Natural Rubber in the coming decade
- policies and projections -

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Introduction

The outlook for demand and supply of natural rubber (NR) is of utmost importance both for producers and consumers. Major questions are: what will be the price and will there be sufficient supply. Earlier studies by the present authors, (Burger and Smit (1994, 1997) indicated that prices would go up again during the latter couple of years of the 1990s and would remain high during the coming decades. The major reasons for this were steady growth on the demand side, be it shifting across the globe, and levelling off on the supply side because of lack of land, lack of labour and high wages in producing countries compared to the price of NR translated in local terms.

The years 1997 to 1999 were turbulent years for the economies in south-east and east Asia. The economies of key players in the NR market both on the demand side and on the supply side were severely affected: substantially lower or even negative growth and dramatic declines in exchange rates. This has resulted in turbulent developments in the natural rubber market in that period as well as in the year 2000. Low prices were experienced during these years. The purpose of this paper is to indicate to what extent this has changed the outlook for NR. Is the fear of a future shortage a thing of the past and will prices remain low or can producers still look forward to higher prices and is a shortage still around the corner? The authors are most grateful to the secretariat of the International Rubber Study Group for providing the vast majority of all data used in the analysis.
1 The world economy - a simple analysis and a scenario for the future

The world rubber economy depends heavily on the world economy. In this section, projections will be provided for world economic growth as well as for growth for selected countries or regions. Future growth rates are based on relatively simple models, as described in Burger and Smit (1997), where necessary adjusted to accommodate additional information. The key role is the aggregate world economy. Growth rates for the past and the future are given in Figure 1.1. The future peaks are anticipated to be roughly at the same level as in the past, but the troughs are not expected to be as deep as in earlier decades.

![Growth in GDP](image1)

Figure 1.1

Growth rate data and projections for selected countries are presented graphically in Figures 1.2 to 1.8. There is no need for elaborate comments as the graphs are self explanatory. The dramatic developments during the Asian crisis are clearly visible.

![Growth in GDP](image2)

Figure 1.2
Figure 1.3

Growth in GDP
Japan

Figure 1.4

Growth in GDP
France

Figure 1.5

Growth in GDP
Indonesia
Figure 1.6

Growth in GDP
Malaysia

Figure 1.7

Growth in GDP
Thailand

Figure 1.8

Growth in GDP
China
2 Vehicles and tyres - history and outlook

Using the above projections of GDP and applying the detailed models, projections by country or region are derived for the following series:
a. passenger cars in use,
b. commercial vehicles in use,
c. new registrations of passenger cars,
d. new registrations of commercial vehicles,
e. production of passenger cars,
f. production of commercial vehicles,
g. production of passenger car tyres,
h. production of commercial vehicle tyres.

Graphs are shown for the world. These results will be used for deriving projections of rubber consumption in section 3.
3 Consumption of rubber - analysis, history and outlook

Introduction
The focus of this section is to arrive at projections of total rubber consumption, without separating them into natural rubber and synthetic rubber. This split will be done in section 5. The first part of this section concentrates on the tyre sector while the second part gives the analysis and outlook for the general rubber goods sector. In the final part the aggregates for the two sectors will be shown.

Rubber consumption by region for tyres and tyre products
The calculation of rubber consumption by the tyre sector seems straightforward. However, there are a number of problems. For some countries consumption data are available at least for part of the sample period for both the tyre sector and the general rubber goods sector. These countries are the United States, Japan, Germany, France, the United Kingdom, Italy, Brazil and India.

Rubber consumption in the tyre sector includes rubber for tyres and tubes other than for passenger cars and commercial vehicles. In our analysis we have estimated this to be around 15-30% of total rubber consumption in the tyre sector, varying according to country, and we have adjusted the rubber weight of passenger car tyres and commercial vehicle tyres accordingly so as to make the totals fit.

The general consumption function in the tyre sector includes:
- production of passenger car tyres,
- production of commercial vehicles tyres,
- estimated rubber weight in a passenger car tyre,
- estimated rubber weight in a commercial vehicle tyre,
- consumption of rubber for other tyres.

These weights are allowed to vary over time as they also vary between countries. The estimated average weight of a passenger car tyre ranges from 2.5 to 3 kg. For all countries except Japan, a commercial vehicle tyre is estimated to have an average rubber weight of between 10 and 22 kg.
Data on rubber consumption in the tyre sector for Canada, Oceania, other Western Europe, Eastern Europe, other Latin America, Indonesia, Malaysia, Thailand, Korea, Taiwan, China and other Asia were estimated using the data on production of passenger car tyres and commercial vehicle tyres per country and estimated rubber weight per type of tyre. Such estimates would be based on derived data for countries with a similar type of tyre and on the resulting split between rubber consumption in the tyre sector and in the general rubber goods sector. This model is then also used to make projections based on the projections for production of tyres by type on the basis of the updated model.

Projections for the world divided into five regions are shown in Figure 3.1. Rather steady developments can be seen for most regions. Only the region called ‘Other Asia’ shows a remarkable growth. This region comprises all Asia except Japan.

