



10-1-2014

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Recommended Citation

Dimaculangan, Pierre (2014) "The Needham Question and the Great Divergence: Why China Fell Behind the West and Lost the Race In Ushering the World into the Industrial Revolution and Modernity," *Comparative Civilizations Review*: Vol. 71 : No. 71 , Article 10. Available at: <https://scholarsarchive.byu.edu/ccr/vol71/iss71/10>

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The Needham Question and the Great Divergence: Why China Fell Behind the West and Lost the Race In Ushering the World into the Industrial Revolution and Modernity

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At over four thousand years old, China is the oldest continuous living civilization in the world. In that span of time, the people of that civilization have created a sophisticated and highly developed culture unparalleled by any other neighboring nations for millennia. With a recorded history that has remained largely unbroken since the days it began, China has exercised great influence over Asia and has commanded its respect and tribute for many centuries. With a highly developed culture, many significant advances emerged in government, art, and science that were beyond the caliber of its contemporaries throughout the ancient, medieval, and pre-modern eras. This paper attempts to explain how Chinese and European maritime voyages, military technology, colonialism, industrialization, philosophy, economic systems, and religious motivation eventually allowed the West to dominate global affairs and overtake China by the beginning of the modern era.

The Zhou Dynasty, a contemporary of the Classical Greek and Roman civilizations, gave birth to the likes of Lao Zi, Confucius, Mencius, Zhuang Zi, and Sun Zi who laid the foundations of Chinese thought and culture for the next two and half thousand years. The establishment of the Han Dynasty, a contemporary of the Roman Empire, marked the first golden age in Chinese history based on Confucian philosophy, and gave China its identity establishing it as the dominant super power of Asia. While Europe toiled in the Dark Ages, China flourished in the Tang Dynasty - an era of unprecedented wealth, freedom, and cosmopolitan culture unlike anything else in the world during that time. Its successor, the Song Dynasty, was highly industrial and inventive, marked by significant advances in engineering and military technology.

China was considered by its people as “the birthplace of history, the font of religious wisdom, the inspiration of philosophical insights, the source of technological innovation. It was the Middle Kingdom. The Celestial Empire. The Center of the World” (Hawley, 2005, p. 26). The Chinese saw themselves as the preservers of culture and considered all other people “barbarians”. If this perspective of China is true, why then did the Chinese not lead the way to an Industrial Revolution that would pave the road towards the modernity we now live? What factors contributed to China’s declined international influence causing the “great divergence” that allowed the European West to dominate world affairs? These questions are collectively known as the Needham Question, named after Joseph Needham - a British scientist and Sinologist who is best known for his many books on Chinese history, culture, and contributions to the world.

Investigations of the Needham Question can begin in the early 15th century. It is here we see the initial stages of China's lost opportunities to become the undisputed economic, cultural, and military world leader. At this time, China had just ousted the century old Mongol-dominated Yuan Dynasty. A new era called the Ming was established by the native Han people. That began what many consider to be the third golden age in China's history, "an era of Chinese cultural revival" (Yuan, Knapp, Landman, and Veeck, 2010, p. 59), and it "was the most powerful empire in the world" (Parker, 2010, p. 2). In the year 1405, almost a century before Christopher Columbus set sail, the Yongle Emperor Zhu Di, of the Ming Dynasty, proposed to send a majestic fleet unlike the world had ever seen to travel through the ancient Arabic trade routes of the Pacific and Indian Ocean to proclaim China's greatness to the nations abroad. These naval missions weren't for exploration but "power projection" (Dreyer, 2006). The purpose of the mission was to establish and enhance diplomatic and trade relations with the nations inside the Indian Ocean trade network, and to proclaim China's power to all its people. This armada was larger and more powerful than the combined fleets of Europe during that the same time.

