Are Coffee Prices Too High?

Evidence from the Danish Coffee Market

Incomplete Draft

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Abstract

Many people claim that multinational companies are exploiting their market power in national coffee markets by keeping consumer prices too high. The purpose of this study is to evaluate some of the arguments made to support this claim, using time series data from the Danish market for roasted coffee over the period 1967-2003. The Danish market has a structure that is typical of many consumer markets for coffee; there are two large roasting companies owned by multinationals, two middle-sized and several small local roasters. The econometric approach is to first test for stable long-run relationships between the variables with cointegration analysis, and then to estimate a model for pricing behavior that allows for asymmetric transmission of input-price shocks. Our major finding is that there is no evidence of market power in the long run, and ?

1. Introduction

Coffee bean prices started to decline rapidly during 1998 and by 2002 they had dropped by 60 to 70 percent. Not surprisingly, such low world prices of coffee beans cause widespread poverty among coffee farmers in the developing world. At the same time, consumer prices are perceived to remain high, or decrease too slowly. This has spurred interest in the question of market power of the roasting companies, since a small number of multinationals are active in most, if not all, consumer markets in the developed world. Some claim that multinational are abusing their market power by keeping prices too high and thereby limiting demand for coffee beans. For instance, Talbot (1997) argues that market power of the multinational companies enabled them to maintain the level of retail prices of coffee while world market prices for green coffee were falling in 1987 and plummeting in 1989. Others are equally straight forward, such as the former president of the WTO, Michael Moore (2002), Dicum and Luttinger (1999), Galiano (2003) and Gooding (2003), while others are more careful in their wording but nevertheless seem to support this view (see Fitter and Kaplinsky 2001; Oxfam, 2002; Ponte, 2002).

The purpose of the study is to evaluate some of the claims made in support of the hypothesis that multinational companies have market power in consumer markets for roasted coffee. To do this we use time series data for the period 1967 to 2003 for the Danish market for roasted coffee. Since two multinational companies together have a market share of over 70%, the Danish market is likely to be a good representative of

consumer coffee markets; in most developed countries consumer coffee markets have a few very large firms and many small ones.[1]

Most authors base their arguments about multinationals' market power on observations of current large spreads between producer and consumer prices and anecdotal evidence of slow responses of consumer prices to declines in producer prices. However, there are some empirical studies. Morisset (1998) analysed several markets for commodities and found symptoms of market power in all of them, but particularly in coffee markets. According to Morisset, the spread between world coffee-bean prices and consumer prices increased on averaged by 180 percent from 1975 to 1994 in a sample of six major industrial countries. This occurred because of asymmetric price transmission; the impact on consumer prices of changes in world prices were systematically higher for increases than decreases. Morisset attributed this to the market power of large trading companies. An important result of Morisset's analysis was that the pattern he observed was similar across all countries so it should be relevant for Denmark as well.

Talbot (1997), Fitter and Kaplinsky, (2001) and Ponte (2002) use global value chain analysis to argue that multinational companies have market power. According to Talbot (1997), the collapse of the International Coffee Agreement (ICA) at end of the 1980's led to an increase in market power and a massive shift of surplus from coffee producing countries to multinationals, which used their market power to hold down prices of green coffee while inflating consumer prices. This claim is based on the

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[1] See Durevall (2003), Clarke et al (2002) and Sutton (1991) for information of market shares in various countries.

description of data for U.S. consumer prices, transportation costs and producer prices for the period 1971-1995. Fitter and Kaplinsky, (2001) and Ponte (2002) make a similar point but add trade liberalization in exporting countries as an important factor. Their analyses consist mainly of detailed accounts about changes in the world coffee markets, which, they argue, systematically have shift market power towards large multinational roasters. Currently there are five of them, and in 2000 they bought almost 50 percent of all green coffee (Oxfam, 2002).

The empirical analysis of this paper consists of two parts. In the first we use graphs to look at the evolution of spreads and margins between world market and consumer prices, and some other potentially relevant variables. The purpose is to make a comparison with the findings of Morisset (1998) and Talbot (1997). In the second part we first test for the existence of a structural break at the end of the 1980s due to the breakdown of the ICA, as predicted by the earlier literature. Then we develop an error correction model for pricing that allows for asymmetric transmissions of input prices, which is tested in order to make sure that the assumptions regarding its stochastic properties and empirical stability are fulfilled.

