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Economic and Market Commentary

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Scientists will tell you the last Ice Age occurred some 20,000 years ago and covered much of North America and Northern Europe. A mile thick sheet of ice crept its way down from the north, scraping everything before it right down to bedrock. It is estimated that the glaciers extended as far as Latitude 37 degrees north which means future cities like New York, Chicago and Boston lay beneath more than a mile of ice.

This last ice age lasted some 8,000 years before the ice pack began to melt about 12,000 BCE and started to retreat. What was left behind were bays, canyons, lakes and what became riverbeds when the ice melted, these depressions began to form flowing rivers and streams. The earliest highways of modern man.

DRAW A LINE

If one were to draw a straight line from Crecent City, California and extend it east (at approximately 42 degrees north latitude) you'd pass right through central Massachusetts. There, one would encounter the head waters of the Assabet, Sudbury and Concord rivers along with rolling hills, fertile farmlands and bountiful deposits of quartzite, one of the rare earth minerals of their day. Why were these deposits important? Because prehistoric people inhabiting the area recognized quartzite's value in crafting both tools and weapons from them. We're talking about skinners used to process games into clothing and shelter. Arrow heads, spearheads and fire starters used when struck against hard rocks or iron pyrite. Remember these basic tools meant the difference between life and death for prehistoric hunter gatherers.

THE EARLIEST PEOPLE

By 7000 BCE, around the early days of agriculture by the Tigris and Euphrates rivers in Mesopotamia, prehistoric people were already canoeing the rivers of what was to become central Massachusetts. Soon, Native American trails crisscrossed throughout the lands. It was the Nipmuc Indian tribe that ultimately settled the land more than 2500 years ago with the heart of their activities centered at the cross-roads of their trails that European settlers ultimately called Westborough. From Westborough ancient trails could be followed east to

Massachusetts Bay, south to the Connecticut river, (leading into Long Island Sound) west to Cananda and with Fay Mountain (the highest point in eastern Massachusetts nearby) Westborough was an easy place to find. Twenty-five hundred years later, the Nipmucs, a state acknowledged tribe, meet at their ancestral home for their annual gathering.

THERE GOES THE NEIGHBORHOOD

By the 1630's, Europeans were exploring the Westborough area and in 1717, with 27 families residing there, Westborough became the 100th recognized town in the Massachusetts' colony. By the mid-1700's, a new family moved into the area and through hard work, astute business acumen along with extremely fertile soil developed one of the most successful farms in New England. The family was blessed with their dream of a household made chaotic with a house full of children.

With their wish come true, a new child was born and named by his mother Elizabeth Fay, Eli. Eli proved to be quick-witted, creative and determined. He and his mother, Elizabeth, were as thick as thieves but she wound up dying young when Eli was just 11. Clever and inventive, his dad gave him additional support and encouragement when it came to young Eli's innate entrepreneurship. By age 14, Eli had established his own nail making company in one of his dad's workshops. The company was profitable and Eli had reason to be proud, yet he was smart enough to know he had a whole lot more to learn.

With that in mind, he knew he was in luck and there was a great university barely 100 miles away. So, with that knowledge in mind, he set his heart on going to Yale University in New Haven.

THE ROAD BLOCK

With his plan and preparation well in hand an unexpected impediment arose. Eli, Sr., Eli's dad, got lonely after the death of his dear wife and had gotten remarried. Problem was the new Mrs. Whitney didn't think Eli or any other of his siblings should go off to college. They should add to the prosperity of the farm.

Talk about having the air let out of your balloon. With his stepmom adamantly against college and his dad mute on the point so as to not irritate his new wife, he offered no support. It was clear young Eli needed a Plan B.

PLAN B

His parents now were against him and with no financial support and a life ahead not of his choosing, Eli felt he had about one choice: move out of the house, find his own place and get a job. (A parent's dream today but reason for ostracization back then.) Nonetheless,

that's exactly what he did, only he didn't get one job. He had a multitude of jobs all revolving around nails, the industry that inspired Eli as a 14-year-old to start his own company. He made them, wholesaled them, retailed them and saved as much as he could. By age 23 he had saved enough money to pay for his full education at Yale and would end up graduating three years later.

