

The Durable Goods Report

September 2012

Executive Summary of US Economic Activity



Manufacturing Data Release of 8/31/2012 (July Preliminary)

Employment Data Release of 9/7/2012 (August Preliminary)

Retail Data Release of 8/14/2012 (July Advanced)

Industrial Production Data Release of 8/16/2012 (July Advanced)

Source Data: US Census Bureau, US Bureau of Labor Statistics, US Department of Commerce, Energy Information Administration, Federal Reserve Board, Baker Hughes

John E. Layden

The Durable Goods Report – A Service of Time Compression Strategies

By the Numbers

Durable Goods Key Measures			
	Current Mo	Prior Mo	Prior Yr
New Orders-Durable	230,519	221,368	212,790
12 month moving average	219,154		203,749
% Change from Prior Year	7.6%		
Growth Index - Durable New Orders	1.019	0.999	1.044
Unshipped Orders - Durable	996,565	988,660	928,914
% Change from Prior Year	7.3%		
Value of Shipments - Durable	230,736	225,011	201,505
Inventory - Durables	369,153	366,503	353,297
% Change from Prior Year	4.5%		
Inv to shipments ratio - Durable	1.60	1.63	1.60
US Economy Key Measures			
	This period	Last period	Change
GDP 2012 Q2	15,606.1	15,478.3	0.8%
Industrial Production	2,589.8	2,578.1	0.5%
Capacity Utilization %	79.3	78.9	0.4
Manufacturing %	78.4	78.2	0.3
Durable Goods %	78.6	78.1	0.5
Primary Metals %	73.9	73.0	0.9
Autos and Parts %	79.9	77.7	2.2
Machinery %	85.2	87.0	(1.9)
Durable Goods (\$Mil SA)			
New orders	230,519	221,368	4.1%
Shipments	230,736	225,011	2.5%
Inventory	369,153	366,503	0.7%
Unshipped Orders	996,565	988,660	0.8%
Retail ex Food Service (\$Mil SA)	359,857	356,946	0.8%
Autos and Parts	73,727	73,158	0.8%
Gasoline	43,414	43,200	0.5%
Core retail (ex auto, gas)	242,716	240,588	0.9%
Employment (000's SA)			
Civilian employed (Household Survey)	142,101	142,220	(119)
% of potential workforce	58.3%	58.4%	-0.1%
Civilian not employed (HS)	101,465	101,134	331
Non-Farm (Establishment Survey)	133,300	133,204	96
Private (ES)	111,400	111,297	103
Government (fed, state, local) (ES)	21,900	21,907	-7
Goods Producing (ES)	18,323	18,339	-16
Manufacturing (ES)	11,970	11,985	-15
Construction (ES)	5,515	5,514	1
Durable Goods Mfg (ES)	7,489	7,506	-17
Housing (000s of Units SA)			
Total housing starts	746	754	-1.1%
Single family starts	502	537	-6.5%
Single family sales (new)	372	359	3.6%
Single family for sale (new)	142	144	-1.4%

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US Economy – Quick Look:

US GDP

Q2 GDP revised to 1.7% from the initial estimate of 1.5% SAAR (0.8% QtQ, 4.0% YtY)

Durable Goods

New orders for durable goods increased 4.2% in June to \$230.7 billion.

Retail:

Retail sales (ex food service) increased 0.8% in July after two months of decline.

Employment:

August employment showed a loss of 119,000 jobs, following a July loss of 195,000 jobs in the household survey. The smaller employer survey showed a gain of 96,000 jobs, but doesn't pick up the activity of small employers.

Housing:

Single family housing starts declined 6.5% to a 502,000 annual rate. Single family sales increased 3.6% to a 372,000 annual rate. Total starts declined 1% to a 746,000 annual rate. Single family for sale dropped to 142,000, the lowest level since records began shortly after WWII.

Random Thoughts, Stray Data and Rants:

- Follow up to comments on low carb/high protein diets: The claim of 1869 as the earliest report on the subject was made by Gary Taube ("Good Calories, Bad Calories"), and he was talking about the US. There are earlier indications of this fundamental diet insight in ancient history. Spartan warriors were fed a diet of meat. Slaves in Sparta were fed grain based diets. Gladiators in Rome were fed a diet of meat during training and oat porridge for several weeks before a scheduled fight to build a protective layer of fat.
- Carbs make you fat. Period. Dietary fat is not stored as body fat.
- "If you want your body to burn fat, you need to feed your body fat." Dr. John Sears, "The Zone Diet."
- Still today we hear from the American Dietary Association (a monopoly "guild" organization) that the low fat diet is preferred. Most doctors repeat this nonsense advice.
- Penny Pritzker, Chicago billionaire heiress to the Bob Pritzker fortune (Hyatt Hotels, manufacturing, airline (can't remember which one)) is fund raising for the 35 million purchase of the Obama home and library in Hawaii. Putting a heavy arm on Chicago inner circle. "You don't want the president to be homeless, do you?"
 - o Bob actually built the business.
 - o I knew Bob Pritzker when I headed Alan Pritsker's company. The two were distantly related. Both families escaped from Prit, Ukraine during the revolution of 1915. They came out via different routes (Greece, Serbia I think) hence the different spelling of the names.
- Waste in the health care system now exceeds the Pentagon budget.
- On Thursday at the Democratic Convention President Obama said that nobody should be forced onto vouchers. On Friday HHS launched a program to move 2 million seniors onto vouchers. In politics it's known as a pivot.
- How do drugs get cheaper by shipping them to Canada and back? Could we do it twice? Just asking.
- Please Spare Us department: Someone has registered the domain name "campaign2016.com."

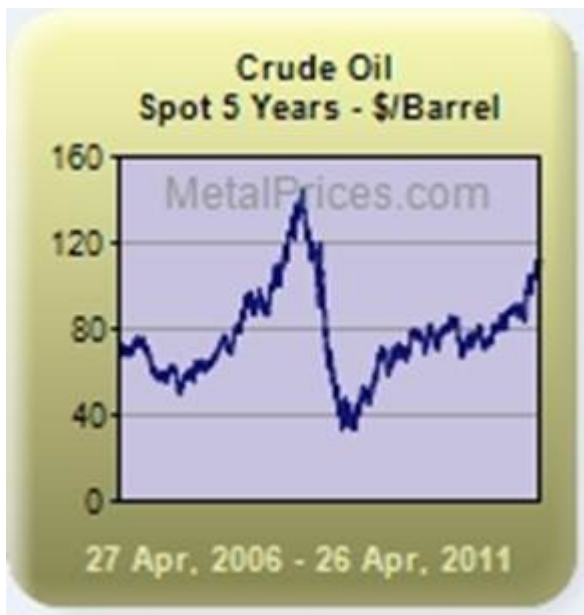
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Economy:

- Prices for steel and iron ore in China plummet. Supply contracts are left in default.
- Chinese Purchasing Managers Index falls to 49.2 in July and 47.5 in August (below 50 is contraction). Lowest level in 4 years.
- Still no solution to the debt crisis in the EU. Default is inevitable. There is no longer enough wealth in the EU to service the aggregate debt.
- George Soros proclaims that Germany must drop austerity demands and get on board with the new lending facilities to support growth in the southern countries. Otherwise Soros will lose his ability to manipulate a single currency.
- Why didn't I think of that? More debt is the answer to excessive debt.

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- The Diplomat magazine reported in detail this month on the local government debt crisis in China that DGR covered last month. They explained that it was done through easing the capital requirements on the banks. The money was invented from whole cloth in the banking system. Like the US stimulus, most of the money was spent on prestige projects that add nothing to the economy.
- The DGR reported long ago on a condition that biologists and anthropologists seem to have missed: Free money makes you stupid.
- A close corollary applies to central bankers: Celebrity makes you stupid.
- GM reports Q2 net earnings drop 41% from \$2.5 to \$1.5 billion. EU went from \$106 million profit to \$361 million loss. That means there is also decline in the US and Asia. Some reports that GM is sliding back into bankruptcy.
- News report during the Democratic convention that GM had regained number 1 position globally. Actually they took over the number three spot. VW is number one. But "We're number 3!" doesn't have the same marketing panache.
- **Energy**
- Just so we remember how easy it is to reduce oil prices. On July 1, 2008 oil hit \$145 per bbl. President Bush issued an executive order to open offshore drilling on July 8, 2008. The mere anticipation of these new supplies drove oil prices to \$39 per bbl within 90 days (the life of the most common futures contract on oil).