Our major findings are that there is no evidence of market power in the long run ???;

The paper is structured as follows. The next section describes the economic model that forms the basis for the empirical analysis. Section 3 provides a short description of the Danish market for roasted coffee. Section 4 first uses graphs to describe the data and look at the hypotheses abut changes in margins. Section 5 reports results

from estimation of the model. Section 6 summarizes the results and concludes the paper.

2. Theoretical Framework

This section outlines a simple oligopoly model to motivate the choice of variables and help in interpreting the results of the empirical analysis.

The model consists of a demand and a supply side. The supply side is based on the assumption that companies maximize their profits by choosing the quantity. For firm i ($i= 1…n$), the profit π_i is given by,

$$\pi_i = \left[(1-\tau)P(Q) - s\right]Q_i - C_i(Q_i, \kappa, w_i) \tag{1}$$

where τ is value added tax, Q the total industry output, Q_i output of firm i, $P(Q)$ the inverse demand function, s is a specific tax and $C_i(Q_i, \kappa\ w_i)$ is the cost function w a vector of input prices and κ import duty.

The conjectural variation, that is, the strategic interaction between firms, is defined as,

$$\frac{dQ}{dQ_i} = \lambda^i \in [0, n] \tag{2}$$

where λ^i can take any value between zero and n depending on the degree of market power: when there is perfect competition, $\lambda^i = 0$; Cournot conjectures, $\lambda^i = 1$; and perfect collusion, $\lambda^i = n$. Differentiating Equation (1) with respect to Q_i gives the profit-maximizing condition, perceived marginal revenue is equal to marginal costs plus the specific tax,

$$(1-\tau)\left[P(Q) + \lambda^i P'Q_i \right] - s - MC_i = 0 \qquad (3)$$

where $P'(Q)$ is the derivative of $P(Q)$ with respect to Q, P is the consumer price and MC_i marginal cost.

By dividing Equation 3 with λ^i and summing over i we obtain the first order condition for the whole industry. Then we can solve for the price level to get

$$P = \frac{1}{1 - \dfrac{1}{e \sum \dfrac{1}{\lambda^i}}} \Phi, \qquad (4)$$

where $e = -P/Q \, P'(Q)$ is the elasticity of demand and

$$\Phi = (1+\tau)\left(\frac{\sum \dfrac{1}{\lambda^i} MC_i}{\sum \dfrac{1}{\lambda^i}} + s \right). \qquad (5)$$

By assuming that all firms have the same constant marginal cost functions, which is not unrealistic for roasted coffee (see Sutton, 1991 and Bettendorf and Verboven, 2000) we can combine Equations 4 and 5 to get

$$P = \mu(1+\tau)(MC + s) \tag{6}$$

where μ, the mark-up, is equal to one if there is perfect competition and larger than one when there is market power. To estimate Equation 6, we need information about MC. Although the marginal cost function is not known, we have a good deal of knowledge about it.

The roasted coffee production process is relatively simple; to make 1 kg of roasted coffee approximately 1.20 kg beans are required. Other costs include labor, packaging, energy and capital costs, each of which usually stands for less than five percent of total costs. In coffee roasting there are few economies of scale, which allows us to assume that companies have similar cost functions, in spite of being of different sizes (Sutton, 1991). It is common to use a linear marginal cost function, as in Bettendorf and Verboven (2000), since the relation between coffee beans and roasted coffee has been stable, but there certainly has been substitution between other inputs. We use different functional forms in the empirical analysis. The linear version can be specified as,

$$MC(w) = \beta_0 O + \beta_1 R + \beta_2 W + \beta_3 (1+\kappa) IP \tag{7}$$

where O stands for all other costs, R is user cost of capital, W are labor costs, IP is the import price for coffee beans, β_0, β_1, β_2 and β_3 are parameters. We have accurate of observations on the marginal costs of coffee beans in the form of IP, the coffee bean price, import duties, κ, and specific coffee tax, s, for the period 1967:1-2003:12. There exist indexes on average labor costs for manual workers on a quarterly basis for 1974:1-2003:4 and monthly basis for 1980:1-2003:12, and yearly observations on unit labor costs in manufacturing. These series can be combined to obtain a proxy for marginal labor costs. User cost of capital is measured as the rate of return on capital and depreciation times the value of capital, all net of taxis. We use the bond rate as a proxy for the user cost of capital, noting that user costs of capital in general it is found to be a stationary series (see references?). This implies assuming that the value of capital follows the general price level (CPI) in the long run. Furthermore, we also assume that other costs, O, follow the general price level, an assumption made Genovese and Mullen (1998) in their analysis of the U.S. sugar market. Although it may seem that some of the simplifications of the marginal cost function are serious, this might not be the case because since, as shown below, fluctuations in IP are by far the most dominant source of the changes in P.

