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A Public Choice View of Pharmaceutical Expenditures in Germany – An Econometric Approach

- Draft -

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Abstract:

The German Compulsory Health Insurance System has been characterized by disproportional cost increases for pharmaceuticals within the last two decades. Scientific literature attributes this development usually to the complex political negotiation and decision-making processes that would prevent fundamental reform acts. However this structural-centered view totally ignores that politicians pursue self-oriented interests that not necessarily coincide with the declared goal of cost-containment. Thus we estimate an econometric model explicitly considering politicians' interests, i.e. partisan, opportunistic and corporatistic behaviour. We will come up with the conclusion that the development of drug expenditures does not arise from the helplessness of politicians but is the outcome of consciously pursued votes- and clientele-oriented interests as well as of a reciprocity of interests between politicians and pharmaceutical industry.

JEL classification: H 89, I 18, I 19

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1. Introduction

Health care reform acts are always a tightrope walk for politicians. Every modification of the health care system leads directly to cost-shifting between consumers and suppliers of health care services. Due to the fact that 'health' is the most valuable good in human life people react highly sensitive to reductions in health care provision. Coeval the prevalent misapprehension of health care as a public good results in negative attitudes against co-payments or increasing contribution rates. Consequently politicians are caught in a dilemma of interests. On the one hand votes-maximizing politicians should aspire to a comprehensive health care provision without higher burdening of people. On the other hand demographic ageing of population as well as technological progress cause cost escalation and necessitate higher financial funding or lower service offering what in turn deteriorates re-election chances.

The question arises how politicians deal with this dilemma of interests. Obviously, if arrangements to the disadvantage of the insurants are associated with the loss of votes, politicians should favour cost cuttings at the expense of health care suppliers. But especially the medical fraternity dispose of close relationships to the patients and act as opinion multipliers. Accordingly burdening physicians could hardly be used as a votes-maximizing strategy. Unlike this pharmaceutical business companies possess only minor influence on public opinion, but in fact have a bad reputation in broad population groups. It can be supposed that savings at the expense of the pharmaceutical industry are more likely to gain votes than benefit cuts or increasing contribution rates.

But again politicians hold the wolf by the ears, since the pharmaceutical industry is one of the most important economic sectors, which generated an annual turnover in Germany of € 23 billion in 2003 and 9 percent of the German foreign trade surplus. Accordingly the pharmaceutical sector is a key industry for economical prosperity.

This paper tries to evaluate how politics deal with this problem set. Empirical data will be presented and econometric tests will show the existence of interrelations between pharmaceutical expenditures and the elections for the German Bundestag (Lower House of German Parliament). The presented results give rise to the hypothesis that politicians misuse health policy for votes oriented interests.

The paper is organized as follows: Section 2 gives a short outline over the development of drug expenditures in Germany in the last twenty years. Thereafter in section 3 we take a look at the common explanation approach in scientific literature. Section 4 introduces the Public Choice view. In section 5 an econometric model is specified trying to develop a new way to explain drug expenditures explicitly considering political parties' selfish interests. Section 6 examines if the attained model results correspond with empirical observations of drug expenditures. Finally section 7 will state the conclusion.