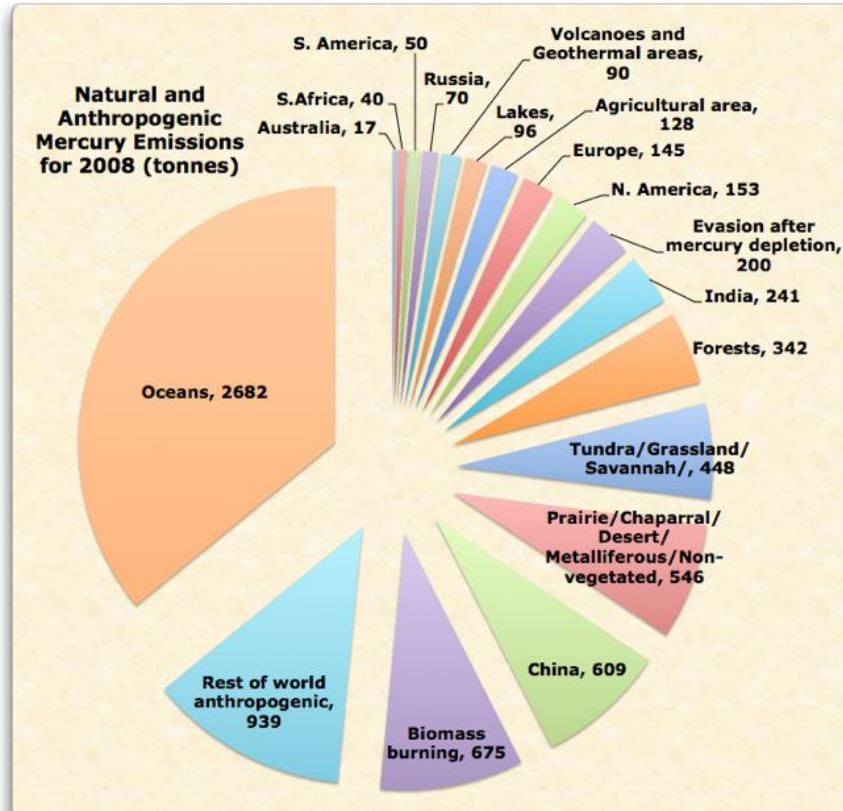
- It's not that supply/demand is the easiest play in controlling prices. It's the only play.
- T. Boone Pickens reports "I Lost my ass on wind energy." Everyone did, although some moved the losses to taxpayers via government subsidy. The subsidies hid the fact that wind energy is not a net producer of energy. Lifetime energy return on energy invested is only 30% best case. He needs to hire a new engineer.
- If wind energy is such a good idea, why do we no longer have any commercial sailing vessels? Just asking.

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- If wind energy is such a good idea, why do we no longer use windmills to run grist mills? Just asking.

Climate

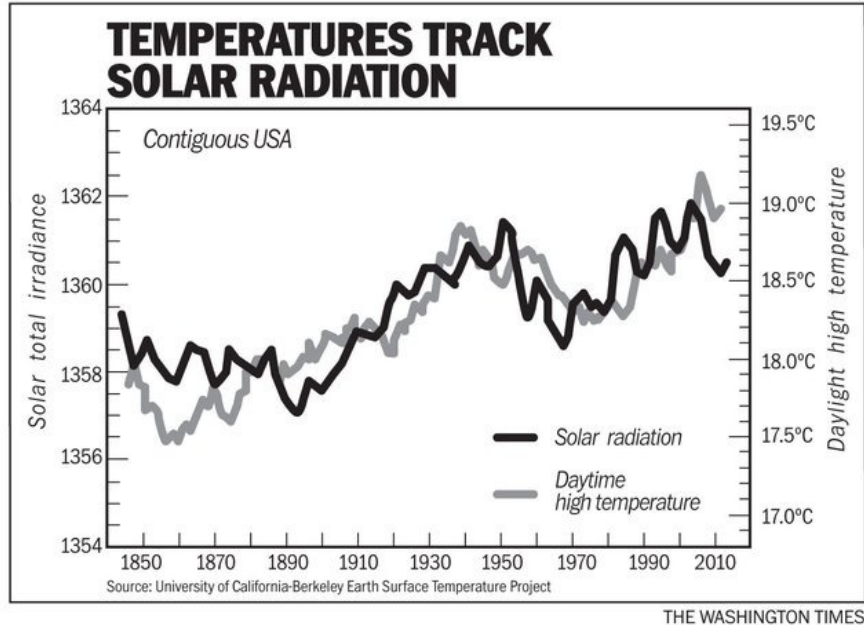
- A repeat by popular demand: North American emissions of mercury from human activity total 153 tonnes. Global total mercury output is 7500 tonnes from all sources. From US Government study via Dr. Willis Eschenbach.
- Figure 1 below. Natural and anthropogenic sources of atmospheric mercury emissions. About 7,500 tonnes of mercury are emitted into the atmosphere each year. Named countries show anthropogenic (human caused) emissions for that country.



- BTW: almost all of these emissions are elemental mercury or ethyl mercury, both easily metabolized. Humans are exposed to them daily without harm. Only methyl mercury is harmful and is a vanishingly small percent of the total.
- A new study makes detailed measurements of CO2/Temperature relationships and puts another nail in the coffin of the Alarmists. For the first time careful analysis of direct measurements of global concentrations show that 1. CO2 changes in the atmosphere lag changes in temperature. 2. That atmospheric concentrations of CO2 appear to be independent of human use of fossil fuels. 3. That temperature changes occur first in the oceans, then in the lower troposphere, then on land. This means that greenhouse radiation (Infrared) cannot drive the temperature, since infrared radiation cannot heat the Oceans. Full study is behind a pay wall, but good summary here:
<http://hockeyschtick.blogspot.com/2012/08/new-blockbuster-paper-finds-man-made.html>

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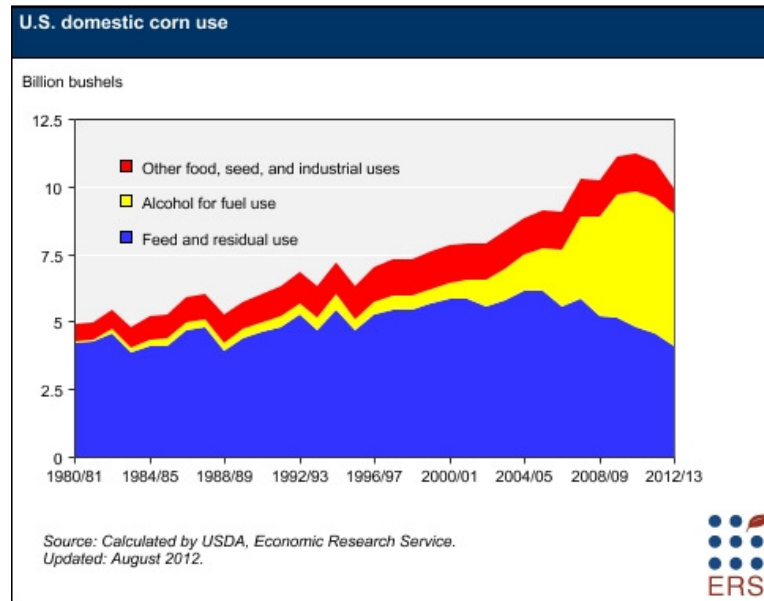
- The greenhouse effect does not warm the planet by 33C as has been universally accepted for decades. The error results from improper use of the Stefan-Boltzman equation. Full report here:
 - o <http://joannenova.com.au/2012/09/do-greenhouse-gases-warm-the-planet-by-33c-jinan-cai-checks-the-numbers/>
- DGR readers have known this for a decade. Measurements of Earth, Mars and Venus long ago confirmed that atmospheric temperature gradients were a result of altitude/density profiles only.
- Who would have expected this: Global temperature tracks with Solar output.



- **Government**
- Richest man in France seeks Belgian citizenship in response to the promised 70% tax rate for millionaires.
- The US government mess continues to get worse. Seems odd that so many people are competing to run it.
- Proponents of government spending argue that a job created by government "investment" creates 1.7 jobs in the private sector. Only half the story. It assumes that there is no penalty for collecting the money that produces the job. If the money is collected from consumers it usually results in a reduction in durable goods purchases. That results in the elimination of 8 jobs. Other scenarios show a loss as low as 3 or as high as 13. In no case is there a net gain in jobs.
- Unintended consequences department: Government pushes for electric and hybrid cars that use hundreds of pounds of Lithium batteries to reduce the use of oil. The world is now in a Lithium supply crisis. We are awash in oil. Another unforced error. A car has an alternate – gasoline is cheaper than bottled water. My laptop does not.

