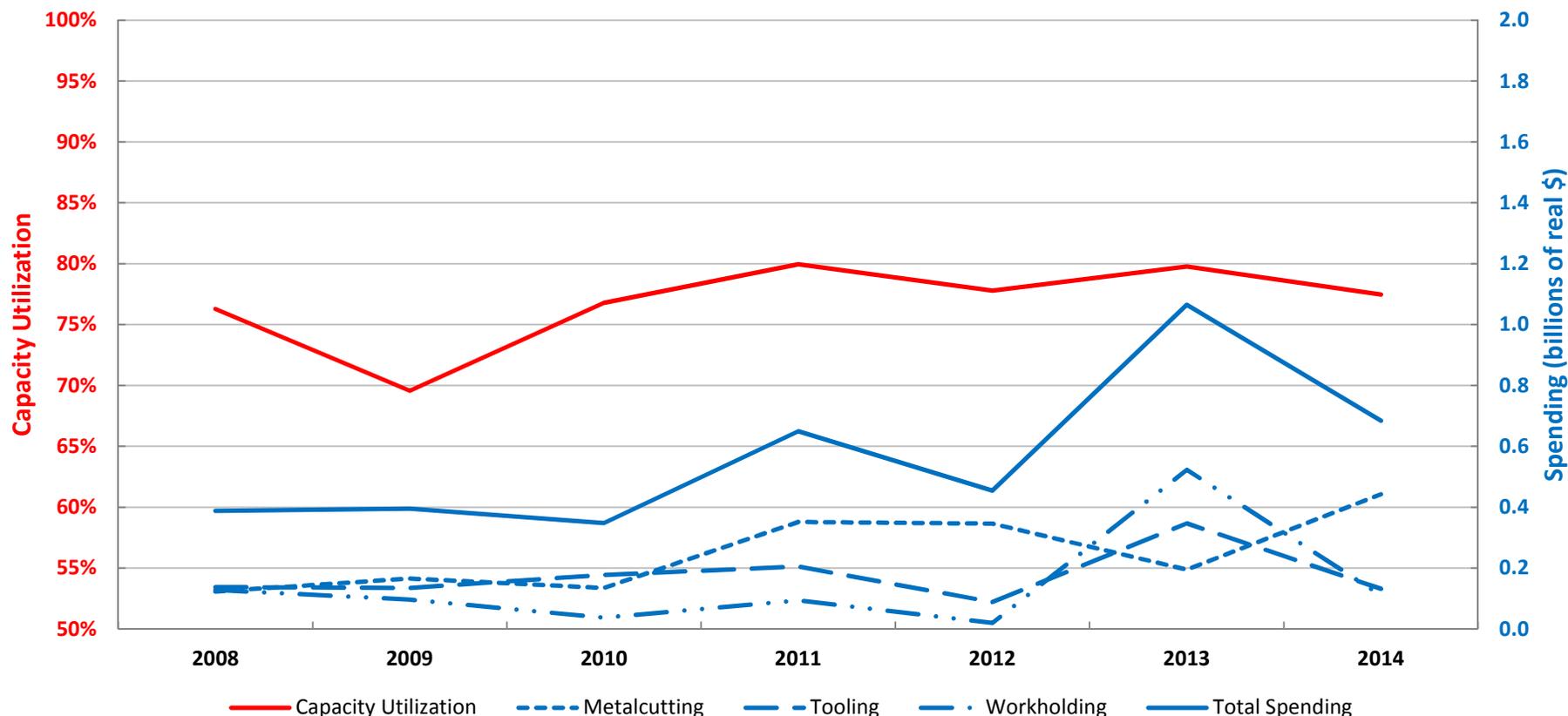
- Industry probably more affected by reshoring than any other
- Consumer spending on electronics continues to hit all-time highs
- Production near all-time highs
- Production should grow faster in spending growth remains strong



- Index shows that industry has been mostly growing in 2013
- However, new orders have contracted the last two months and backlogs are contracting rapidly



ELECTRONICS – CAPACITY UTILIZATION VS. SPENDING



- Increased machine tool spending from semiconductors and manufacturers of industrial process controls
- More than half of the spending will come from the West North Central and Middle Atlantic, which are both up significantly
- More than 80% of the spending at plants with more than 100 employees