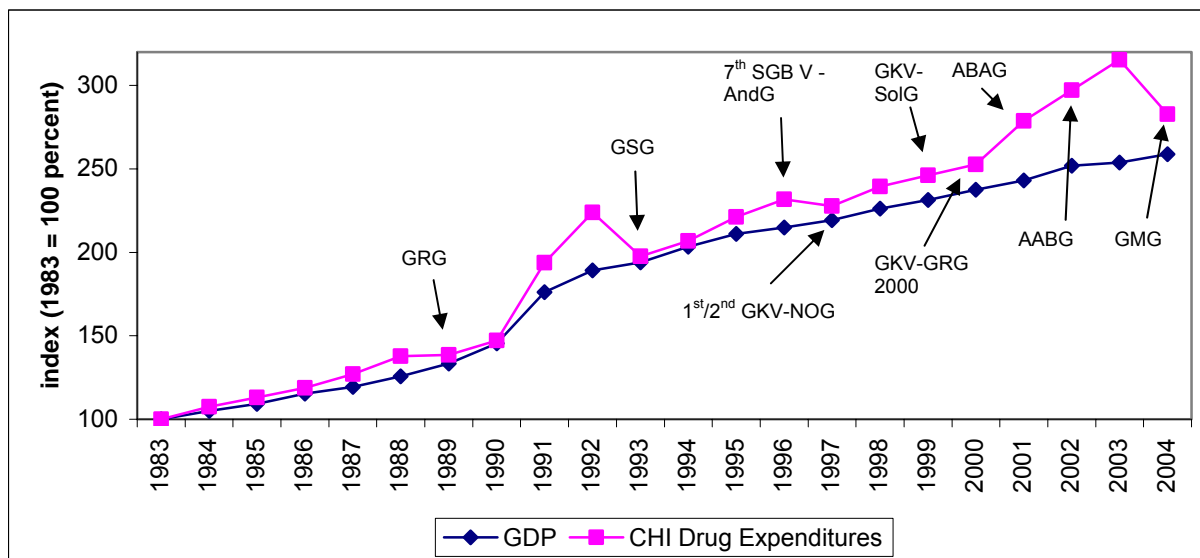
2. Development of Drug Expenditures

With more than € 24 billion the drug sales volume¹ of the "German Compulsory Health Insurance System" (CHI), which covers approximately 90 percent of the German population, once again reached a record high in 2003. Therewith the CHI roughly spent as much for pharmaceuticals as for ambulant treatments. Between 1983 and 2003 the burden of the CHI with drug expenditures had increased by 215 percent. In contrast, the German GDP had increased merely by 150 percent (see figure 1). Apart from 2004, especially within the last decade, the expenditure development has become more dynamic. Hence the quota of drug expenditures on the total CHI-expenditures has grown from 13.9 percent in 1993 up to 16.7 percent in 2003 (Schwabe 2004, p. 5).

The comparably excessive rise of drug costs motivated the legislator to introduce a series of reform acts. Up to now the implemented control instruments, which affect the supply as well as the demand side, are pursuing the official objective of obtaining a comprehensive extent of drug provision with simultaneous consideration of premium rates stability. But till this day the repeated adjustments of the regulatory framework failed to stop the continuing trend of increasing drug expenditures. Even the optimistically advertised "Health Care Modernization Act" (GMG), which decreased drug expenditures in the first quarter of 2004 by about € 900 Mio. compared to the same period in the previous year, will hardly achieve persistent effects. Indeed first estimates of the sickness funds assume that expenditures in 2005 will increase again by about 10 percent (FTD 12/02/04). Therewith the impact of the GMG would have been deflagrated.

¹ The drug sales volume is the gross turnover of the pharmacies with reimbursed, finished product pharmaceuticals. The data from this section are taken from the CHI-Drug-Index of the Scientific Institute of the AOK (WIdO), published in Schwabe /Paffrath volumes 1985 - 2005.

Figure 1: German GDP and CHI-Expenditures for Pharmaceuticals 1983 – 2004 and Health Care Reform Acts.



Health Care Reform Acts (selection): GRG = “Health Care Reform Act”, GSG = “Health Care Structure Act”, 7th SGB V AndG = “7th Health Care System Modification Act”, 1st GKV-NOG = “1st CHI Restructuring Act”, 2nd GKV-NOG = “2nd CHI Restructuring Act”, GKV-SolG = “Act to Strengthen Solidarity in the CHI”, GKV-GRG 2000 = “CHI Health Care Reform Act 2000”, ABAG = “Drug Budget Replacement Act”, AABG = “Drug Expenditures Containment Act”, GMG = “Health Care Modernization Act”.

Source: Based on data from Federal Statistical Office and Schwabe/Paffrath (several volumes). From 1992 inclusive the new German Laender.

The overview of the development of drug expenditures in figure 1 draws a sobering picture about the long-term cost-containment impact of health care reform acts and political control instruments respectively. Hence the question arises: Why has politics failed to construct an incentive compatible control system to achieve the enunciated goal of cost-containment?

3. Common Explanation Approach

As a major reason of the unassertive reform process it is usually alleged that the German CHI is characterized by the qualities of the so-called “negotiation democracy”. The concept “negotiation democracy” was used for the first time in the 1970s to describe political systems in which essential decisions were not reached by a majority of votes, but on the way of negotiation processes.² Especially health policy is highly affected by a multiplicity of negotiation arenas. On the one hand most health care reforms require the approval of both the

² The term “negotiation democracy” was introduced into the German-speaking political science by Lehbruch as “Proporzdemokratie” (Lehbruch 1967). Later on he replaced this term by the Swiss concept “Konkordanzdemokratie” (Lehbruch 1968), which is the German equivalent to Lijphart’s “consociational democracy” (Lijphart 1968). See also Lehbruch 1996. The theory of “negotiation democracy” was extended in the 1980s by the compromise and negotiation enforcements of the federal structure as well as the neo-corporatism conflict-settlement in Germany (Czada 2000, p. 4 ff.).