By combining Equations 6 and 7 we obtain the price equation,

$$P = \mu(1+\tau)(\beta_0 O + \beta_1 R + \beta_2 W + \beta_3(1+\kappa)IP + s) \tag{8}$$

Apart from being the basis for the estimation equation, Equation 8 can be used to understand two measures calculated in Section 4, the spread and the margin. The spread is often used to show how the distribution of income is divided between

coffee-growing countries and importers and form the basis of value chain analysis. It can be viewed as a simplified Lerner index where some parts of the marginal cost function have been left out,

$$\frac{P - IP}{P} = \frac{\mu(1+\tau)(\beta_0 O + \beta_1 R + \beta_2 W + s) + (\mu(1+\tau)\beta_3(1+\kappa) - 1)IP}{P} \quad (9)$$

Equation 9 shows that the mark-up, as well as VAT, coffee tax and other marginal costs, influences the spread. Moreover, the technology used to convert beans into roasted coffee also affects the ratio. It is thus apparent that changes in the spread do not have to be due to changes in market power. An alternative measure that provides more information about market power is the real margin. It is obtained by dividing by the consumer price index, P_{cpi} instead of the coffee price,

$$\frac{P - IP}{P_{CPI}} = \frac{\mu(1+\tau)(\beta_0 O + \beta_1 R + \beta_2 W + s) + (\mu(1+\tau)\beta_3(1+\kappa) - 1)IP}{P_{CPI}} \quad (10)$$

Since we know the values of β_3, IP can be re-scaled making $\beta_3 = 1$. Then we can move over taxes in Equation 10 to the left hand side,

$$\frac{P - IPc}{P_{CPI}} = \frac{\mu(1+\tau)(\beta_0 O + \beta_1 R + \beta_2 W) + (\mu - 1)IP_C}{P_{CPI}} \quad (11)$$

where IPc is,

$$IP_C = (1+\tau)\left((s + (1+\kappa)IP)\right) \quad (12)$$

Although the left-hand side in Equation 11 also depends on marginal costs, it provides some information about the value of the share of income that goes to the roasters (and retailers). More..

3. The Danish Coffee Market (incomplete)

Most markets for roasted coffee in developed countries have similar structures. Each market consists of one or a couple of large and several small roasting-houses (see Durevall, 1993; Sutton, 1991). The large ones usually account for more than 80 percent of the market, while the market shares of each of the small ones is less than 5 percent. The large roasting-houses include both domestic and multinational players, of which the largest are Kraft and Nestlé, with a global market share of 13 percent each, followed by Sara Lee with 10 percent, and Procter & Gamble and Tchibo with 4 percent each (Oxfam, 2002). While Kraft, Nestlé and Sara Lee are present in many countries, Procter & Gamble is mainly active on the U.S. market and Tchibo in Germany and Austria.

The distribution of market shares in Denmark is typical of an industrialized country coffee market. In 2002 Sara Lee, with the Merrild brand, was market leader with a market share of 31 percent, while Kraft Morris with a 27 percent market share was the second largest player, followed by two domestic companies, BKI (B·K·I Kaffe A/S) with 17 percent and DKK (Dansk Kaffekompagni A/S) with 14 percent. The

remaining roasting-houses hold 11 percent of the market.[2] The roasting-houses also do private label production, which, if included, would alter the market shares somewhat.

Add historical information about the presence of multinationals.

In 1992, Kraft General Foods and Sara Lee had together 72% of the market. More to come. When did multinationals enter the Danish market?

To be completed

Table 1: Market Shares of Roasting Houses for Roasted Coffee Do for Denmark?

Company	Brand	Market share %

Source:

4. Spreads and Margins: A Descriptive Analysis

In the public debate, the relation between coffee-bean prices and consumer prices is often used as an indicator of unequal distribution of rents and the existence of market power. Although, as shown in Section 2, the correct measure of input costs is the marginal cost, the evolution of the consumer prices in relation to import prices of green coffee, including taxes, nevertheless provide interesting information.