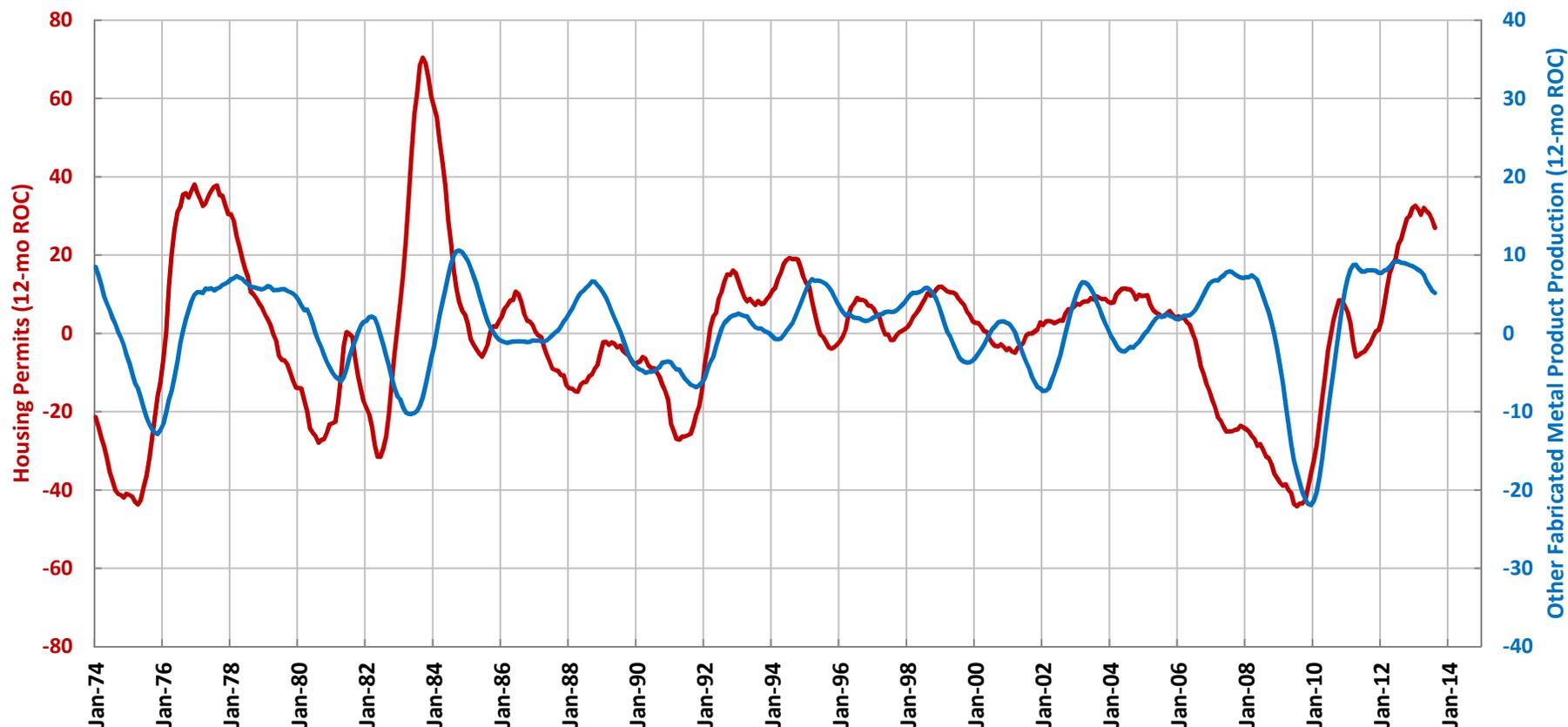


- **Equipment**
 - HMCs will nearly double with more than 80% of the projected spending on machines with a 400-800 mm pallet
 - Slight increase in smaller VMCs
 - Turning centers up big and by far the most spending in any year since at least 2008
 - Big increases in vertical turning centers and small horizontal turning centers
 - Strong spending in multi-spindle and Swiss-type CNC machines
 - Lathes will nearly double in 2014; virtually all of the increase in small horizontal lathes
 - Very strong spending on cylindrical/external and internal grinders
 - EDM spending highest since at least 2008; focus on ram and wire type
- **Workholding**
 - Continued strong spending on dedicated fixtures
- **Tooling**
 - Solid carbide cutters will more than double any year since at least 2008



