

NATURAL RUBBER: A PRIMER ON THE COMMODITY

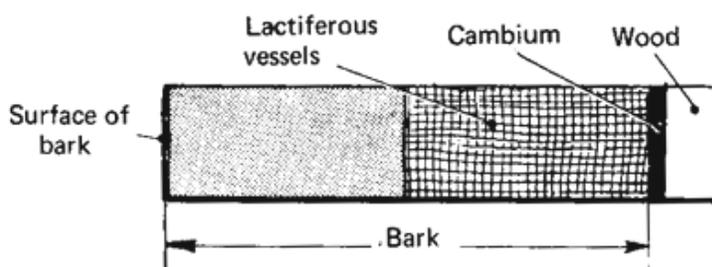
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Although we think of natural rubber as a key raw ingredient in the technically specialized world of tape production, we owe it to ourselves to remember that natural rubber is a commodity. Natural rubber is not a specialty chemical produced under exacting, controlled circumstances, rather it is extracted from living trees and processed in developing countries. It's a natural product, often exposed to the chemical-changing elements of sun, rain and air. This paper is not meant to be a definitive be-all, end-all of natural rubber, but a jumping off point to understanding the complexity of this raw material's supply chain.

The Basics Of The Process

The natural rubber we find in tape factories started its life thousands of miles away in dense tropical forests situated within fifteen degrees of the equator. Pre-Columbian civilizations in South & Central America used uncured rubber balls in games dating back to roughly 1400 BC. Rubber harvested today is collected in much the same way it was hundreds of years ago: a slight cut is made through the bark in to the lactiferous vessels of the tree, but not through the cambium layer of the tree trunk. (Damage to the cambium layer will injure the tree.) The tubes of this layer produce the milky white latex of the rubber tree.

Figure 1. Bark Of The Rubber Tree (Food & Agriculture Organization of the United Nations, 1977)

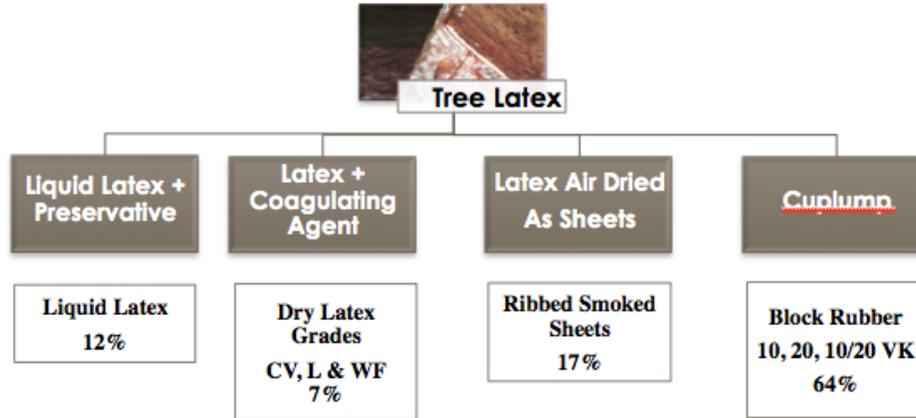


The trees should be tapped before dawn for best results and the latex collected in the afternoon. Workers optimally tap a tree twice weekly. Tapping more often damages the tree, so supply levels are capped. The latex drips into a cup hanging on the side of a tree where tappers collect it either as liquid latex on the same day or at the time of the next tapping as dried cuplump. Factories use these two types of raw material to produce most of the rubber consumed globally.

The quality of latex and the finished rubber product are affected by many factors including: composition of the soil, ambient weather, clone of the tree, the collection process, raw material storage

(location and time), processing factory and controls, etc. The final consumer grade depends on how the latex is preserved and processed.

Figure 2. Raw Materials & Grades of Natural Rubber



Tape producers mainly consume natural rubber classified above as dry latex grades, including CV (constant viscosity), L (maximum 7 Lovibond) and WF (whole field latex) grades. All these grades must be produced from liquid latex, which is most commonly found on plantations. Plantations are large growing areas under the control of a single company. Each plantation has its own factory to process its latex. Plantation rubber has the advantage of being produced from the same trees, collected in the same manner and run through the same machinery day in and day out ensuring end product consistency. Plantation-produced rubber only accounts for roughly 20% of the world’s natural rubber production.