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[2] The source of Danish market shares is Max Havelaar Fonden in Copenhagen. This data should be regarded as preliminary.

The upper panel of Figure 1 depicts quarterly observations of the per-kilo consumer price of roasted coffee relative to import prices of green beans over the period 1965-2003. The price of green beans has been adjusted for import duty, specific tax on roasted coffee, value added tax and shrinkage due to roasting (see Appendix for details). As evident, the two series follow each other closely; both are very stable up until the mid-1970s but fluctuate heavily during the rest of the period. The spread, calculated as a simplified Lerner Index, is defined as $(P-IPc)/P$ where IPc is the tax and shrinkage-adjusted bean price. It is shown in the lower panel. Three characteristics are worth highlighting. First, the evolution of the spread does not support Morisset's (1998) hypothesis that there was a positive long-term trend in the spread between 1975 and 1992. In the Danish data the spread was quite high during the period 1965-1975, i.e., 0.53 on average. It dropped in 1976 and during period 1976-89 it was only 0.33 on average. The spread started to increase at the end of the 1980s and peaked in 1992; on average it was 0.51 during the period 1990-2003. Hence, there was no secular trend in the spread and the long period with a low spread relative to the beginning of the 1970s does not lend support to the hypothesis of market power of the multinational trading companies.

The evolution of the spread is consistent with Talbot's (1997) conclusions in the sense that there appears to be a level shift at the end of the 1980s, and that it coincided with the permanent suspension of the International Coffee Agreement (ICA) in 1989. However, the ICA's quota system was in force between 1962 and 1972, but not 1973-1980, indicating that there is no simple relation between the ICA and the market power of the multinational firms. Hence, the increase in the spread at the end of the 1980s may have been caused by other factors.

Taxes introduce a wedge between bean and consumer prices and thus account for part of the spread. As Figure 2 shows, when measured as a fraction of bean prices, they have increased almost monotonically since the 1960; while import duties were reduced in a number of steps and set to zero in July 2000, nominal coffee tax and VAT were increased. During the last years of the sample, taxes accounted for about 50 percent of the import price. One reason for this is the increase in the weight of the coffee tax when bean prices declined. Figure 2 also plots the ratio between taxes and the consumer price. This series shows that the ratio increased until the mid-1980s and then remained at the same level, accounting for roughly 20 percent of the spread between bean prices and consumer prices.

The rise in the value of the spread at the end of the 1980s gives the impression of an increase in the market power of the international traders, roosting firms or possibly retailers. However, what it shows is a reduction in share of the total price that accrues to coffee bean exports. A measure that provides a stronger indication of changes in market power than the spread is the difference between consumer prices and the cost of beans in constant 1995 Danish kronor, that is, the margin deflated by the consumer price index, set to unity in 1995. This margin covers costs of wages, electricity, packaging, transport, retail margins etc, as well as profits. As evident from Figure 3, there was an almost continuous decline between the 1960s to about 1985 but little change after that; while the margin was as high as 70 DKK in 1995 prices, at the end of the 1960s, it hovered around 28 DKK between 1986 and 2003.

To some extent, the changes in the real margin can probably be explained by changes in taxes. Figure 4 depicts the value of tax income resulting from import duty, specific tax, and VAT in constant 1995 DKK. It was high between 1976 and 1985, mainly as a result of higher bean prices. The decline in bean prices during the latter half of the 1980s and the stepwise dismantling of import duty kept the value of real tax income relatively low and stable during the rest of the sample period.

Another variable that might have contributed to the decline in real margin between 1965 and 1985 is the evolution of labour costs. Figure 5 shows yearly observations for unit labour costs for the manufacturing sector; unfortunately we do not have data for coffee roasting or at a more disaggregated level. Nevertheless, unit labour costs declined from the 1950s (see Figure 5a) until mid-1985 and then remained stable. Note also that there is one period in the beginning of the 1970s when unit labour costs stop decreasing and thus coincides with a period with a stable margin.

It is interesting to note that the drop the real margin also happened at the same time as inflation declined from a two-digit level, in the 1970s and first half of the 1980s, to less than 5 percent from about 1985 to 2003. This is shown in Figure 5. How do we interpret this? One explanation is that roasters were not capable of raising consumer prices in line with general price increases when inflation was high, 1965-1985, but could do it when inflation was low. Banerjee and Russel, (2001) provide evidence of a close negative relationship between mark-ups and inflation and several theoretical explanations.