HOUSING PERMITS LEAD OTHER FABRICATED METAL PRODUCTION

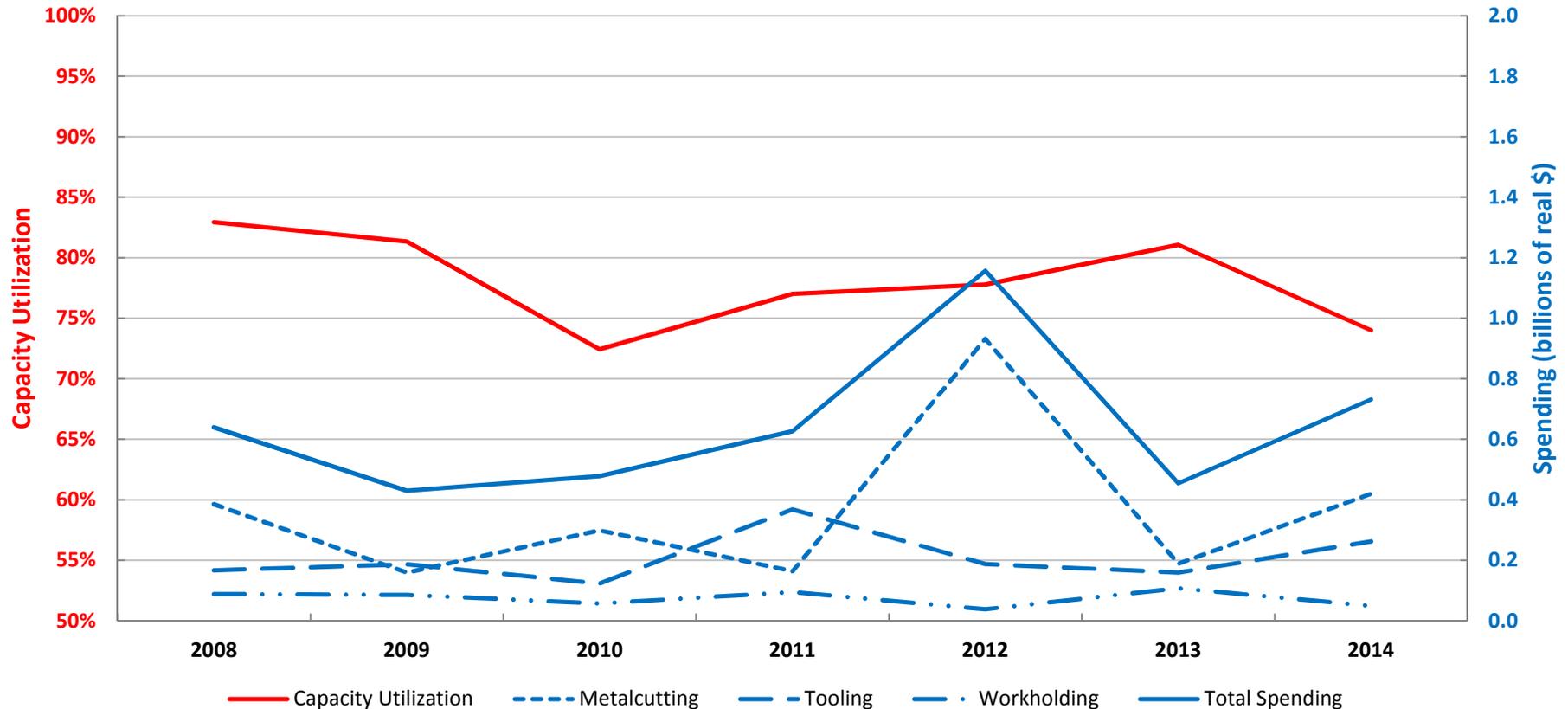
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- Many parts for pumps, valves and plumbing products are classified under other fabricated metal product
- Housing permits are still in recession territory but the growth rate is strong
- Production for pumps, etc. growing at a strong rate



PUMPS, VALVES & PLUMBING – CAPACITY UTILIZATION VS. SPENDING



- Most spending by pump and pumping equipment and air and gas compressor manufacturers; big increases at fabricated pipe and enameled iron and metal sanitary ware
- Three important regions – East North Central, West South Central, and Middle Atlantic
- Most spending by plants with more than 50 employees