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- Unintended consequences: Shortages of grain based products and resultant soaring prices are tied to the exploding demand for ethanol forced by government mandate in the US.



- All government spending is mal-investment, by definition. Government does the things the private sector won't do because there is no return. We need to be more careful what we ask government to do. Some mal-investment is unavoidable (defense spending). Most of the rest should be rejected.

The Corruption of the Language Department

- George Orwell is best known for his popular book "1984." But he was a prolific writer against tyranny and pointed out that it was always dependent on the ability of the elites to redefine and corrupt the meaning of the language. Hence this new department where we can collect modern examples. To make this list the phrase only needs to be intentionally misleading, mathematically impossible, or oxymoronic.
 - o Affordable housing: I don't know about you, but I've always lived in an affordable house. When this term is used by politicians it means government subsidized housing. That means you pay for someone else's mortgage. Giving free stuff to voters.
 - o "We're all in this together" means "it's not my fault."
 - o Sharing (when used by a politician) means they covet your money.
 - o Fair share: would that mean everyone paying the same %? Guess not.
 - o Social Justice: I thought justice was a matter of law. Silly me.
 - o Targeted tax cuts: The real issue is that someone besides the market gets to pick winners. Taxpayers are always the losers.
 - o Living wage: You deserve a good wage even if you don't produce that much value. In that case your job goes away and you no longer receive the embarrassment of a low wage.
- We'll keep the list growing as we get time.

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US GDP

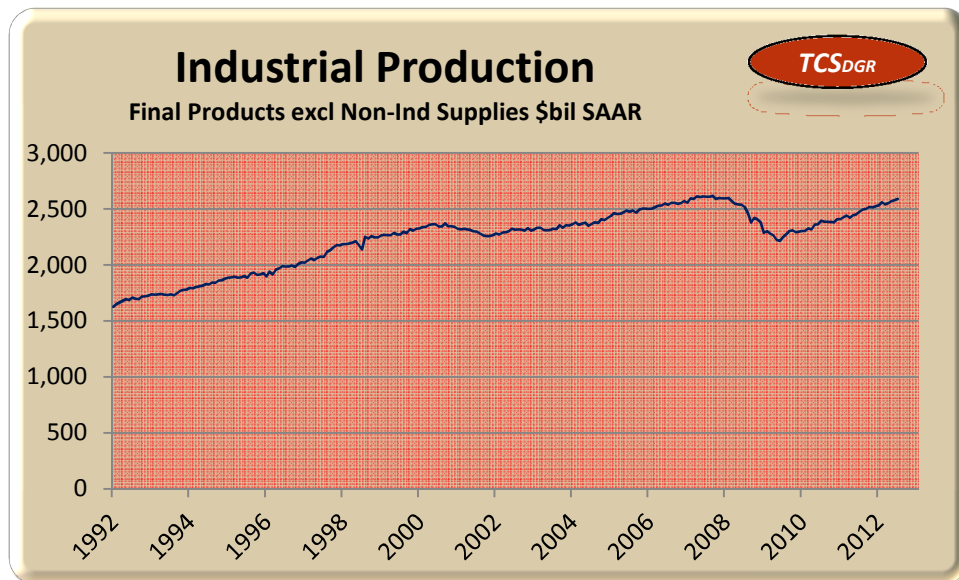
SAAR reported at 1.7% for Q2, up from 1.5% in the earlier estimate.

Gross Domestic Product				
Year	Qtr	GDP \$b (SAAR)	Chg from Prior Pd	Chg from Prior Year
2008	1	14,273.9	0.1%	3.7%
2008	2	14,415.5	1.0%	3.1%
2008	3	14,395.1	-0.1%	1.9%
2008	4	14,081.7	-2.2%	-1.2%
2009	1	13,893.7	-1.3%	-2.7%
2009	2	13,854.1	-0.3%	-3.9%
2009	3	13,920.5	0.5%	-3.3%
2009	4	14,087.4	1.2%	0.0%
2010	1	14,270.3	1.3%	2.7%
2010	2	14,413.5	1.0%	4.0%
2010	3	14,576.0	1.1%	4.7%
2010	4	14,735.9	1.1%	4.6%
2011	1	14,814.9	0.5%	3.8%
2011	2	15,003.6	1.3%	4.1%
2011	3	15,163.2	1.1%	4.0%
2011	4	15,321.0	1.0%	4.0%
2012	1	15,478.3	1.0%	4.5%
2012	2	15,606.1	0.8%	4.0%

Industrial Production (excluding industrial supplies)

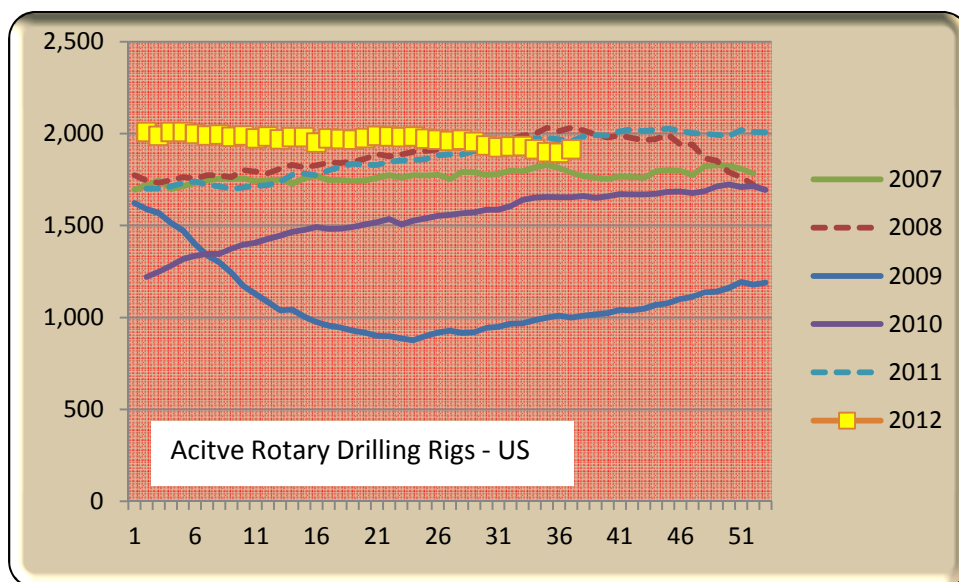
Some analysts have claimed that the steady (if tepid) growth in industrial production is a sign of health in the economy. A quick look at employment will dispel this notion.

Year	Mo	Ind Prod - Value of Prod	Chg from Prior Pd	Chg from Prior Year
2011	1	2,410.4	0.1%	4.6%
2011	2	2,425.1	0.6%	5.2%
2011	3	2,442.0	0.7%	5.0%
2011	4	2,420.8	-0.9%	4.4%
2011	5	2,444.1	1.0%	3.5%
2011	6	2,451.9	0.3%	3.8%
2011	7	2,474.8	0.9%	3.4%
2011	8	2,494.5	0.8%	4.6%
2011	9	2,500.4	0.2%	4.8%
2011	10	2,516.5	0.6%	5.6%
2011	11	2,516.2	0.0%	5.7%
2011	12	2,524.4	0.3%	4.8%
2012	1	2,532.7	0.3%	5.1%
2012	2	2,560.8	1.1%	5.6%
2012	3	2,540.6	-0.8%	4.0%
2012	4	2,552.0	0.4%	5.4%
2012	5	2,570.7	0.7%	5.2%
2012	6	2,578.1	0.3%	5.1%
2012	7	2,589.8	0.5%	4.6%



Energy:

August saw a slight uptick in drilling activity. The elevated price of oil would normally be expected to produce more activity, but the near total shutdown of offshore and federal land-based drilling has slowed growth.



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Efforts continue by the green movement to curtail fracking, despite the lack of damage of any kind in the past 70 years. The environmental movement is immune to data. They adopt the moral high ground against greedy capitalists and polluting energy industries, a position that needs no data. Totally content free debates.

Permitting processes continue to force the industry to attempt to prove a negative about the future – there will never be any harm. It's a logical impossibility. It indicates how far our culture has faded from the can-do attitudes of the past. Too many of us hide from imaginary fears.