The fleet was dynamic and versatile with three hundred ships of various sizes and purposes. Some were treasure ships, believed to be either 448.8 to 493.5 feet or 390 to 408 feet in length, much larger than any other ship in the world at that time (Levathes, 1994, p. 80). Others were used as transports or battleships armed with an array of bronze cannons. The fleet, led by court eunuch Admiral Zheng, made seven epic voyages to Southeast Asia, India, Arabia, and the East coast of Africa over the span of almost 30 years. In 1433 the naval expeditions of Zheng He came to a sudden halt. The Admiral unexpectedly died during a stop in India. Meanwhile, a new Emperor had ascended the throne and ordered that the armada be recalled to China, that all ocean-going expeditions be canceled, and that the ships be either left to rot in the shipyards or burned to the ground. The promise of China creating an overseas empire and becoming the world's undisputed naval power ceased to exist. Even so, many countries continued to make tributary missions to the Ming throne while the Indian Ocean trade network proceeded long after the expeditions were canceled.

According to historians, the cancelation of the naval voyages was considered to be one of the biggest blunders and major turning points in world history. "China was poised to seize control of the seas and colonize the world years before the Portuguese, Spanish, Dutch, and British" ("China", 2006). The Emperor's decision to end the voyages is also the first of many events that caused China to unintentionally and indirectly relinquish its potential domination of the world to the Europeans. Why did the Emperor cancel these great expeditions? Why did the Chinese government not employ the pattern of expansion and colonization the Europeans would later impose upon the world? Many would argue that the Chinese culture in general was simply too pacifist, inward-looking, and perhaps even backwards to have created an overseas empire. Is this true? Was it so simple?

There are many theories as to why the Ming Emperor made his decision to command such a drastic change in policy. One logical reason is that the lavish expeditions were simply too expensive to maintain, placing to great a strain on the Imperial treasury. The Ming were also troubled with domestic issues, especially the continual raids from Mongols in the North along with incessant marauding of Japanese pirates on the East Coast that plagued major shipping lanes and coastal villages. These problems may have compelled the Emperor to cancel the voyages and focus the government's attention and finances on the country's national defense.

Another possible reason for this change in foreign policy was the influence of Neo-Confucianism on the government's thought, and the management its affairs. Its teachings were conservative and indeed inward looking, having a general neglect for foreign affairs, and an emphasis on internal matters to promote self-improvement. This philosophy neglected the outside world and greatly limited China's interaction with foreigners (whom they viewed as unimportant and insignificant) and therefore, the exchange of knowledge and the promotion of trade was hardly present, at least legally.

After Ming China had closed its doors, Europe began to send voyages of its own a few decades later. These early voyages marked the beginning of European expansion and influence around the world as Europeans began to seek new trade routes and opportunities through significant participation in the Indian Ocean trade network. Furthermore, the discovery of the New World fueled the European drive to make even more voyages to bring wealth to their respective monarchs, while extending their influence internationally (albeit at the expense of the native people of the New World, Africa, and parts of Asia). The elements that brought Europe to power and dominance in the world will be discussed later.

Nevertheless, Ming China continued to be a powerful, influential international power throughout the 15th, 16th, and even the 17th centuries. The Spanish, Dutch, and Portuguese vied for the chance to trade with the Ming Dynasty but were limited to a few trading ports along the Southern coast. Evidence for China's continued role as a super power, and misplaced pride in international affairs, stood strong and was demonstrated through a ritual in the Imperial Chinese policy known as the "kow tow" in order to grant trade requests from foreigners. It was a somewhat humiliating gesture the Europeans and other foreigners had to exercise as a prerequisite in establishing and maintaining diplomatic and trade relations with the Chinese (Wills, Jr., 2011, p. 29). It forced them to kneel and bow with their foreheads pressed against the ground in submission, admitting the superiority of China and the Emperor.

Further demonstrations of China's authority on the world scene took place at the first and second battle of Tunmen or Tamao against the Kingdom of Portugal in 1521 and 1522, when China took naval action against the Portuguese sailors in defense of her national interests and the interests of her tributaries, in particular the Sultan of Malacca from

present day Malaysia. Both battles proved decisively victorious for the Ming Navy (Wills, Jr., 2011, p.27-32). Even over a century after these battles, Ming Loyalist, warlord and pirate Zheng Chenggong aka Koxinga, led an overwhelming force of troops to invade Holland's greatest colony of Formosa (Taiwan) to successfully reclaim the island as Chinese territory from oppressive Dutch colonists in 1661 and 1662. This is now known as the Sino-Dutch War (Andrade, 2012).