OFF TO SEE THE WORLD

Like the graduates of today, many of Eli's schoolmates wanted to travel upon graduation, and so did he. He had made friends with some southerners during his time at Yale and decided to take their invitation to visit Georgia. Never having been south before, he was amazed to learn of the tedious nature of plantation life, the inefficiencies and their reliance on enslaved labor. At a visit to Mulberry Grove, a plantation then owned by the widow of General Nathaniel Green, who was a hero during the Revolutionary War as well as a close confidant of General Washington, he was introduced to the exceedingly slow and laborious process of separating the seeds from the short-stable cotton. It took roughly one full day for a skilled cotton worker to process 1 pound of seed-free cotton lint. Eli's Massachusetts sense of efficiency incensed, (keep in mind Eli was a Northerner, Massachusetts had outlawed slavery in 1783) and he found the institution abhorrent. Additionally, as a factory owner, he knew the processing system of cotton currently in place was unstainable and to make it sustainable it needed to be mechanized.

CALL IT NAIEVETE OR A CASE OF UNINTENDED CONSQUENCES

Eli was sure that it wouldn't be that difficult to craft a machine that could be manpowered, simplistic in design and capable of processing far more cotton per day which would greatly reduce or eliminate completely the number of enslaved people the plantation system required.

So, with these two complimentary concepts firmly ensconced, Eli set about his task. At the time, he was a private tutor to Catherine Greene's children at Mulberry Grove. Mrs. Greene had such confidence in young Eli and agreed with this thinking so much she lightened his teaching load, gave him use of a workshop, tools, and workers along with money for all the materials he needed. Eli was not going to disappoint, at least not in the way he ever imagined.

JUST A MATTER OF WEEKS

The design came quite quickly to Eli, a dramatic contrast to the 8000 plus types of filaments Thomas Edison and his team tried before finding carbonized bamboo to be used in the first electric light bulb. Eli wanted his machine to be light enough to be hand-cranked, portable, and efficient with as few moving parts as possible.

Now picture a long wooden, open topped, rectangular box. In the box is a wooden drum turned by the hand crank mentioned earlier. The drum has metal hooks on its surface. The hooks put the cotton through a metal mesh whose openings are large enough to allow the cotton fibers through but small enough to not allow the seeds through. Now a worker could process over 50 pounds of cotton in one day instead of just one. The price of well-made cotton clothing should drop dramatically, and America will become a major force in the industrial revolution. Eli and his backers would make a fortune and there would no longer be a need to enslave people. Regrettably, only one of his aspirations turned out the way he had hoped.

WHAT WENT WRONG

To begin with, American patent laws were virtually non-existent at the time and non-enforceable. His cotton gin was easily copied. He and his partners tried in the courts but to no avail. The final insult came in 1807 when Congress did not renew his patent. Eli was frequently quoted as saying "an invention can be so valuable as to be worthless to the inventor." Eli was resilient as well as brilliant, and now had a lucrative contract with the government by the late 1790's. Eli's new company would be paid top dollar to produce 10,000 muskets for the country's new provisional 10,000-man army. Our standing army was only 3,300 men at this time. The problem was relations with our previously staunch ally, France, had deteriorated since the XYZ affair. (The Watergate of its day.) American merchant ships were being attacked by French privateers in the Caribbean. French envoys were looking for bribes to see to it the peace accord between France and the United States, going back to the Revolutionary War years, be upheld. The U.S. Congress, upon finding out about the conspiracy through the XYZ letter, immediately withdrew from the peace accord and what became known as the Quasi-War began. That's why the huge contract for the muskets and the government saying spare no expense, we need these guns yesterday.

Here's the problem: up until then, all muskets were handmade and no two pieces were the same, meaning you couldn't use interchangeable parts. You had to metal smith the lock place, cock, frizzen, flash plan the list goes on and on. No room for error. All the parts had to fit together perfectly. Time-consuming you better believe it.

IT TOOK A VILLAGE

Taking his keen eye for necessity, simplicity, and efficiency, he took his challenge to task. The first thing he recognized was the necessity for machines making only one part with each part exactly the same. When all the parts were done they could be assembled quickly by a minimum of skilled people tasked with a single job.

The machines were made, craftsmen trained in their function and all materials were successfully assembled. Now, all that was needed was a workshop/factory to start production. Never one to think small, Eli hit on the idea of developing a "factory town" where workers could live well, live close to work and support community business and

activities. A few miles from Hamden, Connecticut, he built his armory. Close by he helped develop Whitneyville where his other companies built every manner of labor-saving tool like filing jigs, milling machines and trip hammers. Eli founded apprentice and journeymen programs to ensure a reliable workforce.