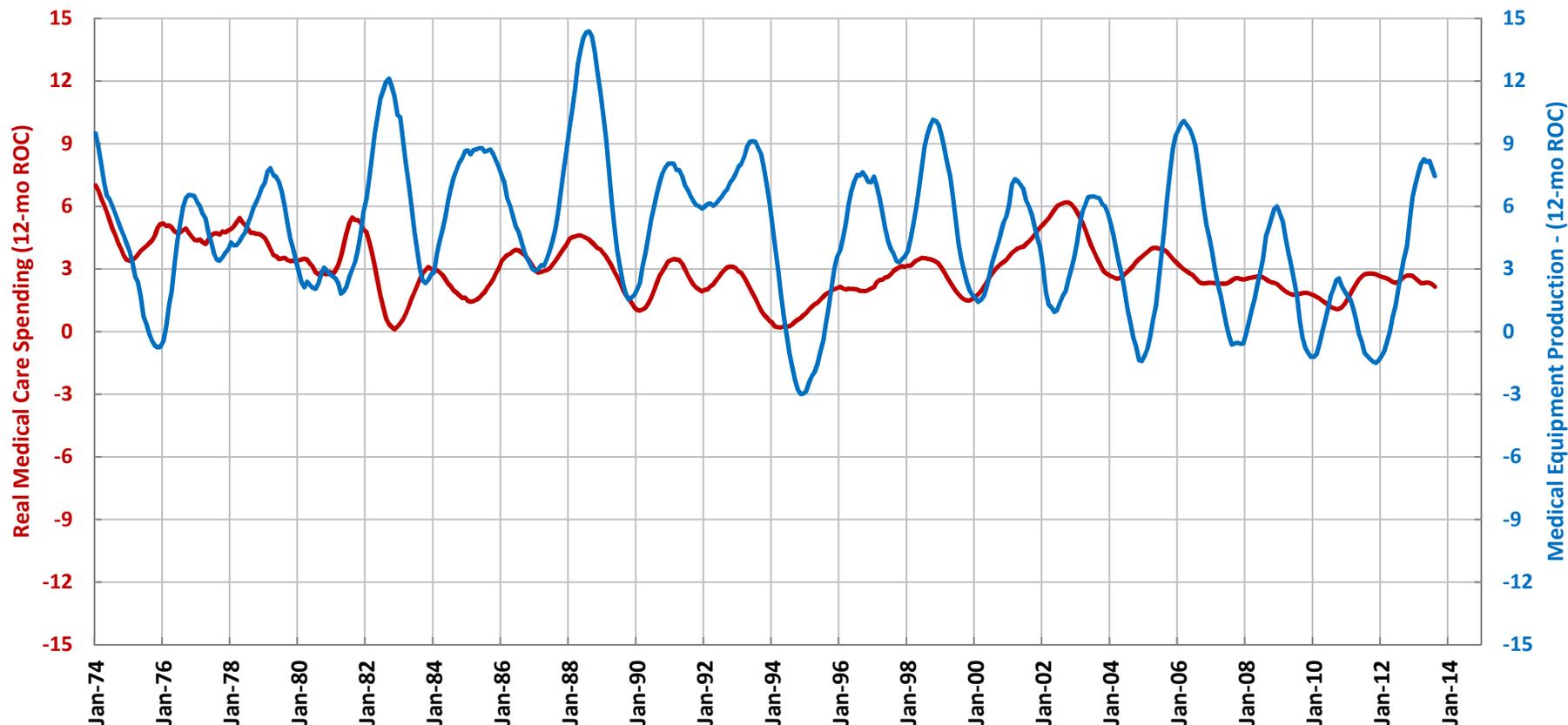


- **Equipment**
 - Spending on machining centers up about 250%; increase is from HMCs with less than an 800-mm pallet
 - Noticeable increase in lathes, particularly in vertical and small horizontal lathes
 - Special emphasis on drilling/tapping machines
- **Workholding**
 - Continued good spending on dedicated fixtures, automate systems and transfer lines, and pallet and pallet-handling systems
 - Good spending on bar feeders
- **Tooling**
 - Milling tools, particularly solid carbide and indexable cutters, up significantly
 - Noteworthy increase in drills from high-speed steel, solid carbide, and indexable drills
 - Strong spending on stationary and rotary inserts
 - Grinding wheels and other abrasives up a lot
 - Special emphasis on taps