All rubber trees go through an annual “wintering” period during which the trees lose their leaves. The tree knows that it has to replace these leaves to survive, so latex production drops up to 75%. In some countries, it is customary to stop rubber production altogether during this 5-8 week time period.

The Natural Rubber Market

This ingredient literally comes from the other side of the world, meaning that your rubber probably travels over 15,000 miles before it arrives at your factory. The major producers of natural rubber and our predictions for their 2012 production levels include the following.

Figure 3. 2012 Estimated Production of Natural Rubber

Producing Country	Metric Tons (,000s)
Thailand	3,500
Indonesia	3,075
Malaysia	1,025
India	925
Vietnam	840
China	740
Cote d’Ivoire	240
Rest of World (ROW)	1,000

Estimated 2012
Production 11,345

It’s important to note that two of the top six producers are net importers, China and India. Many origins grouped under “ROW” include poorer, less secure countries in terms of supply chain concerns including: Liberia, Nigeria, Papua New Guinea, Cameroon, Ghana, Guinea, Burma and others.

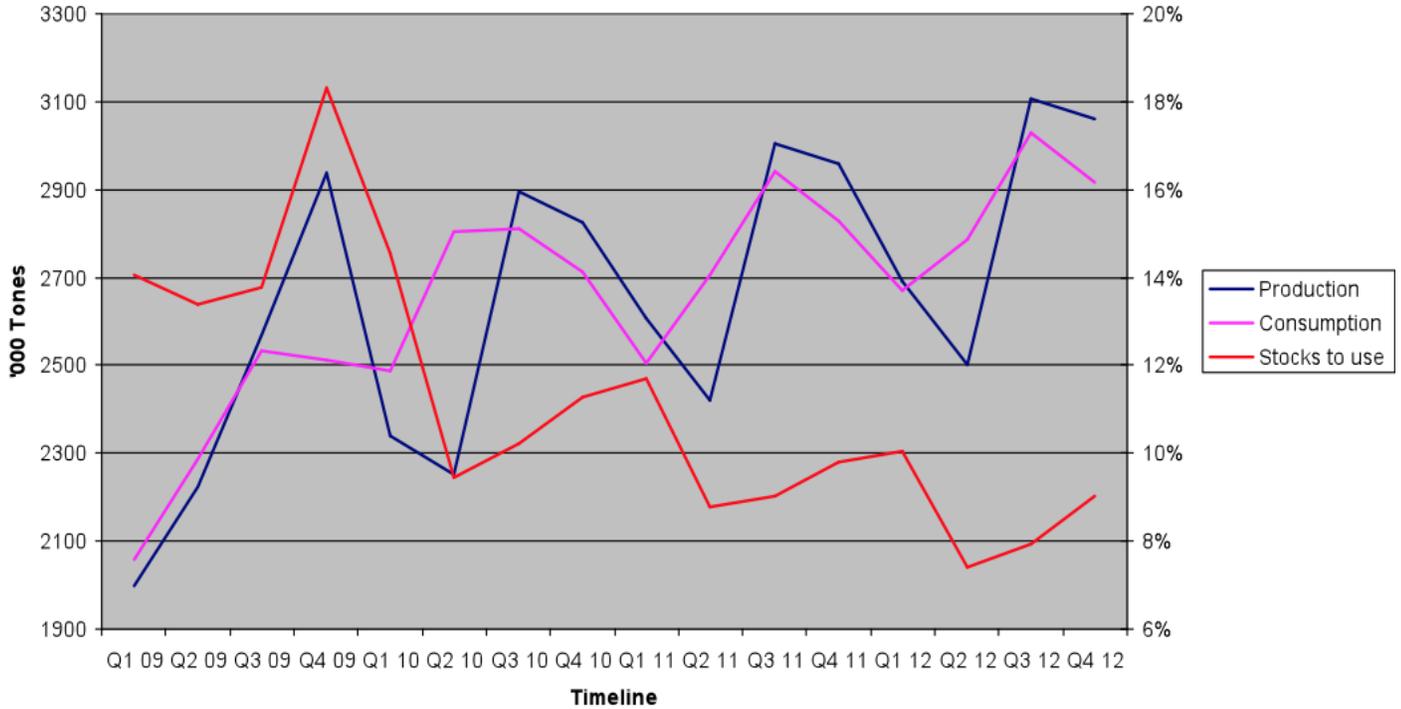
Whereas 15 years ago North America and Europe consumed most of the world’s natural rubber, this is no longer the case. A quick view of the top consumers of natural rubber shows that Asia dominates this market.