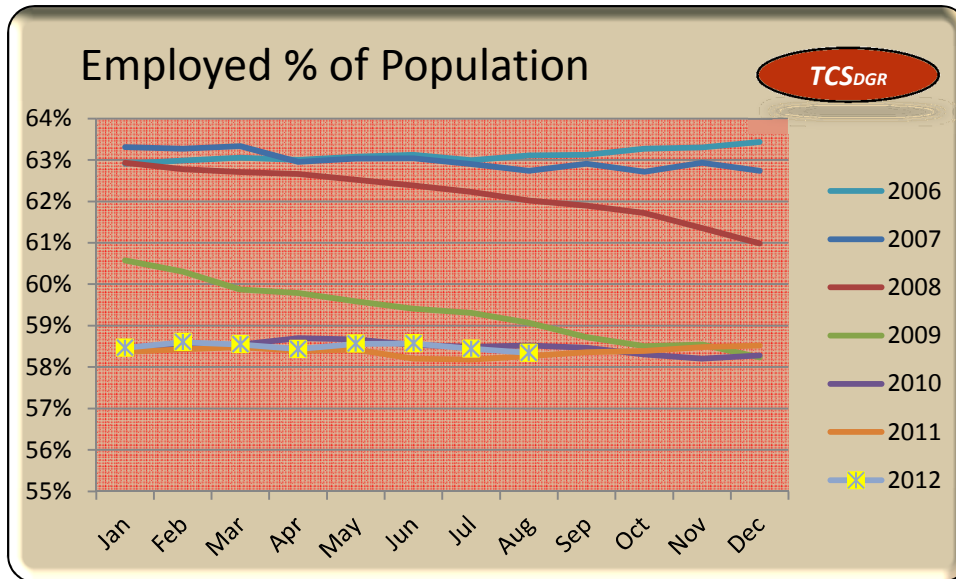
The most disappointing scene is major oil companies advertising their commitment to “green” and “alternative” energy. We need to banish these notions. There is no such thing. Hydrocarbon combustion, nuclear fission, hydro-electric remain the only net producers of energy.

The only practical replacements anywhere on the horizon:

- Thorium reactors to replace Uranium (proven in the 1970s)
- Polywell fusion (distant future)
- Cold fusion (a distant long shot)

If you think we can grow energy you probably don't know anyone with a thermodynamics background. You might as well try to run the economy on unicorn poop.

Employment:



The employed % of the non-institutional population dropped again to 58.3% in August. The total number employed declined by 119,000 in August after a loss of 195,000 in July. Since March the economy has generated a net total of 36,000 jobs against a population growth of 1.1 million.

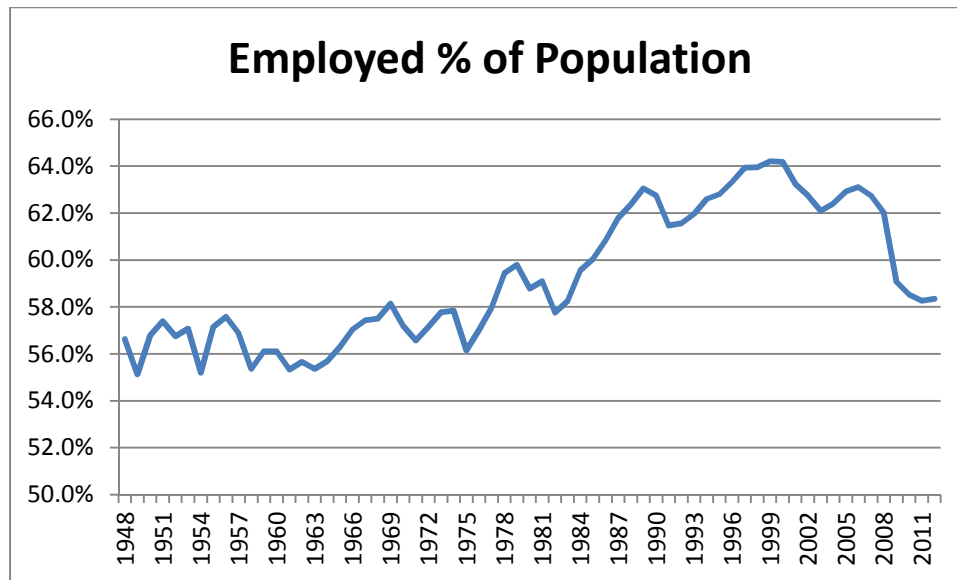
Once again the establishment survey (smaller sample, large institutions) showed a weak gain of 96,000. This was presented as a disappointing performance (it takes about 220k to tread water). The reality was much worse.

Looking at the situation compared to the beginning of the employment slowdown in 2007:

		Aug-12			Jan-07	
Employed		<u>142,101</u>	<u>58.3%</u>		<u>146,028</u>	<u>63.3%</u>
Unemployed	12,544			7,116		
Not looking	88,921			77,506		
Not Working		<u>101,465</u>	<u>41.7%</u>		<u>84,622</u>	<u>36.7%</u>
Working age pop		<u>243,566</u>			<u>230,650</u>	

The long view is equally bleak. The recovery that started with the tax cuts of May 1993 stalled in January of 2007 and collapsed in the financial meltdown of early 2009.

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August Employed % since 1948

By any objective measure employment is a train wreck and trending worse. By this measure we have already entered a recession.

Durable goods employment dropped by 17,000 in August.

Sector Detail

The Durable Goods Sector:

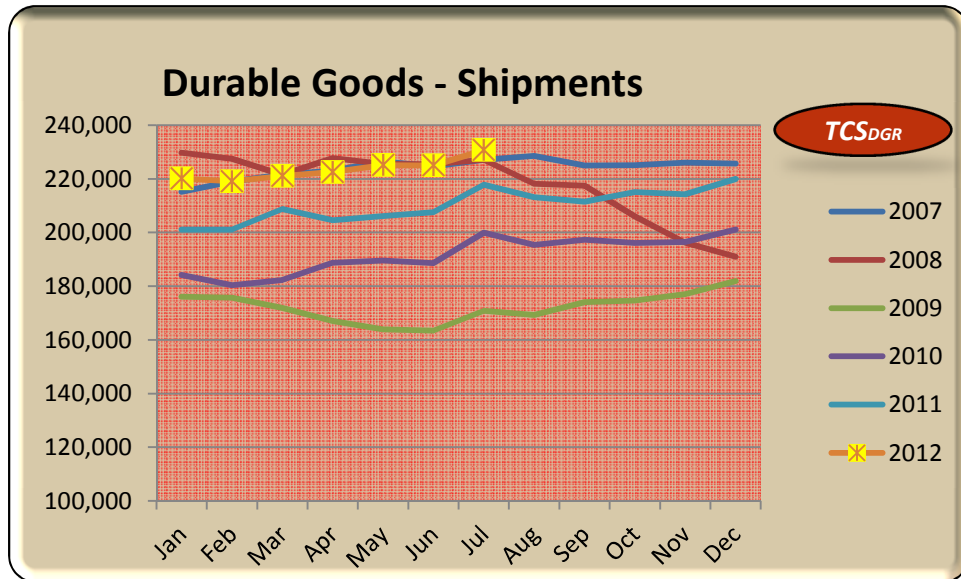
New Orders: Durable new orders increased 4.1% to \$230.5 billion. The new order growth index moved slightly positive at 1.019. Last year's comparable number was 1.044. Inventory to shipments ratio remains high at 1.6. Generally stable, but with caution flags.

Note: The latest durable goods number is from July. Employment numbers are for August. The drop in manufacturing employment in August suggests a reversal with the next data release.



Shipments increased 2.5% to \$230.7 billion. Book to bill ratio remained flat at 1.00 (long term average is 0.98). A generally good month with good balance in operations.

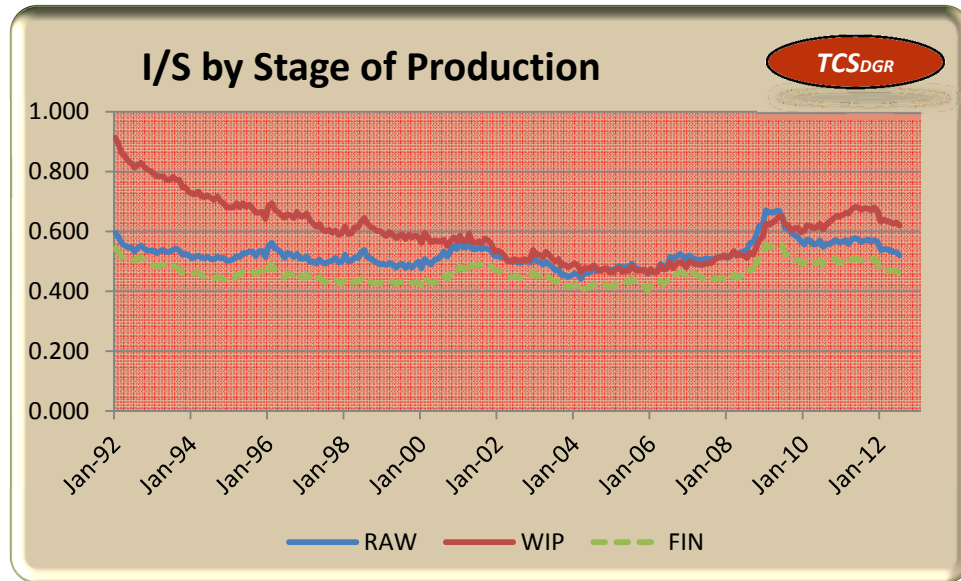
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Unfilled Orders increased 0.8% to \$997 billion.