5. Empirical Analysis
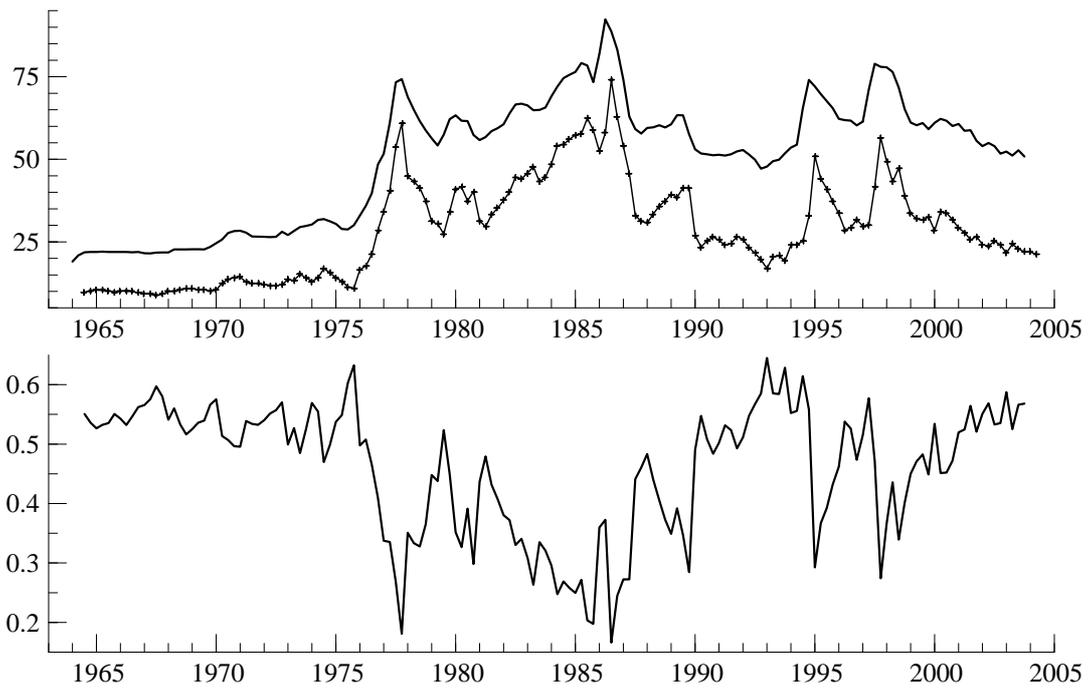
Yet to be completed

6. Conclusion

Figure 1: Evolution of consumer prices (——) and cost coffee beans (-+-+-+) (upper panel) and tax-adjusted price spread (lower panel)
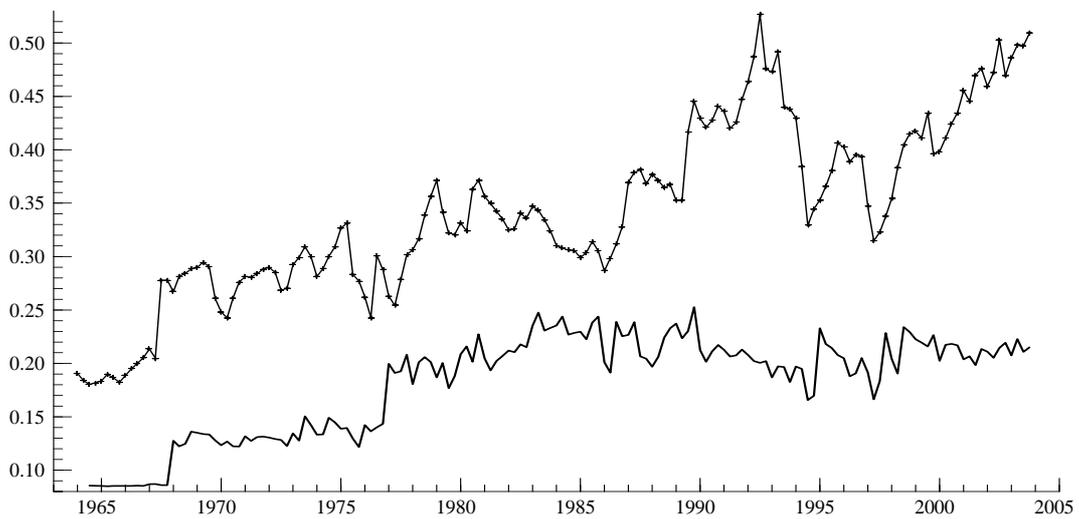