Figure 4. 2012 Estimated Consumption of Natural Rubber

Consuming Country	Metric Tons (,000s)
China	3,800
India	1,000
Japan	800
North America	1,200
Europe	1,524
Rest of World (ROW)	3,061
Estimated 2012 Consumption	11,385

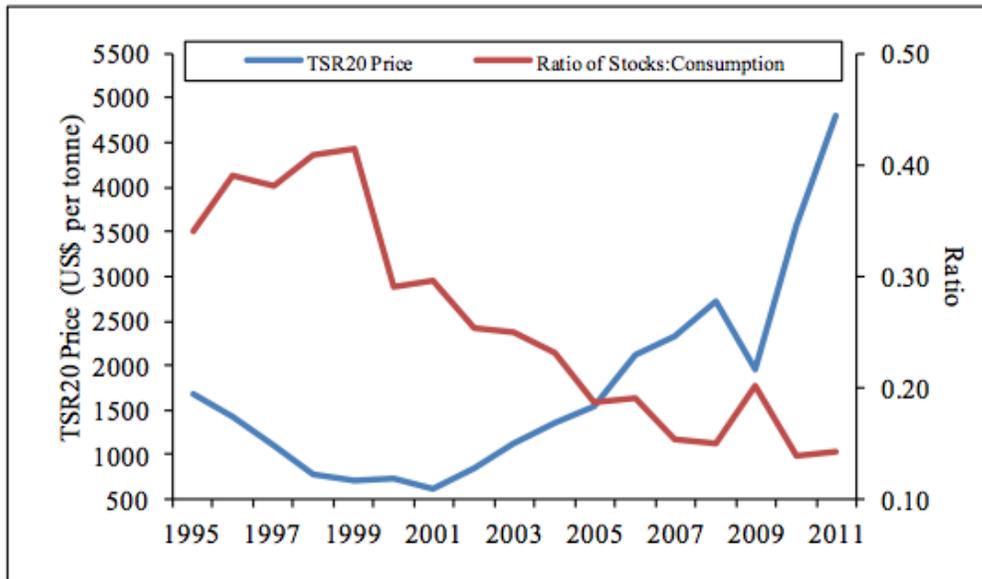
Consumption outstripped production for several years running and world stocks have been drawn down to historical lows as a percentage of consumption. We expect this pattern to continue.

Figure 5. RCA Graph of Production vs. Consumption with Stocks as a % of Consumption



The following graph from the International Rubber Study Group (IRSG) demonstrates the connection between stocks as a percentage of consumption and the price of natural rubber. Back in the mid-1990s, when stocks measured more than 40% of the world’s annual consumption, natural rubber prices were stagnant at very low levels. As the percentage of stocks started to fall, prices started to rise. We saw a blip in 2009 back up to 20% of consumption, due to the economic crash in 2008 and residual stocks at all levels of the supply chain. Our group predicts values below 10% this year, a factor that will support prices through the end of the year. The definition of a comfortable level of stocks as a percentage of consumption varies between commodities, but 20% is a reasonable level for natural rubber considering the pace of consumption globally and the product’s vulnerability to weather related production swings.

Figure 6. IRSG Graph of Prices vs. Stocks as a Percentage of Consumption (International Rubber Study Group - IRSG, 2012)



Unfortunately, rubber trees do not grow as quickly as sugar cane or other annual commodity crops. Rubber trees take approximately seven years to mature, so significant production increases take time and careful planning.

China and India's burgeoning economies in conjunction with their close proximity to much of the growing areas gives them a distinct advantage in securing supply. As these two countries continue to develop their infrastructures, rubber that has traditionally come to the US will increasingly stay in Asia to satiate their higher demand. It behooves North American companies to think outside the box and source rubber from non-traditional sources further away from the Asian consumption sphere. The volatility of natural rubber prices over just the last fifteen months provides added incentive for North American consumers to understand the natural rubber supply chain better and recognize what it means to be a thoughtful consumer of polymers.