![Figure 3.1](image_url)

**Rubber consumption by region for general rubber goods**

Consumption data for both the tyre sector and the general rubber goods sector are available for the eight countries mentioned above. For these countries relationships have been estimated between rubber consumption and income. Data on rubber consumption in the general rubber goods sector for the other countries and regions were estimated using the aggregate data and the data derived above for the tyre sector. Similar models were then estimated. Using the projections for GDP, projections for rubber consumption in the general rubber goods sector are derived. Projections by region are shown in Figure 3.2. Rather steady developments are apparent except for Europe and the region called ‘Other Asia’. The latter shows a strong growth. The developments in Europe are strongly influenced by the dramatic changes in Eastern Europe and the CIS.
Total rubber consumption by region
Projections of total rubber consumption can be obtained by simply adding the two components: rubber consumption in the tyre sector and in the general rubber goods sector. Projections for the world are presented in Figure 3.3.

4 Normal production levels for natural rubber

Introduction
This section aims to depict natural rubber supply by country with a view to making projections for long term supply. Normal production levels are analysed using the vintage approach presented in Burger and Smit (1997) when data permit.
Natural rubber production

Thailand

![Graph showing natural rubber production in Thailand from 1975 to 2020. The graph compares normal production with data and old data, May 2000. The production peaks in 1995 and then declines.]  

Figure 4.1

Natural rubber production

Indonesia

![Graph showing natural rubber production in Indonesia from 1975 to 2020. The graph compares normal production with data. The production shows a steady increase until 2000, followed by a slight decline.]  

Figure 4.2

Natural rubber production

Malaysia

![Graph showing natural rubber production in Malaysia from 1975 to 2020. The graph compares normal production with data. The production peaks in 1990 and then declines steadily.]  

Figure 4.3

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Figure 4.4
Natural rubber production
India

Figure 4.5
Natural rubber production
Sri Lanka

Figure 4.6
Natural rubber production
Philippines
Other countries

Myanmar: going up to about 65,000 tonnes in 2020;
Cambodia: increasing to around 50,000 tonnes in 2020;
Papua New Guinea: reaching around 12,000 in 2020;
Bangladesh: levelling off at around 8,000 tonnes;
Liberia: recovering and levelling off at 155,000 tonnes;
Côte d’Ivoire: to reach around 160,000 tonnes by 2020;
Ghana: increasing to around 35,000 tonnes;
Nigeria: declining first, but starting to increase in a few years to reach around 200,000 tonnes;
Cameroon: production levels are expected to be steady at around 60,000 tonnes;
Zaire: now DR Congo) steady at 10,000 tonnes;
Gabon: reaching around 18,000 tonnes.
World
World production was 6840 thousand tonnes in 1999 as compared to 6690 in 1998. The projections for the near future are for production to go up but not with the same increase as we have seen in the last few years (Figure 4.9). But this depends on the effects that the changes in the East Asian exchange rates have on the local economies. By itself, the currency depreciation in the major Asian producing countries leads to substantially lower world market prices in US$. But lower prices should trigger more demand, and a new equilibrium can be reached. This is the subject of the next section.

5 Capacity utilisation, consumption shares and price formation for natural rubber

Introduction
The objective of this section is to confront projections of total rubber consumption as derived in section 3 with projections of natural rubber production given. For NR production, projections of ‘normal production’, excluding price effect on tapping intensity and the like, have been derived in section 4. Prices and technology determine the share of NR in total rubber consumption as well as actual NR production.

Developments in growth of total consumption and normal production
An early indication of possible future shortages or surpluses can be obtained comparing the trends in total rubber consumption as resulting from section 3 and normal production of natural rubber as presented in section 4. The two sets of growth rates, total rubber consumption on the one hand and normal production of natural rubber on the other hand are shown together in Figure 5.1. It is clear that in the near future growth in normal production is close to growth in total rubber consumption be it a bit lower. Not before the year 2003 can a more tight market be distinguished. Below, this is expressed in terms of projections of prices, NR consumption and NR shares.
Natural rubber supply, natural rubber share in total consumption and natural rubber price formation

In reality in most cases production and consumption react to prices which then are determined at such a level that in broad terms supply equals demand. This approach is also applied in this study. The analysis for supply of NR is based on the assumption that the tapping intensity depends on prices. Tapping intensity is formulated as the ratio of actual production to normal production. While total consumption of rubber is supposed not to be influenced by relative prices, the share of NR is indeed affected by relative prices. Developments in the end-use composition of rubber consumption are included in the model. Results are shown in the remainder of this section. In the past, world shares have increased from a trough of less than 30% in the late 1970s to a peak of over 40% in the early 1990s. A major reason for the increase of the share on a world scale is the geographical composition of world consumption. The increase is explained by two major factors: the shift of consumption growth to NR producing countries with a relatively high share (e.g. India and Malaysia) and the reduction by over 80% in the former Soviet Union, which applied a share of NR of less than 10% in the late 1980s.