MEDICAL CARE SPENDING LEADS MEDICAL EQUIPMENT PRODUCTION

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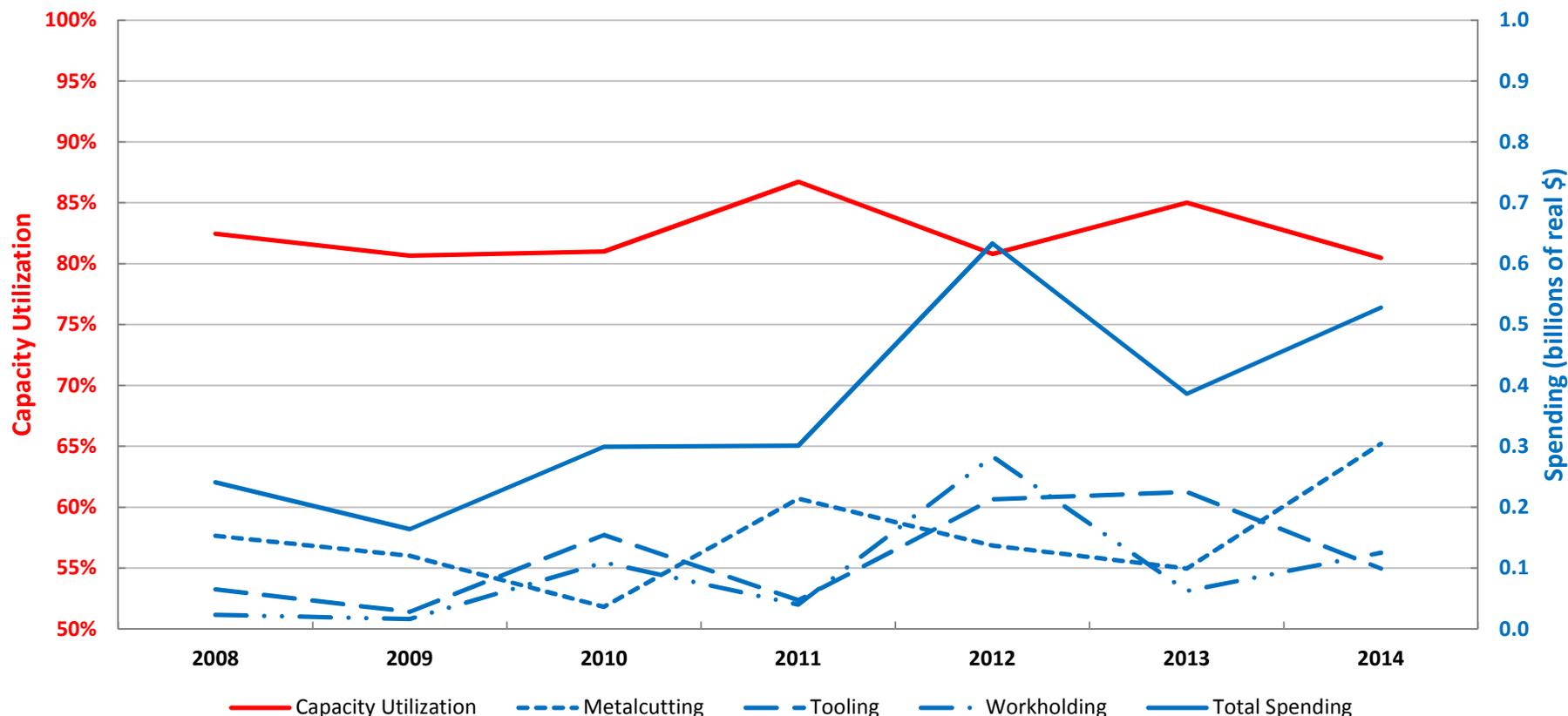


- Obamacare should dramatically increase spending even if it is only price inflation
- Medical device production at all-time highs
- Growth rate very strong but industry is very cyclical



MEDICAL – CAPACITY UTILIZATION VS. SPENDING

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- Bulk of spending on surgical and medical instruments; strong growth in surgical and medical instruments, dental equipment and supplies, and lab apparatus and furniture
- Pacific, South Atlantic, and East North Central account for more than 50% of spending; Pacific and South Atlantic up while East North Central down
- More than 80% of spending at shops with more than 250 or less than 19 employees