Figure 7. Graph of Natural Rubber Prices FOB Origin – 10/10 through 3/12



The Supply Chain

The natural rubber supply chain has more than its share of risks associated with it, including:

- Climate Risks
- Geopolitical (Both producers and consumers)
- Natural Disasters
- Competition for land in country of origin
- Counterparty risk – quality & replacement assurance
- Vertical supply chain integration
- Synthetic and natural rubber recipe substitutions
- Price Risk / Price Volatility
- Currency Risk
- Transportation Risk
- Communication risks

Supply chains around the world share several of these factors, especially those that span 15,000 miles and numerous languages and cultures. These self-explanatory risk factors include: currency risk, transportation risk and communication-associated risks. The only exceptional point to note among these is that the normal shipping times from Southeast Asia to the East Coast of the United States range between 50 and 70 days via breakbulk ocean vessels. Combined with the normal contracting periods, arrival inspections, etc. the average natural rubber supply chain from origin comes out to about 75-110 days.

Climate Risks

As mentioned, rubber trees go through a wintering period, which greatly decreases production for between four and eight weeks. If the weather patterns during the time of leaf formation are exceptionally dry, then the tree's recovery will be slowed down and overall production will drop more than expected. Excessive rains can also disrupt the tappers' ability to collect latex on a regular basis,

again causing yields to drop. Heavy rains at origin also disrupt the transportation of natural rubber when bridges and roadways get washed out and ports become inaccessible.

Geopolitical

Political strife at origin can obviously affect the natural rubber supply chain. Thailand, the world's largest producer of natural rubber, saw their Prime Minister ousted by a coup in 2006 and protest riots in 2010 which resulted in US\$1.5 billion in arson losses and on-going separatist violence in the southern provinces where most of the natural rubber is produced. Cote d'Ivoire, a mostly peaceful nation since the 1960s, experienced its first military coup in 1999. The next ten years were stormy until the ouster of President Laurent Gbagbo in April 2011. Its major ports ran at greatly diminished capacity during much of last year, slowing down rubber shipments from Cote d'Ivoire. As an importer, we filled in the missing shipments from other producers so our customers did not feel the full effects of these disturbances. In coming years, consumers could be more directly affected.

Consuming nations' turbulent times can also affect the supply chain and rubber prices. The Eurozone debt crisis last year threatened to slow global demand for rubber and we saw prices tumble as result of that. When the big slowdown did not materialize, prices went back up again. Most market analysts acknowledge that the rapid, strong growth of the Chinese economy over the last decade contributed greatly to today's higher prices for natural rubber and to the decreasing availability of some origins of rubber for shipment to North America.