In the 16th and 17th centuries, China was able to exercise its military capabilities and enforce its sovereignty over its territories effectively against the emerging Western powers. Many historians even argue that China, including most of East Asia, developed on par with Europe until the beginning of the 19th century -- with both regions having the same industrial output and economic growth. With the sovereignty of China firmly defended against emerging Western powers and its economy staying very competitive, when did China's decline and Europe's ascension occur? What motivating factors did the West have to monopolize trade and colonize the world? What contributed to their seemingly overwhelming success?

The very beginnings of Europe's emerging success can be traced to a series of events that took place over the span of time that historians have labeled the Renaissance. The word Renaissance is a term used to describe the supposed gradual re-kindling of Europe's Greek and Roman heritage, culture, and thought and first took root in Italy in the 15th century. This was made possible through the large amounts of both fiscal and intellectual wealth gained from the lucrative trade the Italian city-states made with the Ottoman Empire. This relationship allowed the Italians to afford the various artists and polymaths that pioneered the Renaissance (Meyer, 2012). The Renaissance sparked Europe's renewed interest in art, culture, philosophy, and science, and was further encouraged by the invention of Johann Gutenberg's movable type printing press. This allowed books to be printed and mass-produced for the public. This greatly stimulated education and literacy rates and played a major role in gradually bringing Europe's less privileged population out of the so-called "Dark Ages".

Some historical evidence also reveals that the Reformation changed learning in Europe. Gutenberg's version of the printing press, which helped bring about the Reformation, "brought a renewed interest in reading and learning, and the Renaissance of learning that had already begun in Europe served as an impetus to what was about to happen spiritually" (Horton, Dyet, and A Beka, 2005, p. 39). The Reformation helped promote growth, learning, and scientific advancement since its doctrines did not inhibit education and learning the way the Roman Catholic Church did. The Reformation also encouraged people to read, learn, and think for themselves, instead of relying on the Church to do it for them.

The economic and social effects of the "Renaissance" helped create a growing interest to participate in the Indian Ocean trade network that was then dominated by Muslim

merchants. One notable voyage undertaken in 1492 by Christopher Columbus sought a new route to the Spice Islands in present day Indonesia. Instead he accidentally found his way to the Americas.

Columbus is one of many mariners to set sail from Europe to find trade and bring wealth to their respective countries. History shows that the motivating factors behind these voyages, factors such as wealth, religion, and reputation, were not unlike those of the Knights who fought in the Crusades. The advent of these voyages created large amounts of competition amongst the nations of Western Europe with each country working harder and harder to gain wealth and influence overseas. These voyages did not go unnoticed by the Church, which saw an opportunity to spread their centralized religion abroad. Along with the sailors and soldiers went Jesuit missionaries inspired with renewed religious fervor to convert the peoples of foreign lands to Christianity, or at least the Roman Catholic Church's version of it. This European mentality and inspiration for voyage, conquest, and religious conversion was quite contrary to the Neo-Confucian thought that dominated the government of China. Individualism and humanism, ideals brought by the effects of the Renaissance, empowered Europeans to think and act for themselves. This would in turn benefit the society in which they live and therefore fuel the establishment of many businesses and companies that would come to profit from overseas trade and colonialism backed up by a capitalist style economy.

The wealth and overall success of the maritime voyages further developed the European states and allowed them to grow in power and influence, particularly in the field of war. The heated competition in Europe began with the establishment of colonies in the Americas, parts of Africa, and Asia. Most importantly, the competition created much advancement in military technology -- notably in gunpowder and weaponry -- throughout the 16th and 19th centuries. Military power played a tremendous role in the success of the Western nations, and it insured their ability to conquer, maintain control over their acquired lands, and to retain an even gap of competition amongst themselves. Matchlock, wheel lock, and flintlock mechanisms for hand-held firearms, breech-loading cannons, and the corning of gunpowder for a much more concentrated explosive force are a few of the innovations from the colonial era. These weapons played an important role in the decline of Chinese influence and the ascension of Europe's.