Inventory Total inventory increased by 0.7% to \$369 billion, another record high. Inventory to shipments ratio improved slightly to 1.6.

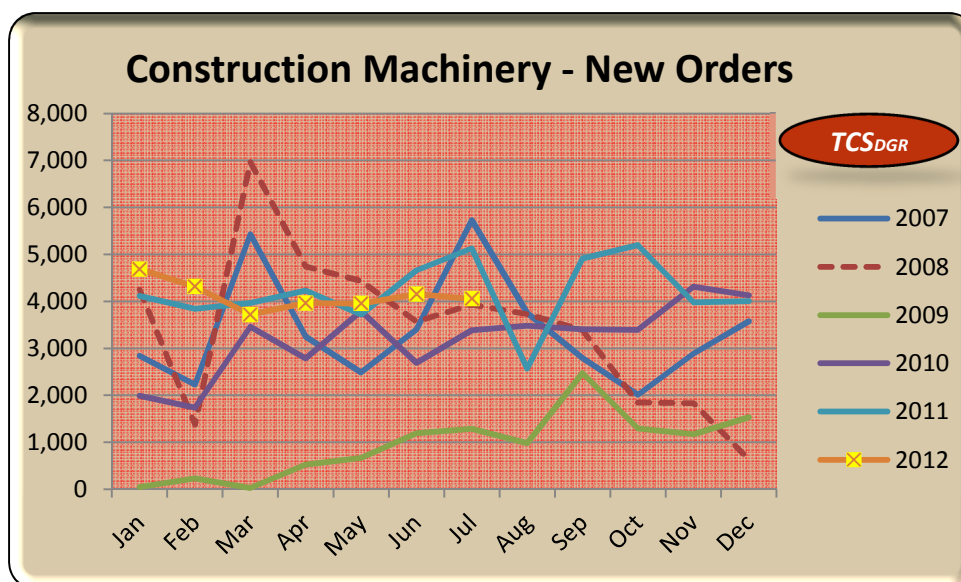




Inventory positions improved in all stages of production in August, continuing a trend of almost a year. While the numbers don't match the best of past performance it shows close attention to balanced supply chains.

Durable goods sub sectors:

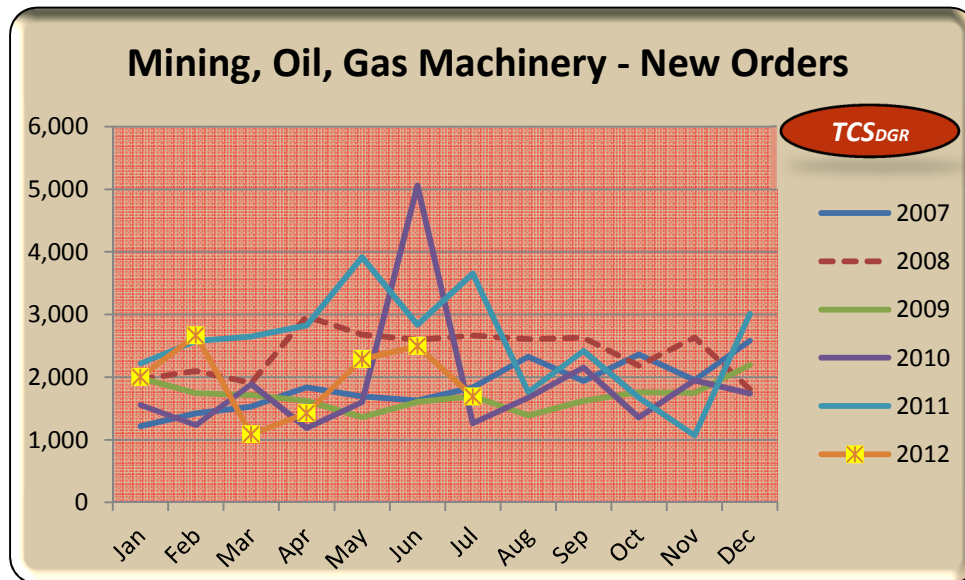
Construction machinery new orders decreased by 2.4% to \$4.05 billion. Shipments surged to \$5.5 billion driving Book to Bill ratio down to 0.74 (long term average 1.01). This is the second month of decline in Book to Bill. Something will change shortly. Orders will increase or shipments will decrease, but the industry doesn't run upside down on B/B for long.



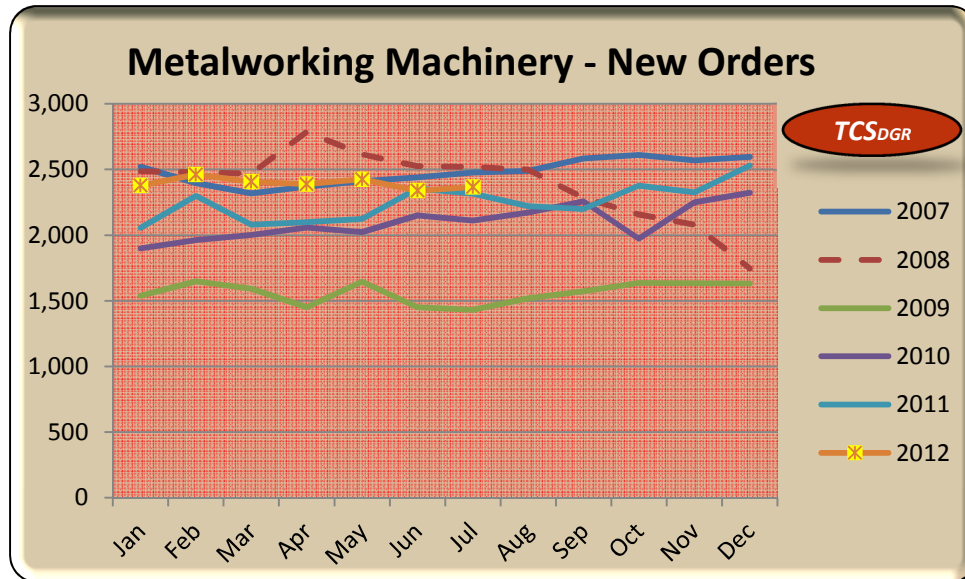
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Mining, oil and gas machinery new orders decreased by 32% to \$1.69 billion. Book to bill ratio plummeted to 0.73 (long term average = 1.03). Order performance YTD is generally weak. The recent uptick in active rig count (see Energy) may help improve the order situation. But the industry chatter seems to center mostly on the dramatic reduction in drilling activity on federal lands.

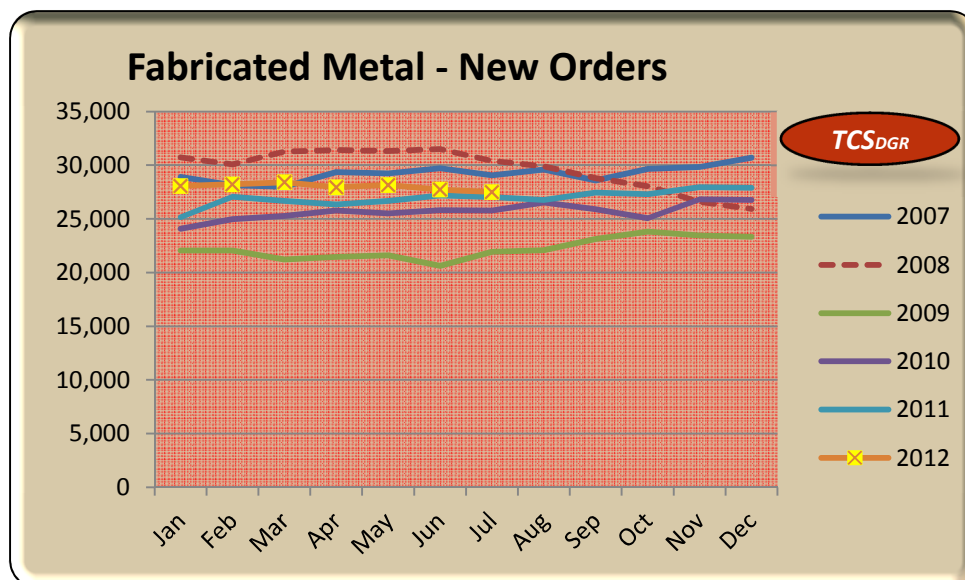
Mining activity is being softened by the shift away from coal and to natural gas for electrical generation.