Bundestag (Lower House of Parliament) and the Bundesrat (Upper House of Parliament). Different political majorities in the chambers often lead to overlaps of the negotiations through the competition of parties, causing blockades of the reform process for tactical reasons (Schreyögg/Henke/Busse 2004, p. 6). On the other hand the organisational build-up of the CHI provides special associations and interest groups with several possibilities to exert influence on the decision-making process (Gäfgen 1988). In the context of the self-administration of the CHI, decision competences are perceived by the associations of CHI physicians and the central associations of the health insurance companies under supervision, but without direct participation of government. Additionally institutionalised forms of involvement of interest groups in special committees are without decision-power, but they are nevertheless very important to have a share in forming the political opinion (Bandelow 2004), e.g. the “Concerted Action in Health Care” (disestablished in January 2004) or the “Advisory Council to the Assessment of the Development in Health Care”.³ Apart from this, usually more than 70 interest groups take part in parliamentary hearings on health care reform acts (Schreyögg/Henke/Busse 2004, p. 5). The analysis of the political decision-making process is getting even more sophisticated by the fact that the process is characterized by unstable protagonist constellations. Every single issue of the reform package generates diverse interest coalitions between the involved representatives (Perschke-Hartmann 1994, p. 21).

After the theory of “negotiation democracy” the described multiplicity of negotiation arenas prevents fundamental health care reform acts. Hence politicians would not be able to assert effective control instruments against the will of the powerful health care providers and the pharmaceutical industry respectively. But a closer look at the history of health care reform acts reveals that the government is not as helpless as this theory believes. Indeed in the past government was able to accomplish, from the view of the suppliers, uncomfortable CHI-modifications, e.g. the introduction of the drug budget in 1993 or the inclusion of patent-protected drugs into the reference-price system in 2004.⁴ Consequently one can adhere to the fact that, contrary to the presumptions of the theory of “negotiation democracy”, government is able to implement strong control instruments even against the ambitions of associations and interest-groups. But it must also be recognized, that government was either unable or not willing to accomplish the obviously possible cost-containment.

³ Bandelow (1998) gives a survey of all included interest groups.

⁴ A detailed overview of the history of health care reform acts and negotiation democracy gives Blankart/Wolf 2005.

4. The perspective of Public Choice

The main failure of the theory of “negotiation democracy” is the basic assumption that politicians are really interested in decreasing drug expenditures. However the investigation of the self-interests of politicians reveals a different picture.

Politicians aspire towards votes-maximizing. They do not act unselfish to satisfy the preferences of people but they try to come or stay into power (Downs 1957). Since health politics is always one of the most recognized policy fields especially during election campaigns it should be feasible that it plays an important role for election chances. People react highly sensitive to reductions in health care provision or increasing charges. Therefore politicians at least officially plead for a comprehensive standard benefit catalogue and contribution rates stability. However since coeval demographic ageing of population and technological progress cause health care cost escalation,⁵ another sponsor is needed. Thus instead of burdening the constituency it should be attractive for politicians to cut the costs at the expense of the suppliers. But especially the medical fraternity dispose of close relationships to the patients and act as opinion multipliers. Accordingly burdening physicians could hardly be used as a votes-maximizing strategy. Contrariwise political decisions against the powerful pharmaceutical business companies are very popular. The bad reputation is based on the perception of electors, saying that many drugs are considered to be useless or even harmful, but are achieved on the market by means of a huge amount of advertising for the purpose of profit maximization of the industry. High net operating margins on an average in the OECD of 7 percent are ascribed to excessive selling prices (Breyer/Zweifel/Kifmann 2003, p. 422). Moreover, the highly internationalized economic sector is deemed a precursor of globalisation, which is associated in large parts of the population with social irresponsibility referring to international concentration of the industry, displacement of production locations and the problem of providing cheap drugs in developing countries . Even the methods of production are caught in the crossfire of critics due to animal experiments and environmental pollution. Recently, these reservations have been invigorated by ethical arguments concerning stem-cell research.