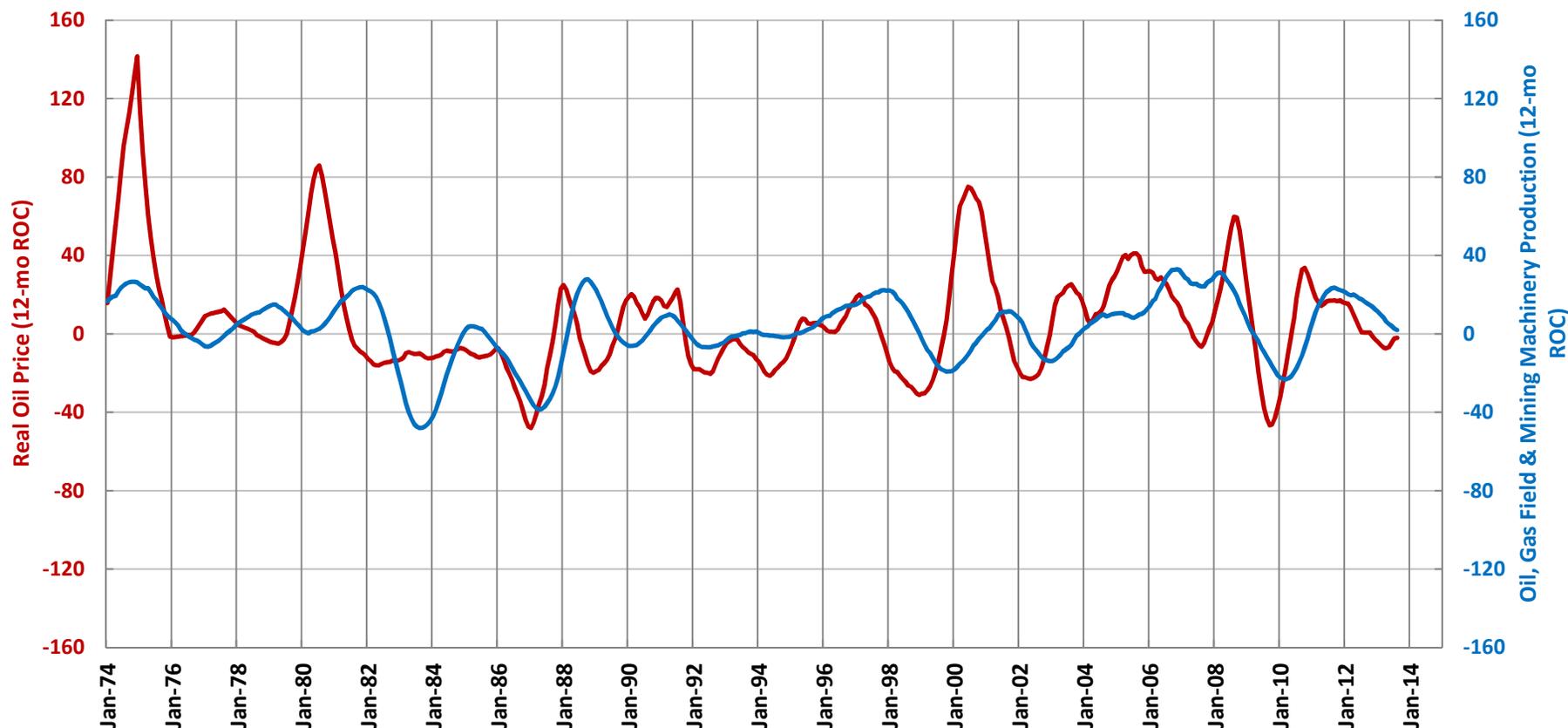


- **Equipment**
 - Machining centers will more than double; HMCs up significantly while VMCs are down
 - All HMC spending on machines with less 800-mm pallet; mid-size market nearly twice as large as small machine market
 - Turning centers up big and most spending since at least 2008; spending evenly split between larger and smaller horizontal turning centers
 - Very notable spending on small horizontal lathes
 - Nearly 25% of all laser sintering additive machine spending is in medical
- **Workholding**
 - Big increases in dedicated fixtures, automated systems and transfer lines, and pallet and pallet-handling devices
 - Noteworthy increase in bar feeders
- **Tooling**
 - Spending on milling tools remains strong
 - Spending on drills most since at least 2008; emphasis is on solid carbide and other drills