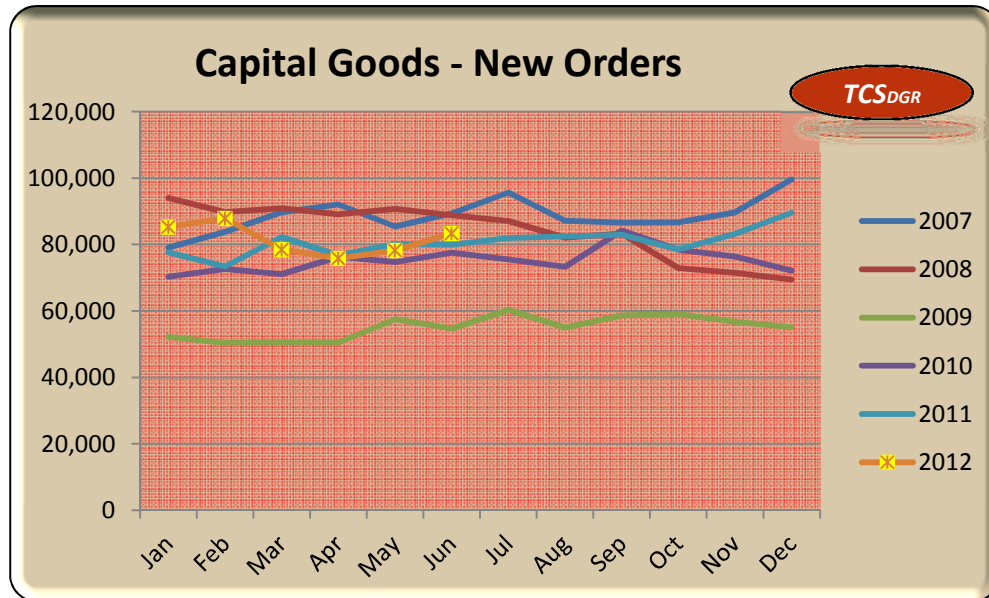
Metalworking machinery new orders increased 1.2% to \$2.4 billion after a downward revision to the prior month. Book to bill ratio decreased to 0.98 (long term average = 1.00). Industry pattern remains solid. Equipment orders remain strong despite the elimination of government investment incentives.



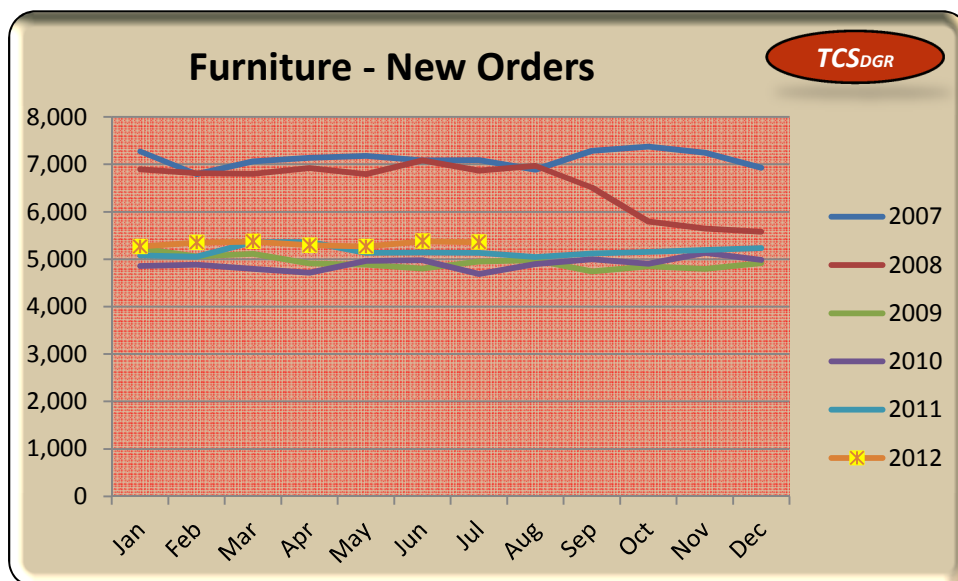
Fabricated metal new orders decreased 0.8% to \$27.5 billion. Book to bill ratio declined to 1.00 (long term average = 1.00). This industry tends to operate on shorter order to shipment cycles than the average durable sector, so the Book to Bill rarely gets out of line very far.



Capital goods increased by 3.5% to \$87.6 billion from an upwardly revised prior month. Book to bill ratio moved to 1.13 from last month's 1.06 (long term average = 1.01).



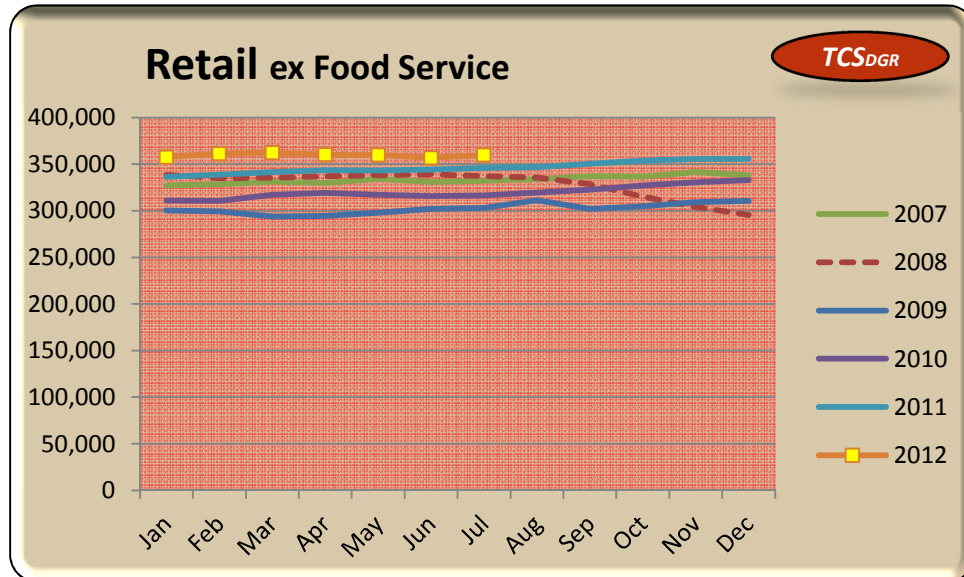
Furniture: New orders decreased 0.4% to \$5.4 billion from an upwardly revised prior month. The book to bill ratio remained at 1.01. Growth index increased slightly to 1.015 (slow growth). The weak housing market and commercial construction sectors don't signal any near term improvement.



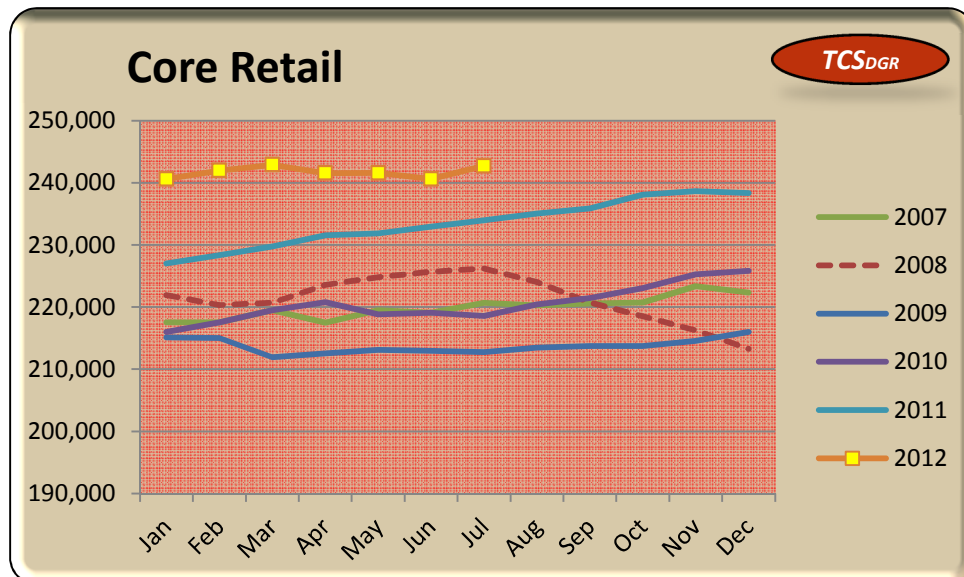
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Retail Data (Advanced Release)

Retail Sales (excluding food service) increased 0.8% to \$359.9 billion in July, after three months of modest declines.