Figure 2: The ratio of total amount of taxes per kilo roasted coffee relative to world market price (_____) and consumer price (-+-+-+-+).
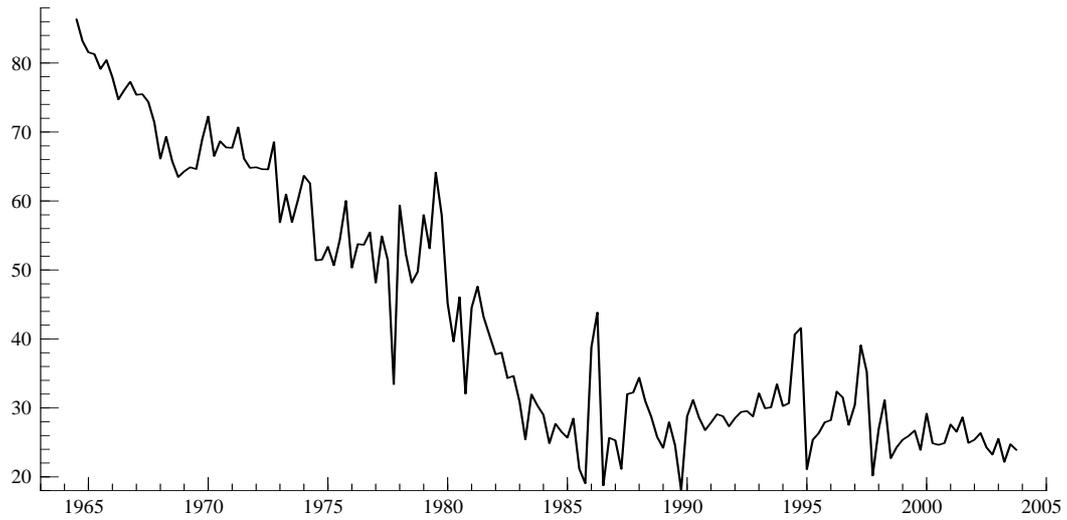
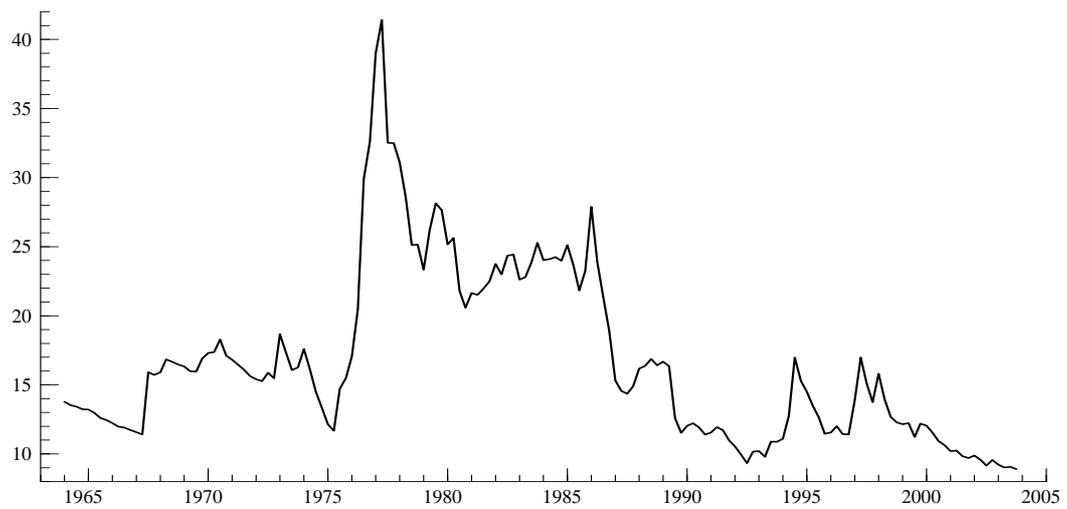**Figure 3: Real margin, difference between consumer price and tax-corrected import costs dived by CPI.**