OIL PRICE LEADS OIL, GAS-FIELD & MINING MACHINERY PRODUCTION

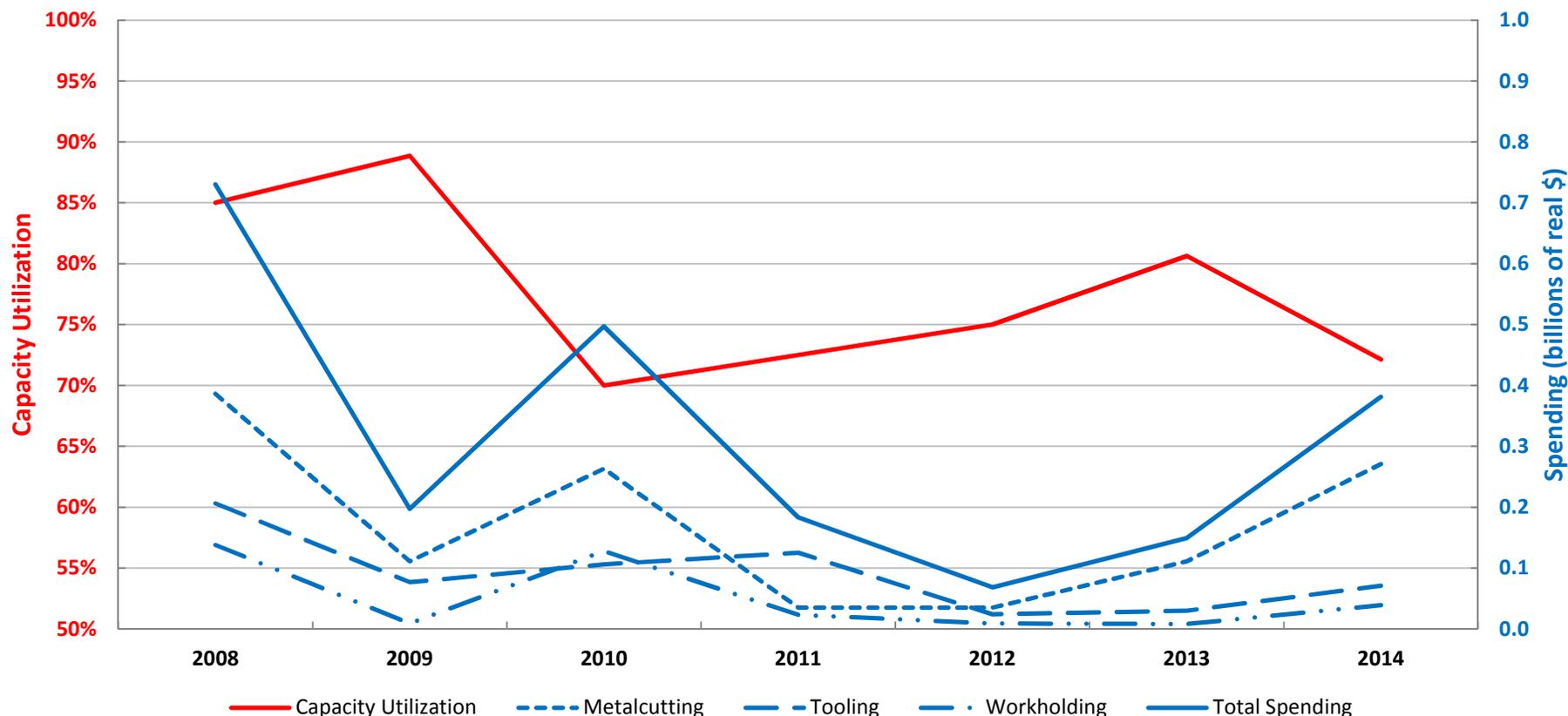
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- Oil price is up significantly since June 2012
- Therefore, oil prices are contracting at a slower rate year over year
- The slower rate of contraction and oil prices over \$100 per barrel (in real terms) should lead to faster growth in production



OIL, GAS-FIELD & MINING – CAPACITY UTILIZATION VS. SPENDING



- Almost all spending on oil and gas-field machinery
- Virtually all spending is in the West South Central although there is a small amount in the South Atlantic and Mountain regions
- Almost all spending at plants with more than 100 employees



- **Equipment**
 - Turning centers will be almost 70% of the spending in 2014
 - Spending on turning centers up nearly 400% from 2013
 - About 66% of turning center spending will be on large horizontal turning centers while the remaining amount will be on small horizontal turning centers
 - Big increase in HMCs with a 400-800 mm pallet
- **Workholding**
 - Big increase in dedicated fixtures
- **Tooling**
 - Dramatic increase in milling tools, particularly solid carbide cutters
 - Solid spending on all drill types
 - Good spending on stationary and rotary inserts



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