Natural rubber supply, share in total consumption and price formation

Developments on the world market, as we now foresee it, are summarised in Figures 5.2 to 5.5. Singapore NR prices (TSR20) in US$ terms and in S$ terms were very low in 1999 (figures 5.2 and 5.3). An important reason is the high level of supply and stocks. Production figures in 1999 for Thailand were revised upwards by the IRSG from 1,958 thousand tonnes in the May 2000 issue of the Rubber Statistical Bulletin to 2,193 thousand tonnes in June 2000 issue. This adds at least for a large part to carry-over stocks (Figure 5.4). However, growth in demand is substantial and for 2000 total rubber consumption is expected to grow at a rate of 4%. This will imply consumption of NR to also grow at around 4%. But it takes quite a while until excess stocks are depleted. Besides, the INRO stock is still overhanging the market, with its very presence presumably depressing prices. Still we predict that prices will recover in 2000, reaching US$1.00 per kg in 2000 and 2001 (Figure 5.2). An additional factor explaining the low prices in 2000 maybe the change in the market with the number of dealers dwindling and consumers and producers heavily buying and selling (far) forward. The rise in prices will definitely be strong in 2001 and is likely to
continue significantly in 2003. Prices are expected to increase to levels close to US$2.00 towards the end of the decade and further to around US$2.50 afterwards. We kept the trend in SR prices as they were, resulting in NR becoming much more expensive than SR. The NR share in consumption is shown in Figure 5.4. Because of higher prices the share is declining during most of the period.
In conclusion, a shortage of NR is still likely to come forward, although the current crisis allows a few more years to cope with it. Prices are still likely to reach the levels of US$2,50, although the US$ prices will be lower than expected before the crisis. All this will lead to a decline in the share of NR from the current 40% to levels of around 35%. Additional calculations show that, if there were enough natural rubber available and prices were adequate this would lead to a rather stable level of the share at around 40%.

6 Alternative scenarios: synthetic rubber prices and economic growth

The model explains most of the developments in the vehicle, tyre and rubber economy. However, regarding future developments of a few factors assumptions have to be made e.g. synthetic rubber prices, growth in world GDP, planting decisions for NR and substitution policies between NR and SR. It is useful to see how changes in the assumptions regarding these factors affect the projections for demand, supply and prices of rubber, in particular NR. Two scenarios are presented here:

Scenario A: higher SR prices,
Scenario B: lower world economic growth, constant at 2.5%.

The scenarios on planting decisions and substitution policies are presented in sections 7 and 8 respectively.

**Scenario A: higher SR prices**
The assumption in the base scenario was that SR prices would increase by 3% per annum to around US$ 1500 per tonne in 2020. Just as an alternative, a steeper increase is assumed (6%) under this scenario with SR prices increasing to around US$ 2000 per tonne (Figure 6.1). This leads to higher NR prices because of competition (Figure 6.2). However, these higher NR prices will lead to higher production and a steeper decline in prices after 2015.
Scenario B: lower world economic growth, constant at 2.5%.
Under this scenario the world economy is assumed to grow at 2.5% per year until 2020. This percentage is quite low (Figure 6.3); this scenario can therefore be seen as a pessimistic scenario. Projections of world rubber consumption turn out to be quite a bit lower (Figure 6.4). This is especially the case for goods sector. Vehicle ownership and driving is not very much affected and so is tyre production. However, the effect on NR prices is not very large (Figure 6.5): no surplus is created because the higher share takes it all. Production capacity for NR is still fully utilised without requiring large amounts of additional production.
7 Influence of a large planting program

Thailand
In Thailand enough land is available in particular in the North East to increase new planting. Under the new scenario the level of new planting is especially high during the first five years. Levels are declining stepwise as can be seen in Figure 7.1. Besides, the share of replanting is now put at 90% as against a strong decline in the base scenario (Figure 7.2). These two factors result in higher levels of replanted area as well as total area under rubber. The effect is that production will increase to levels of around 2600 thousand tonnes in 2020 (Figure 7.5).

![New planting Thailand](image1)

**Figure 7.1**

![Share replanted in total discarded area Thailand](image2)

**Figure 7.2**
Figure 7.3

Area replanted
Thailand

Figure 7.4

Total area
Thailand

Figure 7.5

Natural rubber production
Thailand
Other countries: the results only

Figure 7.6

Natural rubber production
smallholdings, Indonesia

Figure 7.7

Natural rubber production
Estates, Indonesia
Natural rubber production
smallholdings, Malaysia

Figure 7.8

Natural rubber production
Estates, Malaysia

Figure 7.9

Natural rubber production
India

Figure 7.10
Natural rubber production

China

Figure 7.14

New planting

total of 8 countries

Figure 7.15

Area replanted

total of 8 countries

Figure 7.16
Effects on the world market

For the world as a whole the new scenario designed above leads to normal production showing an increase in growth rate again after 2006 (Figure 7.19). Price will not increase further after 2010, reaching levels of about US$ 2.- (Figure 7.20) and the share of NR will stabilize at around 37% (Figure 7.21).
Bibliography