China was the birthplace of gunpowder. It was also in China that gunpowder warfare saw its beginnings. From the Song Dynasty forward, China began mass-producing the first cannons, bombs, handguns, continuous flame-throwers, rockets, and land mines for use in warfare against the Mongols in particular. These weapons were adopted by Mongol forces and continued to be steadily developed under the Yuan Dynasty. By the beginning of the Ming Dynasty, the weapons had developed into multi-barrel hand cannons, grenades, sophisticated land mines, and rocket-propelled arrows and missiles. After the 15th century, the development of Chinese gunpowder weapons stagnated and military technology changed very little (Lorge, 2008). Western advances in weapons, however,

made gunpowder more potent, and made cannons and muskets more powerful, accurate, reliable compared to their counterparts in China. In fact, by the 1500's the Ming began adopting Western designs for their cannons and matchlock muskets with firing methods obtained from the Ottomans.

If strong military and advanced weaponry were an important factor in securing a dominant position amongst the powers of the world, why then were the Chinese not furthering the development of their own inventions the way the Europeans did? By the 1500's Europeans had musketeers and cannons at the forefront of their warfare, with steel weapons assigned only for use in close combat. In China it was rather the opposite. Steel weapons still comprised the mainstay of warfare with various gunpowder units assigned to accompany the traditional units. What caused the widening military technological gap between these two regions?

Firstly, China did not have the same motivating factors as the Europeans to further improve their weapons. China did not have military competition from any neighboring countries that would create a necessity to improve the weapons they already had. Secondly, China's enemies were made up of Mongols and various tribes from the Northern and Western borders that used traditional weapons. These people were almost 100% cavalry-based warriors who used bows, spears, and sabers. The domestically produced bombs, cannons, and rocket arrows at the time were more advanced than the equipment used by the nomads. Third, the only other real, dangerous foes China faced were the rampant pirates from Japan pillaging coastal towns. Some had even made it deep inland after encountering little military resistance from the Ming armies. These pirates were mostly made up of Ronin or dishonored Samurai who had turned to a life of piracy in order to support themselves. Pirates also used traditional weapons such as bows and swords. With non-professional enemies such as these, the necessity or motivation to improve firearms did not exist. Lastly, China during the Ming was a nation that did not hold military careers in high esteem. Except perhaps the highest-ranking military officials, soldiers were considered low class and high in status only in comparison to peasants and merchants. In the Chinese view, a military career was a secondary choice for men who were unable to pass the civil service examination required to earn a prestigious position in the government. This meant that military decisions were made by government officials with no military or combat experience. These officials were only well versed in government policy, Confucian philosophy, and a thorough understanding of the Classics. Soldiers with individual skills in combat and martial arts were also favored more often than those who had actual leadership abilities. This mentality, and the widespread mismanagement of military matters by neglectful and irresponsible government officials, had a significant negative impact on the effectiveness of Ming soldiers, their morale, and the development of technology in the field of war during the latter half of the Ming Dynasty (Hawley, 2005).

Author CJ Peers (2006) effectively summarizes why Chinese weapons technology stagnated while the same technology in Europe improved. "After about 1400 Chinese military technology began to stagnate – a consequence of the low social status of soldiers, the lack of sophisticated enemies to stimulate development, and the suspicion with which the emperors... regarded innovations, especially those which might weaken the power of the state. Although in Europe gunpowder strengthened royal control by enabling governments to destroy the castles of the nobility, in China it tended instead to aid the defence; the enormous thickness of rammed earth fortifications resisted cannon fire in a way which the vertical stone walls of contemporary Europe could not" (p. 185).