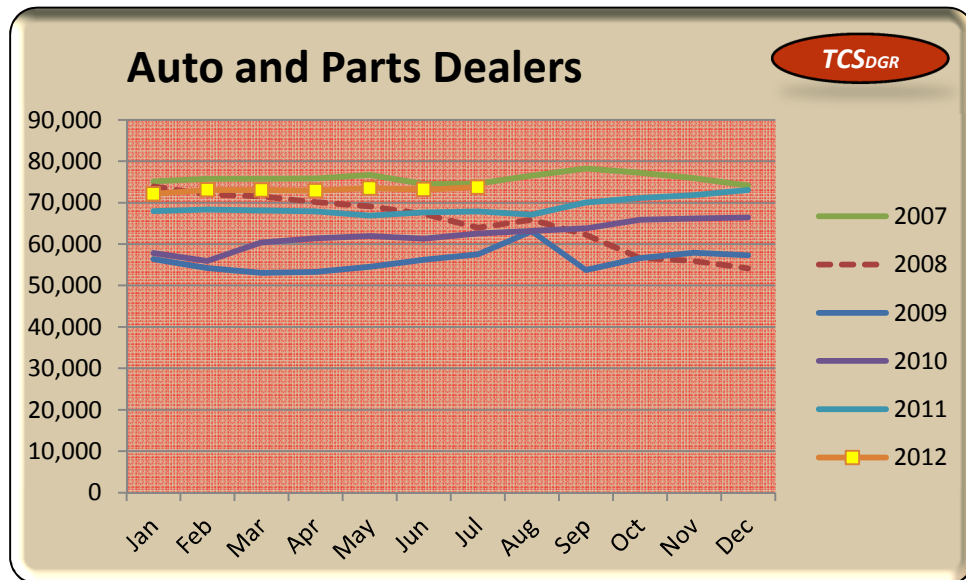
Core retail (excludes food service, gasoline, autos and parts) increased 0.9% to \$242.7 billion, after three months of declines. Inflation has begun to effect food prices (see Groceries).



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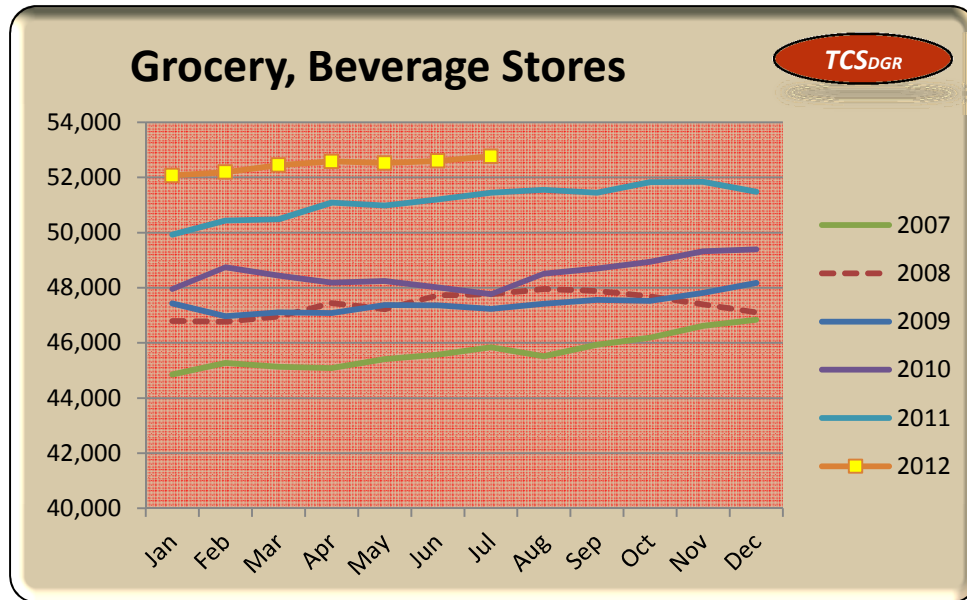
Gasoline sales increased 0.5% in March to \$43.4 billion. The brief relief in gas prices is over. Artificially constrained oil supplies are the clear driver in higher prices at the pump.

Auto sales increased 0.8% to \$73.7 billion in July, getting back to May levels of sales. Sales are approaching the levels of 2007, although the values are measured in inflated dollars. Serious growth in the North American auto industry will depend on improvements in employment.



Food and Beverage stores sales increased 0.3% to \$52.8 in July. Inflation in food seems to be running at more than a 4% rate. Recent reports (UN) on global food price increases of 10% in a single quarter. The continued diversion of grain supplies to fuel use is the primary culprit.

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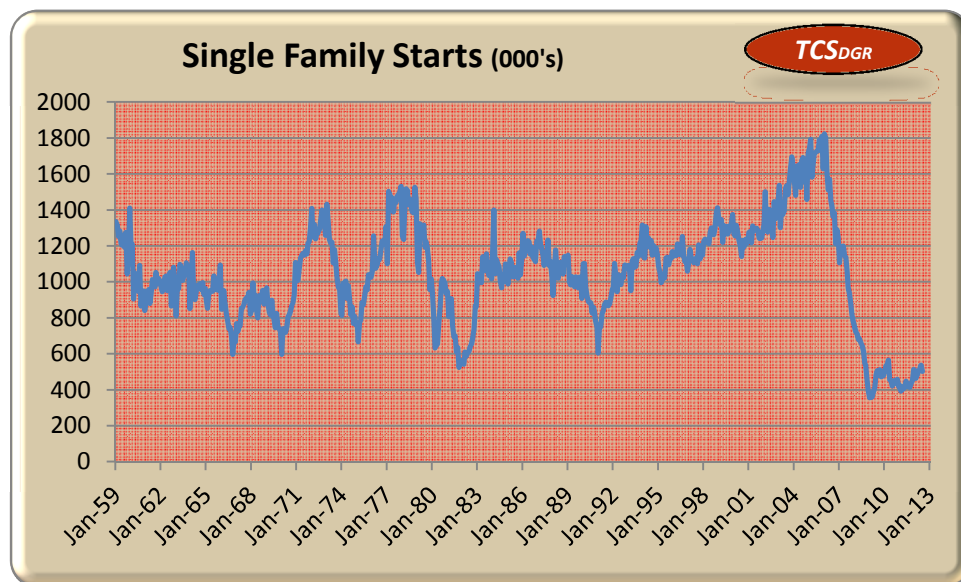
Housing:

Housing sector remains weak.