Thus it can be supposed that savings at the expense of the pharmaceutical industry are more accepted by the public than benefit cuts or increasing contribution rates. However the

⁵ For the interrelation of demographic ageing, technological progress and increasing health care costs see Knappe 1995, PROGOS 1998, Breyer/Ulrich 1999, Hof 2001, Postler 2003.

pharmaceutical industry is a growth industry which generated an annual turnover of € 23 billion in 2003 with 115.000 often highly-qualified employees in Germany. Accordingly the pharmaceutical sector is a key industry for economical prosperity. Furthermore it is highly organised with diverse associations⁶ and strong political connections, especially to the traditionally supplier-friendly Liberal Democratic Party (FDP)⁷. Additionally it has the information and technical expertise which are relevant for regulatory decision-making.

Consequently politicians have to combine two diametrically opposed ambitions: votes-maximizing and economical prosperity. In the following we try to find out how politicians dealt with this dilemma of interests in the past by means of an econometric model.

5. Model specification and methodology

5.1 The endogenous variable

The explanation of the development of drug expenditures of the CHI, i.e. expenditures reimbursed by health insurance companies plus co-payments of the insureds, is the main ambition of the paper. The necessary time-series dataset has been gathered from the CHI-Pharmaceutical Index and are available from 1983 up to 2004, hence 22 data points are being used for the regression.⁸

Endogenous variable: real CHI-Drug Expenditures per insured person (rDrugExp).

5.2 The exogenous variables

It is usually assumed that there exist two exogenous determinants of drug expenditure: age structure of population and technological progress. Additionally the basic model takes co-payments of the insureds into consideration. As a next step we try to include political interests using different political dummy variables.

⁶ Most important is the “German Association of Research-Based Pharmaceutical Companies” (VfA) which represents more than two third of the German drug market and more than 85.000 employees with 14.500 high-qualified people working in research and development (VfA 2004).

⁷ For further information see Blankart/Wolf (2005).

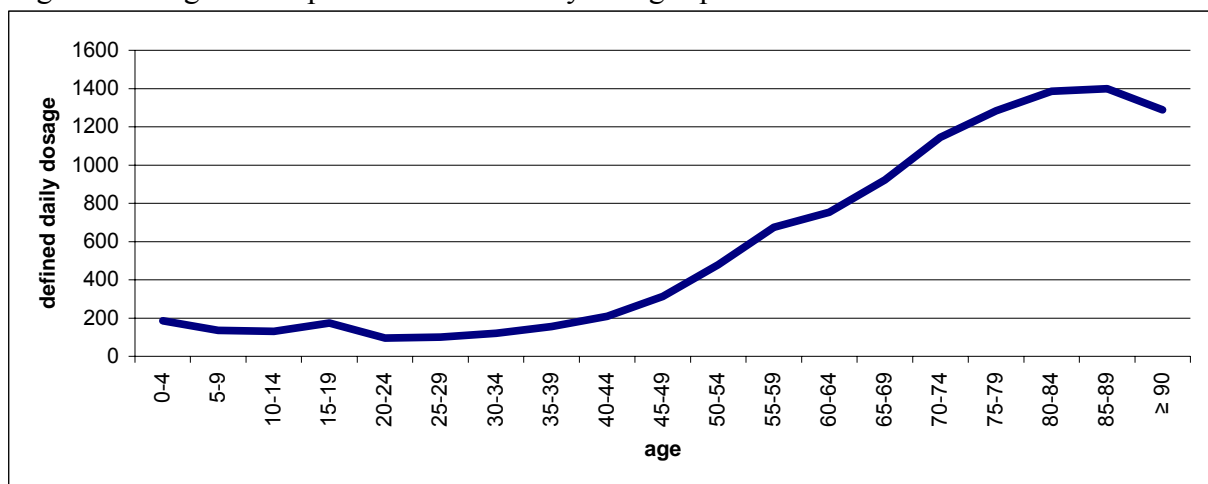
⁸ Source: CHI-Drug-Index of the Scientific Institute of the AOK (WIdO), published in Schwabe /Paffrath volumes 1985 - 2005. The econometric approach traces back to Breyer/Ulrich (1999) which tried to forecast the development of health care expenditures by means of an OLS-Regression.