The unique situation and the enemies the Ming Dynasty faced provided little motivation to further advance the gunpowder weaponry beyond those manufactured in the 15th century. Ultimately, Europe's key advances in weapons and its military power played an important role in establishing itself as a superpower in the world by enforcing its will from the end of a cannon, from the 16th century conquests of the Americas to the Opium Wars of the 19th century.

Another major factor that contributed to China's decline was the fall of the Ming Dynasty -- a gradual process made up of internal and external pressures both natural and political such as famine, flooding, earthquakes, government corruption, peasant revolts, and rapid inflation that finally took its toll in the early 1600's. By the year 1644, an ethnic group from the Northeast called the Manchu took over the government of China and established the Qing Dynasty.

The Manchu were direct descendants of a nomadic group called the Jurchen Jin, rivals of the Mongols during the time of Genghis Khan. Under their regime, China expanded her borders to its largest size. However, many changes they made to government policy, and society as a whole, were detrimental to the progress of Chinese culture and science. Under the Qing Dynasty, China experienced prolonged scientific stagnation and even regression while European powers grew larger and stronger as they continued their policies of colonialism and imperialism across the world.

There are many factors that contributed to China's continued "equilibrium" under the rule of the Qing. One notable factor was the increased government intervention and participation in the private sector. Although China's population, economy, and industrial output bloomed under the Qing, the private sector did not exist under a *laissez-faire* system, nor did it enjoy the same opportunities as those of the West. The European drive to obtain wealth increased the demand for technology and the further advancement of military.

One of the largest contributing factors to Europe's growth, and creation of the Industrial Revolution, was the implementation of the *laissez-faire* system, where government involvement in the private aspects of the economy was very limited, but exercised

sufficient control in order to protect the property rights of businesses and individuals. This system allowed the accumulation of wealth and power for privately owned companies obtained from colonialism, and thus paved the way for the funding of and motivation for the Industrial and Scientific Revolution experienced by the West throughout the late 18th and 19th centuries. The elements needed to create this revolution were not present in China at the same time. The culture imposed by the Manchurians was largely traditional and lacked the innovative and progressive spirit that generally marked the Han Chinese mentality. It also meant that the Manchu had a general neglect for the improvement and manufacturing of firearms since their culture largely depended on the bow for hunting and combat. This mentality contributed to their humiliating defeats in the Opium Wars.

The Industrial Revolution rapidly accelerated the advancement of the European economy, science, technology, and military, advancing them far beyond their contemporaries. An example of the developmental gap between the West and the East was demonstrated in the Opium Wars where British forces easily crushed the military of the Qing during different confrontations in the 1800's. The Opium Wars, and Britain's colonization of some of China's key cities, marked the beginning of an era the Chinese call "The Century of Humiliation". Even Japan had rapidly industrialized by the late 1800's when the Japanese Emperor opened its doors to Westerners and trade relations were re-established (to the disapproval of the Tokugawa Shogunate). China continued to fight for a place in a rapidly changing world throughout the 19th and 20th centuries as it struggled, until 1911, to break the bonds of feudalism and government control of the Qing Dynasty, defended against Japanese invasions, and endured the takeover of the destructive Communist Party in 1949. In the West, the events leading up from the so-called Renaissance and the Protestant Reformation all the way through the Industrial Revolution allowed Europe to take the lead in international affairs by the 19th century and create a world heavily influenced by European culture, religion, and language.

Today, China is the second largest economy in the world and is finding its place amongst the world's industrialized nations thanks to drastic reforms that took place within the Communist Party in the past few decades. Despite the social and economic damage caused by Communism, China has not forgotten its glorious history and great cultural heritage. China is looking to the lessons of the past to help rebuild on the principles that made it great during the dynastic eras of the Han people. Today the world is witnessing the Chinese Renaissance, the awakening of a nation that has enjoyed greatness and prosperity throughout most of history. Perhaps it may someday soon witness China's emergence as the center of the world's attention. Napoleon Bonaparte is commonly believed to have prophetically once said "Let China sleep for when she wakes the world will shake."

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