Figure 4: Difference between bean prices and consumer prices due to import duty, specific tax and VAT measured in constant 1995 DKK.
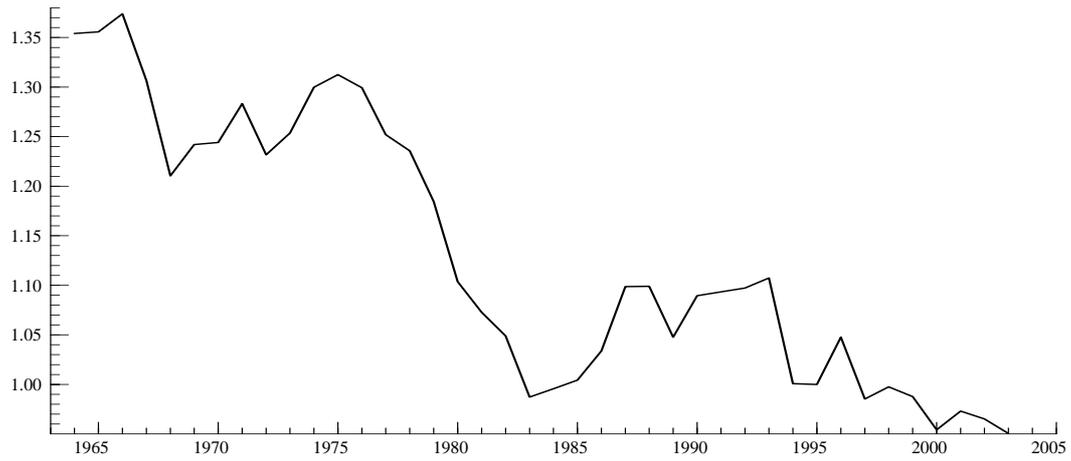
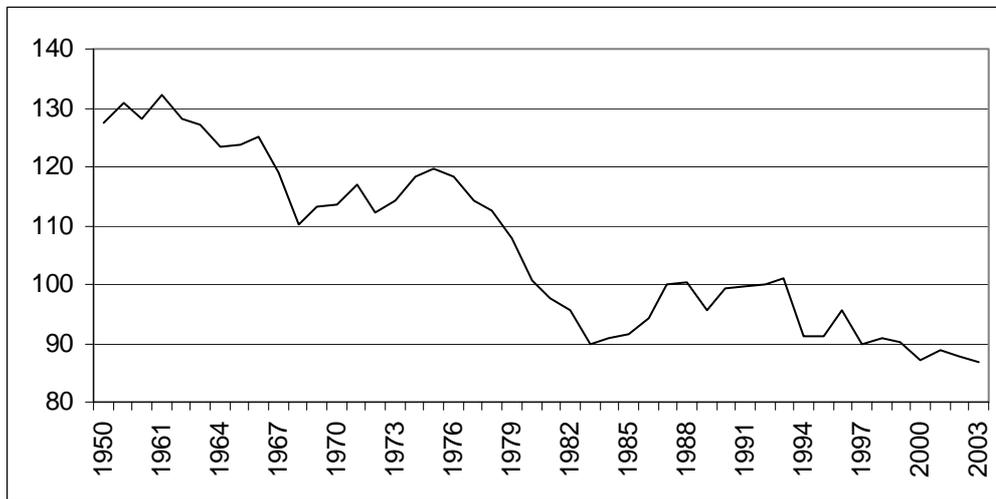**Figure 5: Real unit labour costs for the manufacturing sector, yearly data.**