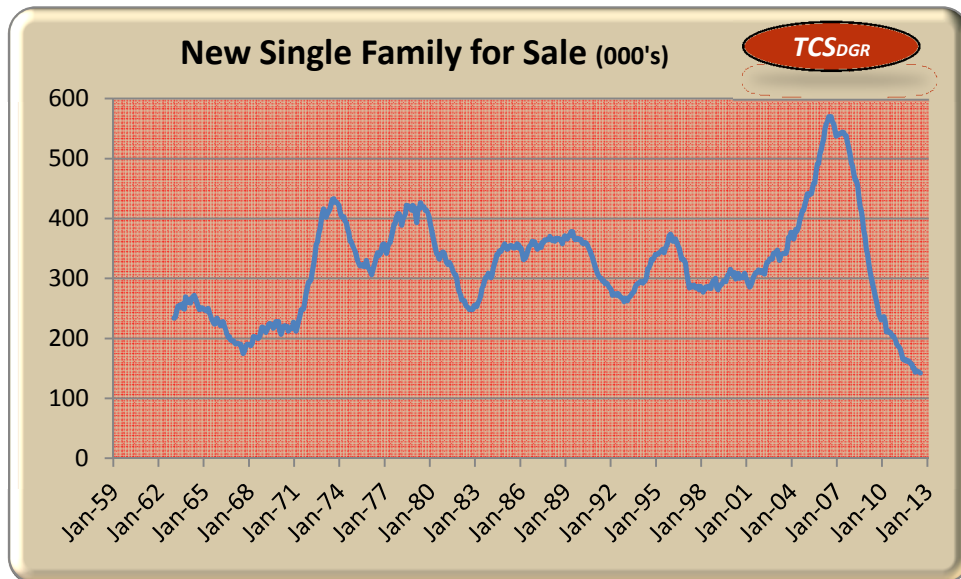
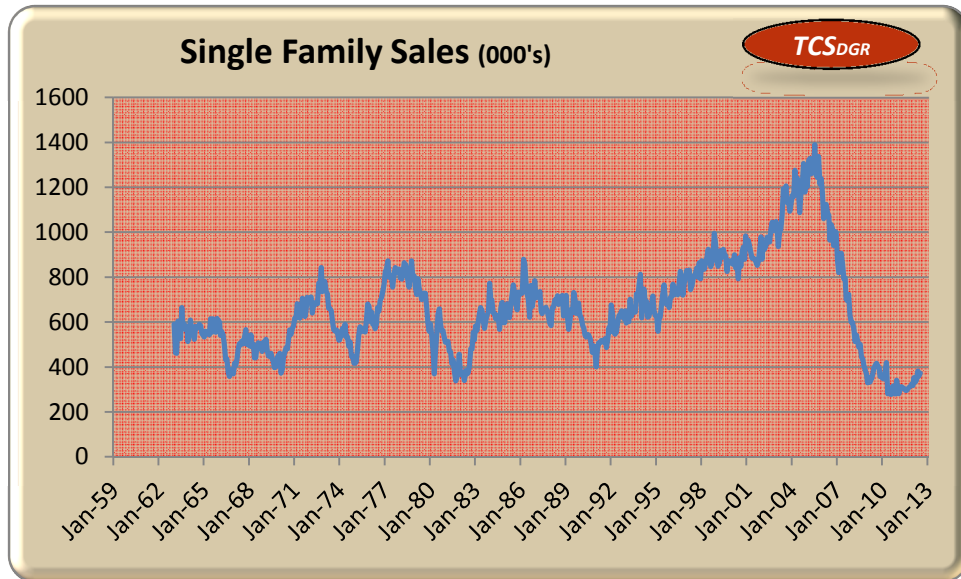
Single family starts decreased 6.5% to 502,000. New single family sales increased by 3.6% to 372,000 units. Inventory of unsold new single family homes decreased slightly to 142,000, another record low and the lowest since WWII.

The good old days of 1 million single family sold seem like a distant memory. And the portion of the market carried by single family housing, once at 85%, now stands at 67%.

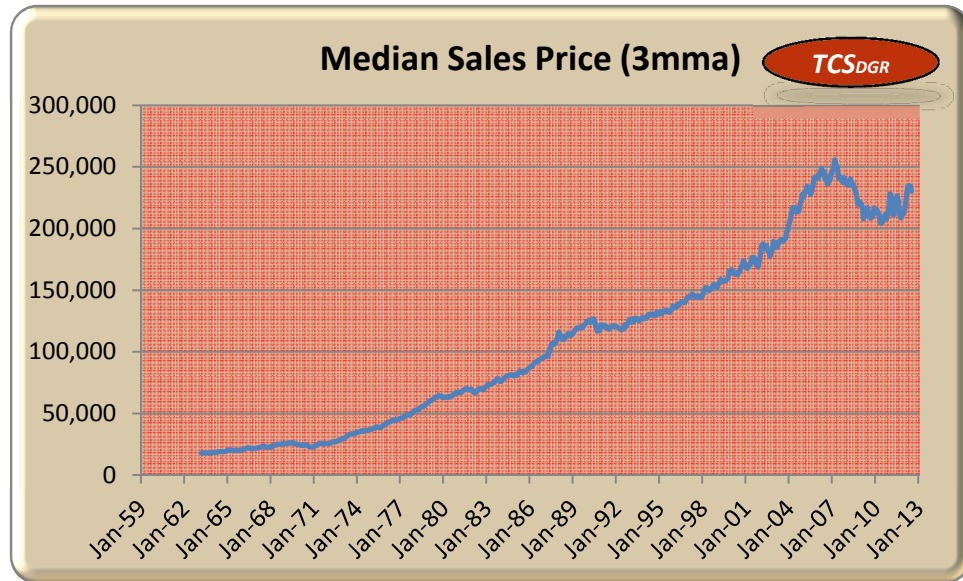
Median sales price (3MMA) decreased 1.6% to 230,400. Median prices are generally stable although the increases in Y/Y price comparisons have returned to neutral in the past 5 months.



The Durable Goods Report – A Service of Time Compression Strategies



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About Time Compression Strategies and the Durable Goods Report

TCS provides business consulting and information technology support to high performance organizations. Our focus is on manufacturing and telecom. Through our business partners we support health care, energy and other rapid-response business sectors.

The goal of the Durable Goods Report is to offer context for the published monthly statistics on durable goods manufacturing in the US. The analysis is historical in nature, and includes no forecasts beyond what may be obvious from current conditions. The analysis of historical patterns provides a necessary framework for understanding plausible scenarios. Since a high percentage of durable goods go through retail, this sector serves as a leading indicator of future durable goods activity.

The Durable Goods Report uses source data from the US Census Bureau, Bureau of Labor Statistics, and the Federal Reserve. Rig count data source is the Baker Hughes Corp. For data sourced from the US government, the “preliminary” publication is used wherever possible. The preliminary release occurs about 5 weeks after the end of the period. An earlier publication (advanced release) is available about 3 weeks after the end of the period, but is often subject to substantial revisions, and is not considered adequately reliable for growth trend analysis. Wherever the advanced release is used it is noted. Tracking reports are available for several durable goods sub sub-sectors. Contact TCS for details about this subscription based service.

Technical Note: The “TCS Growth Index” is measured as the ratio of the 3 month moving average divided by the 12 month moving average. This removes some of the natural noise in the industry data, but also results in a slight response lag. An index value greater than 1.000 is a sign of recent growth.

About the Author:

John Layden serves as CEO of Time Compression Strategies Corp (TCS), a management consulting and information technology company serving manufacturing, distribution, and their supporting technologies. He also serves as Chairman of Temporal Dynamics, Inc. (TDI), the developer of the patented Ancelus high performance database. TCS has developed a suite of high-performance real-time applications systems in support of their client industries.

Prior to launching TCS, Layden’s career included 22 years’ in manufacturing and another 20 years in enterprise software. Most recently he has served as VP of Supply Chain Management for SAP and VP of Supply Chain Market Development for Frontstep, Inc. He served as President of Pritsker Corporation, an early innovator in

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discrete event simulation and advanced planning and scheduling fields. He negotiated the Pritsker acquisition by Frontstep. He was a founder and CEO of Automated Technology Associates, Inc., a leader in the development of real-time quality control systems and factory management applications.

Layden has authored over 40 articles and papers on both the theory and practice of manufacturing and supply chain operations. He was described by one editor as one of the “founding fathers” of the advanced planning and scheduling (APS) industry. He also authored the supply chain chapter in Maynard’s Industrial Engineers Handbook. He speaks worldwide on the subject of world class operating strategies. He has been the keynote speaker at numerous conferences including the Automation Hall of Fame Awards.

As a software company CEO, Layden delivered to market the first real-time advanced planning and scheduling system; the first real-time SPC system; and the first real-time, fourth-normal-form database system. He is the originator of the Return on Capacity modeling process for analysis and improvement of supply chain profitability and delivery performance.

As a key partner to Motorola, Layden developed the quality control concepts that became the Six Sigma Initiative. He introduced the same concepts to GE and the Cadillac Division of General Motors. These initiatives contributed to the Malcom Baldrige awards won by Motorola and Cadillac, and to the highly publicized Six Sigma program at GE. He introduced the Six Sigma concepts to software development and delivered the only application software release to meet these exacting quality standards. Layden holds three patents and is the only American to hold a Japanese patent in quality control.

Prior to his tenure in manufacturing software, Layden spent 20 years as an engineer, operating executive and board member with three Fortune 200 manufacturing companies. The TCS advisory services retain the practical, no-nonsense approach familiar to world class operating executives. His operating roles in manufacturing included plant manager, director of business planning, and VP of Supply Chain Management.

Layden currently serves on 3 boards, and advises several high-tech startup companies.

Mr. Layden holds a BS degree from Purdue University in Electrical Engineering and an MBA from the University of Wisconsin-Milwaukee (Executive Program). He is active with the Purdue University President’s Council, and has served as a guest lecturer in the MBA programs of Villanova University, Columbia University, New York University, Ball State University, and others. He can be reached at 317-842-6417

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