America's first factory town was developed and still prospers today with a population nearing 25,000, an extremely high literacy rate and a median household income far above the national average. Whitneyville became the prototype for hundreds of self-contained industrial towns throughout New England for the next 100 years. Perhaps a bit overstated for Eli's taste, he came to be recognized as the "Father of American technology." It's these towns and technologies that were instrumental in the defense of our union some 60 odd years later. Through Eli Whiteney's vision he helped lay the foundation of mass production, replaceable parts and standardization, hallmarks of the Industrial Revolution.

This was the one aspiration that did work out for Eli. Regrettably the third unintended consequence was the worst and still creates an overhang for our country. What Eli put in motion was not the Industrial Revolution that had its roots in England more than 40 years prior (we'll talk about that in a minute.). What Eli put in motion was the bifurcation of America. It was easy to see how the manufacturing processes of Whitney would benefit the North. After all, they had natural power by means of their rivers, they had a skilled workforce that was not dependent on enslaved labor, and they had access to capital. People wanted a better, more dependable life, and they embraced manufacturing and industrialization wholeheartedly. Where the unintended consequences came in was from the South. In Eli's mind, with the efficiency of the cotton gin, he could see the Southerners would no longer need enslaved workers when a machine could do the work of 50 men. Regrettably, when the efficiencies of the gin were recognized, plantation owners thinking went like this: If one machine can do the work of 50 men, if we enslave 20 more men, we can up our production by 1000%. So instead of eliminating slavery, the gin actually strengthened the economic foundation of slavery which gave a crumbling system new life and was ultimately a major factor in making the Civil War virtually inevitable.

SO WHEN DID THE INDUSTRIAL REVOLUTION REALLY BEGIN

Most anthropologists will tell you the Industrial Revolution marked the biggest event in human history since people stopped wandering and embraced agriculture. An 11,000-year gap for those that are counting. The start of the Industrial Revolution really started with the invention of the steam engine brought into practical use around 1760. The country that capitalized on it first was Great Britain. Why?

- They had a skilled labor force that included apprentice and journeymen training.
- Great power source in hydro-power generation – harnessing their rivers and using waterwheels to convert the natural energy into usable energy.

- James Watt took Thomas Newcom's earlier steam engine invention and was able to modify it to produce rotary motions which then powered the paper industry, iron works and distilleries.
- They had an abundance of cheap fuel producing 80% of all the coal in Europe.
- They could produce better and cheaper steel.
- Inventors had every motivation to produce machinery that would cut down on high labor costs.
- Soon the locomotive came along revolutionizing transportation, the reaper revolutionizing agriculture, and the telegraph revolutionizing communication.

At first the transformation was rocky. Huge amounts of the population moved into the cities where the jobs were. Factories were dirty and unsafe. Working hours were long and hard. Child labor was deployed. Undoubtedly the human cost would be severe in spite of the incredible scientific advancements if sensible reform did not emerge.

ENTER THE LUDDITES

Perhaps you've never heard of them, but their second incantation is amongst us today. The Luddites were comprised of skilled weavers and highly trained artisans that saw their jobs replaced by unskilled laborers operating machinery with the scantest of training, at a fraction of the wage these highly skilled workers were previously making.

At first the Luddites (named for a mythical leader Ned Ludd) tried to negotiate with factory owners. They got no where which led to frustration and outrage and eventually vandalism. The Luddites began to destroy machinery and the government acted swiftly punishing equipment destruction with a sentence of death.

Over time, cooler heads prevailed. Safety standards improved and child labor was abolished, the 8-hour workday was instituted, and compulsory education required. Wages grew; the standard of living improved dramatically for the middle class due in large part to the cost efficiencies of mass production. Jobs that were eliminated were actually replaced in greater numbers because of the new workers required to manufacture and then operate the new equipment. Economists refer to this as "The Luddite Fallacy" which is the mistaken belief that new technology causes permanent unemployment.

LET ME BRING IT HOME

When I wrote the 4th Quarter 2025 commentary, I started what I thought would be a two-part series on AI. By the time I came to write my 1st Quarter 2026 commentary, the war in Iran broke out and AI needed to take a back seat. While continuing my research, I realized there was too much to unpack in a two-part series. Just like the Industrial Revolution was the most significant occurrence to humankind since the dawn of agriculture, most

scientists believe AI has the potential of having a far greater impact. But with opportunity comes danger. The danger of having machines smarter than us, the danger of misinformation, the danger of inadequate safeguards.

My final AI installment will address these many concerns including job displacement, controls, energy consumption as well as a realistic assessment of AI's capabilities over the next 5 years. ***SPOILER ALERT*** "The Luddite Fallacy" is alive and well.

Wishing you a happy and healthy summer. As always, with best regards,

Ray