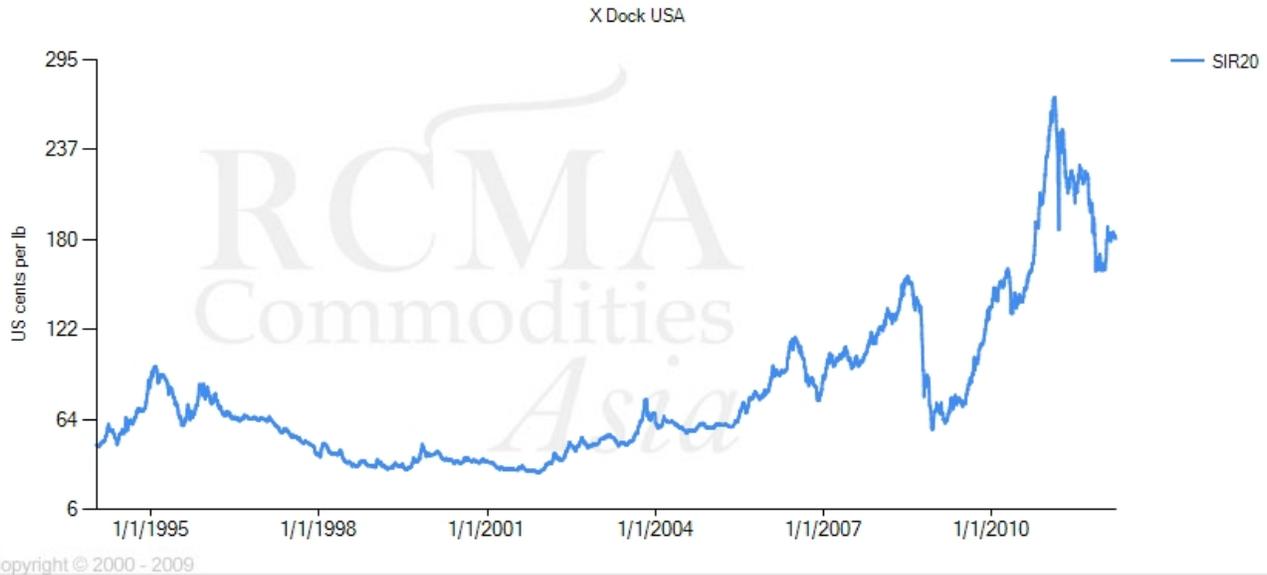
Natural Disasters

The recent earthquake in Japan, the world's 4th largest consumer of natural rubber, resulted in a severe price drop last year. Tsunamis at their origin can also cause production slowdowns, which can affect consumers globally. Rebuilding the infrastructure in producing countries can be painfully slow.

Competition For Land

Starting in the early 1990s, natural rubber prices remained at record low values for almost a decade.

Figure 8. Long Term Graph of Natural Rubber Prices – 1/95 through 3/12



Many plantations and growers cut down their rubber trees to plant more profitable crops such as oil palm. It really was not until 2006 or 2007 that plantation owners replanted rubber trees in significant numbers. In countries like Malaysia, where GDP growth rates are high, we see owners selling plantations and developing the land for housing or recreational use. Malaysian production of natural rubber is off by 22% from its highs in 2006. As other Asian countries develop their economies, they also will move away from agriculture towards other uses.

Counterparty Risk

A responsible consumer always recognizes his counterparty risk in the traditional sense, but there are more complex issues regarding delivery of natural rubber in North America. We mentioned earlier that most tape companies use the dry latex grades of rubber such as L, CV and WF, often called the specialty grades of rubber. High and volatile prices of natural rubber significantly reduced the amount of inventory companies all along the supply chain are willing to carry, including natural rubber importers. This becomes an issue for consumers if they experience quality issues with a shipment. Buyers need to make sure that their suppliers have regular shipments coming in to deliver as replacement in case of a quality problem. If a supplier does not have it in store, a fresh shipment from SE Asia could take several months to arrive.

Vertical Supply Chain Integration

We see Chinese companies starting to integrate themselves both up- and downstream in the natural rubber supply chain. Sinochem recently greatly increased their natural rubber holdings by taking up majority ownership in the world's largest plantation company. By the same token, a plantation group bought a global dealer group to integrate themselves downstream. As the Chinese economy continues to grow, they ensure their ongoing supply with such integration. There is a school of thought that believes the Chinese view natural rubber as a strategic commodity to be watched closely by the government. In March, a major Asian supply chain company, Olam, announced a joint venture with the Gabonese government to develop new plantations in that country.

Synthetic & Natural Rubber Recipe Substitutions

Recently, high synthetic rubber prices forced many tape companies to increase their natural rubber usage. Remembering that the industry uses mainly the specialty grades of natural rubber and that the supply chain from origin can run from 75 to 110 days, a 20+% increase in usage can have a significant effect on nearby supplies and prices.

Price Risk & Price Volatility

By anyone's measure, the volatility in natural rubber prices has been extreme over the last 15 months. Since mid-January, prices have settled in to a narrow range, but consumers and producers alike had a rough ride in 2011. The significant price rise and corresponding increase of funding needed to finance the same amount of rubber/raw materials affected all partners in the supply chain. Inventories of natural rubber decreased at all levels of the supply chain: with producers, importers and consumers. Consumers try to buy only one or two months out, which supports the market and does not allow prices to drop, even when it seems that they should. Because importers stocks are not as large as they once were, we often see higher prices for nearby delivery rubber.

Be A Better Consumer

The same way we ask our children to be aware of their surroundings, it's important for consumers to take measures to avoid supply problems down the road.

- Approve multiple grades of natural rubber for use in your compounds to avoid rushed decisions when problems occur in either the natural or the synthetic rubber supply chains.
- Diversify the origins of your rubber to avoid supply chain hiccoughs.
- Purchase your rubber well in advance, at least 3 to 4 months forward, to make sure that it is available when needed.
- Communicate demand changes immediately to your suppliers because they have a rather long supply chain to manage.
- Hedge your priced end product sales immediately with purchased of priced natural rubber. This will lock in your profits.

Thank You!