Figure 5a: Real unit labour costs for the manufacturing sector, yearly data 1950, 1955, 1960-2003.
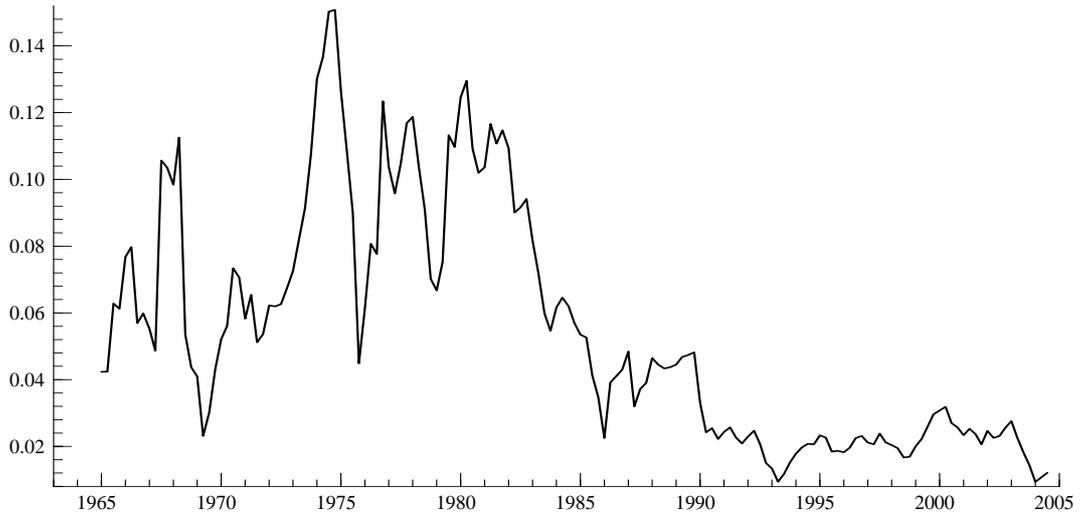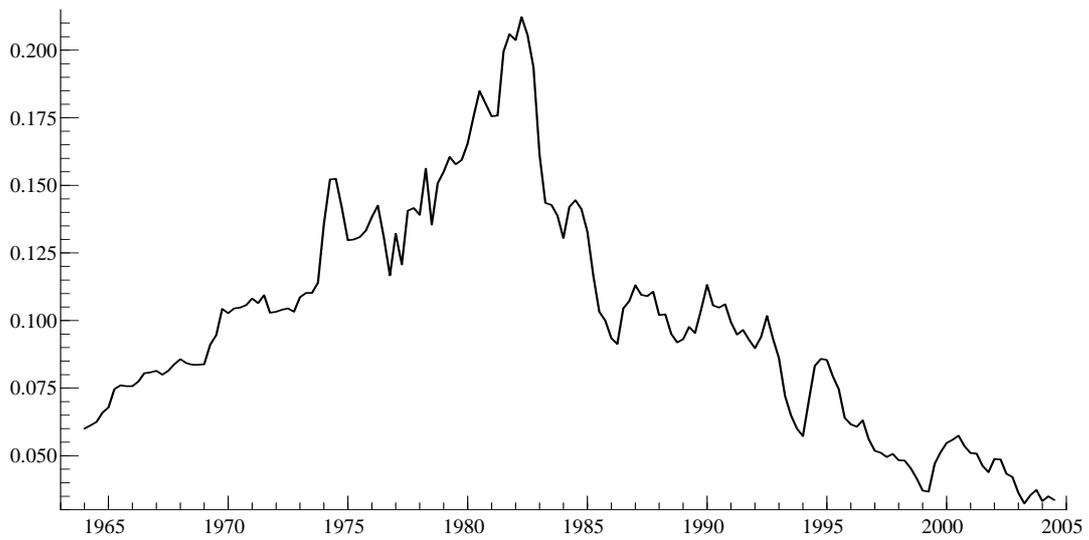
Figure 6: Yearly inflation

Figure 7: The long-run interest rate (Government Bond rate, IFS database)

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Appendix: Description of Data

The following variables have been used in the empirical analysis:

Imports and exports of coffee, green and roasted in volume and value terms
   The data are from the International Coffee Organization and Statistics Denmark.

World Market Bean Prices
   The series is the index for Other Mild Arabicas. Source: The International Coffee
   Organization.

Consumer price of coffee
   Price per kilo of roasted coffee. Source: Statistics Denmark and International
   Coffee Organization.

Consumer price index (CPI)
   CPI is from the International Financial Statistics database of the IMF.

Consumption of Roasted Coffee
   The quarterly series was obtained with the Denton technique by combining the
   yearly data on consumption from the Swedish Board of Agriculture with quarterly
   observation on net imports of coffee beans and weight-adjusted roasted coffee. See
   Bloem et al (2001) for details on the Denton technique.

Labor costs
   Labor cost per hour for manual worker in the food and beverage industry. Source:
   Statistics Denmark

Unit Labor Costs

   Unit labor costs for the manufacturing sector. Source Bureau of Labor Statistics,
   U.S.Department of Labor.

VAT and Specific Coffe Tax
   Sources: the European Commission (2002b) and Ministry of Taxes
   (Skatteministeriet)

Import Duty
   Sources: the European Commission TARIC database, *Den Danske Toldtariff*,
   various issues and Ministry of Taxes (Skatteministeriet)