Thus following expenditure determinants come into consideration:

- a) age structure,
- b) technological progress,
- c) co-payments and
- d) political interests.

a) Age structure: Pharmaceutical consumption is heavily depending on age.⁹ Despite comparable high infantile drug usages due to children's diseases and a temporarily boost between an age of 15 to 19 caused by sex hormones for girls, drug consumption stays at a very low level below 200 daily dosages per year in average. But after the minimum at the age of 20 to 25 drug consumption begins to increase slightly but consistently. Beyond an age of 40 the boost accelerates dramatically in an exponential way. The maximum is reached at the age of 85 to 90 and averages more than fourteen times of the drug consumption of a 20 years old person. In 2003 more than 50 percent of the total drug expenditures were prescribed to people beyond 60 years, although they represent only 26 percent of the insured people (figure 2).

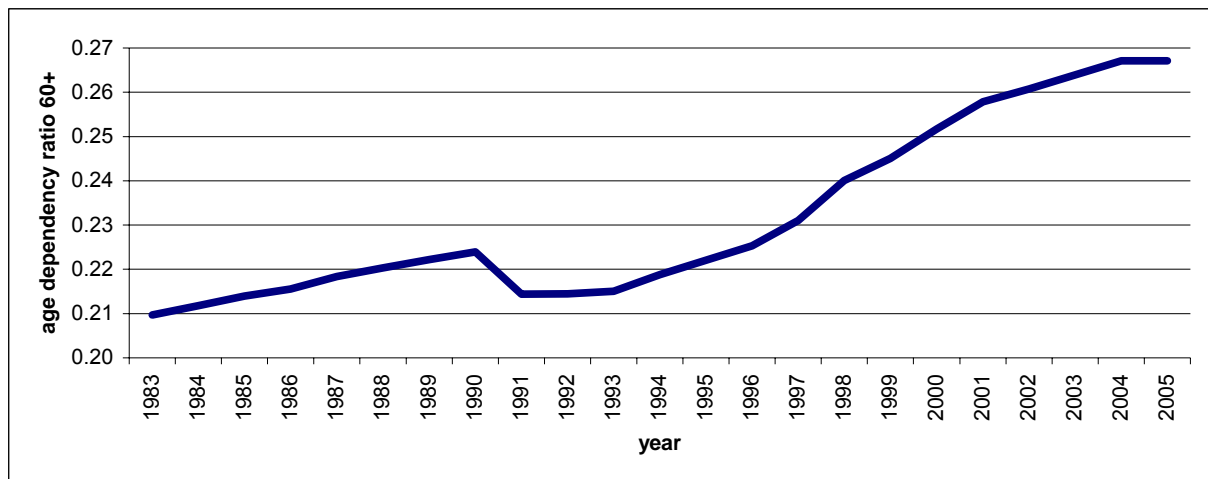
Figure 2: Drug consumption in defined daily dosages per head 2003.



Source: Nink/Schröder (2004c), p. 1105.

⁹ Although state of health is depending on age it is absolutely controversial if demographic ageing of population leads directly to increasing health care expenditures. Cumulative consumption of health services due to higher life expectancy comply with the “Medicalisation thesis” that traces back to Verbrugge (1984). In contrast the “Compression thesis” assumes that health care expenditures relies on the distance to death (Fries 1980). Thus older population does not necessarily imply higher expenditures. Up to now there exists no empirical evidence for one of the theses. Therefrom long-ranged prognoses of drug expenditure development are highly precarious. An overview of the discussion gives Fetzer 2005.

Figure 3: Age dependency ratio 1983 – 2005.



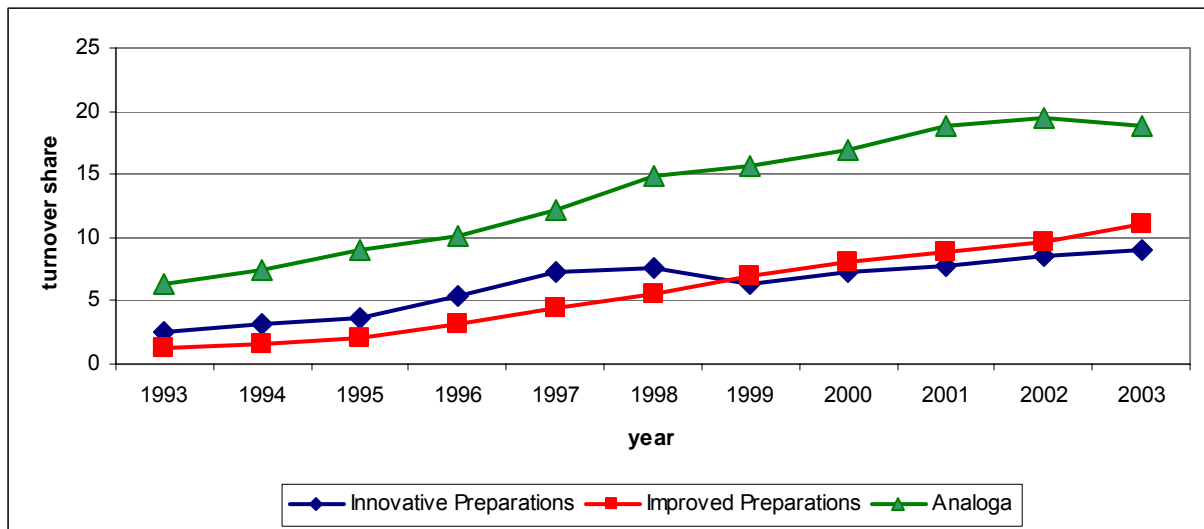
Source: Based on Federal Statistical Office and Schwabe/Paffrath (several volumes). 2005 estimated. From 1993 including the new German Laender.

The relationship between age and drug consumption can be evaluated by using the ratio of insured people that are older than 60 years to the total number of insurants (figure 3). This age limit is of particular importance because it equals the average retirement age in Germany and thus prejudices the amount of liable for contributions wage total.

Exogenous variable 1: Age Dependency Ratio 60+ (AgeDep60). The coefficient is expected to have a positive sign.

b) Technological progress: As soon as the introduction of new control instruments generate adaptations of the pharmaceutical companies in their product-, research-, and price-policy, the technological progress becomes indirectly an endogenous variable of the political decision-making process (Blankart/Wolf 2005). Therefore strategic market-behaviour and arbitrary definition of innovation prevented a direct inclusion of technological progress into the estimation equation. Patent-protection could also not be used as a criterion for technological progress. Figure 4 illustrates this problem.

Figure 4: Turnover share of patent-protected preparations.

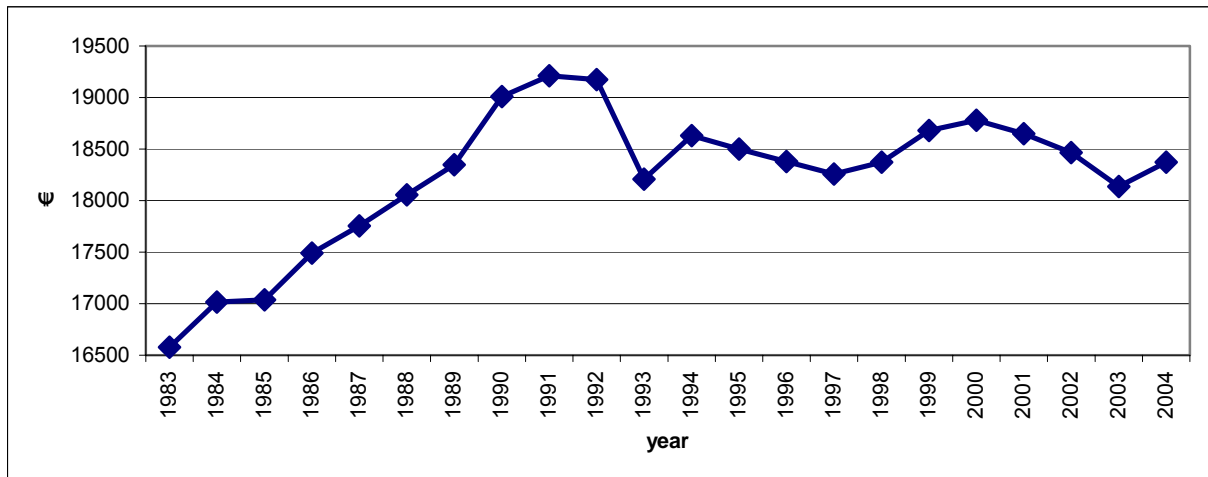


Source: Nink/Schröder (2004b), p. 161. From 1993 including the new German Laender.

Real innovations, i.e. preparations with pharmacological new active ingredients, must be distinguished from preparations with improved properties and preparations with merely marginal modifications, so-called Analoga. The companies' product-mix is highly dependent on the regulatory environment. Correspondingly the turnover share of Analoga increased significantly after 1996 and the exclusion of almost all patent-protected drugs from the reference-price scheme. The attractiveness of those products lies in the comparatively low research costs and the possibility to estimate the potential sales volume knowing the turnover from similar drugs which are already on the market (Schreyögg/Henke/Busse 2004, p. 40). Whereas the re-inclusion of Analoga into the reference system in 2004 impede further bypassing of the reference system. This may result in a reinvigoration of innovative preparations. Thus innovations in the pharmaceutical sector hinge on politics and cannot be used as an exogenous variable. Therefore instead of patent-protected products we use the liable for contributions basic wage total of the CHI-members as a surrogate for productivity advancements and product innovations (figure 5).¹⁰ Moreover the basic wage total indicates the relationship between the demand for pharmaceuticals and economic wealth of people.

¹⁰ Using basic wage total as a proxy for increasing productivity may underestimate the cost pressure due to technological progress. Especially in the health care sector technological progress is dominated by cost driving product innovations. An estimated linear acceding variable may be adequate to compensate the underestimation (see Breyer/Ulrich 1999). Therefore we include a time trend into the cointegration relationship of the error-correction model in chapter 5.6.

Figure 5: Real basic wage total per CHI-member 1983 – 2004.



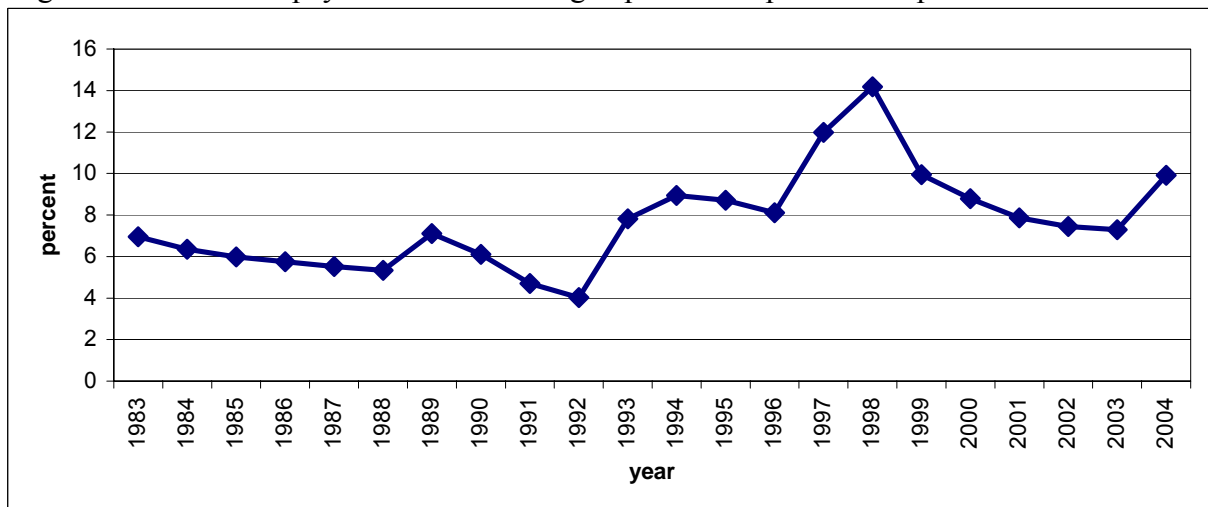
Source: Based on Berié/Fink 2002/2003. From 1993 including the new German Laender.

Since unemployed dependants and children were exempted from contributions we do not concentrate on the number of insured persons but on the number of CHI-Members.¹¹

Exogenous variable 2: Real Basic Wage Total per CHI-Member (rBaseWage). The coefficient is expected to have a positive sign.

c) Co-Payments: Co-Payments raise immediately the direct burden for patients. Accordingly, under the supposition that in average pharmaceuticals are normal goods, it can be assumed that higher out-of-pocket payments decrease drug consumption.

Figure 6: Share of co-payments on total drug expenditures per insured person 1983 – 2005.



Source: Based on Schwabe/Paffrath (several volumes). 2004 and 2005 estimated. From 1993 including the new German Laender.

¹¹ In the CHI only CHI-Members are liable for contributions. Children and not working spouses are exempted from charges. Thus the amount of insured persons exceeds the amount of members.

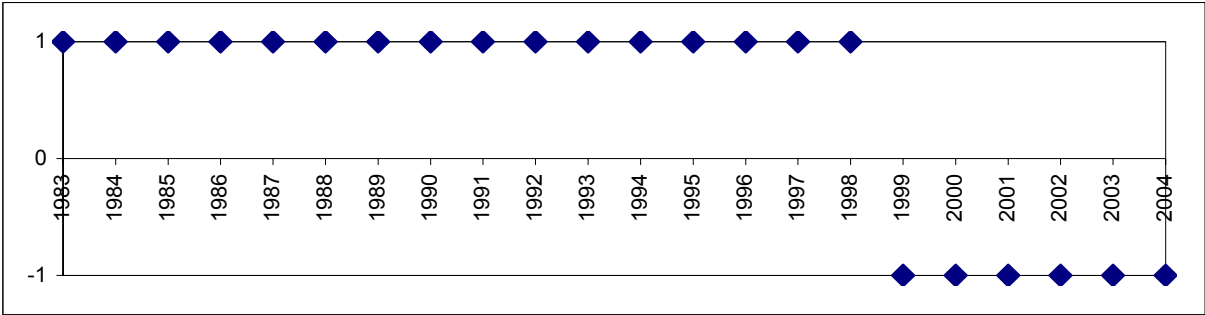
Since the height of co-payments depends on the extend of total drug expenditures we use the share of co-payments on CHI-drug expenditures per insured person (figure 6).

Exogenous variable 3: Share of co-payments on total drug expenditures per insured person (CoPayShare). The coefficient is expected to have a negative sign.

d) Political interests: The impact of politicians’ interests are considered in our model by including a political dummy variable. Crucial for the specification of the dummy variable is the choice of the assumed political behaviour. Scientific literature about political business cycles particularly distinguishes partisan and opportunistic motives.

Partisan theory traces back to Hibbs (1975) and is based on the supposition that political parties serve the interests of their core constituencies.¹² Accordingly, in respect to traditional strong relationships between right-wing governments and medical industry as well as medical fraternity increasing expenditures in periods with a Christian-Liberal coalition in power can be supposed, whereas disburdening of the patients at the expense of the suppliers should appear in the years of left-wing governments. Thus the dummy variable takes the value of one in years of a Christian-Liberal coalition (1983 – 1998) and minus one in years of a Red-Green coalition (1999 – 2004).

Figure 7: Dummy variable: Partisan behaviour.

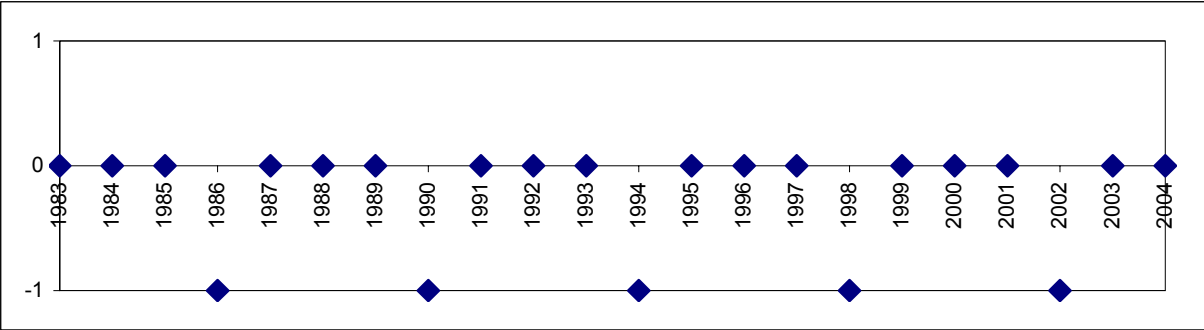


Opportunistic theory can be dated back to Nordhaus (1975) assuming that self-interested politicians use macroeconomic policies to gain votes. The ambition to cut health care expenditures aimed at decreasing or at least stabilizing the non-wage labour costs, reducing unemployment as well as acquiring votes by discharging the insured persons. In contrast to burdening physicians, who act as opinion multipliers due to their intensive contact to patients, it should be very attractive for politicians to cut costs at the expense of the pharmaceutical industry. On the one hand, the pharmaceutical expenditures are one of the largest cost-pools

¹² An overview of Partisan theory gives Hibbs 1992.

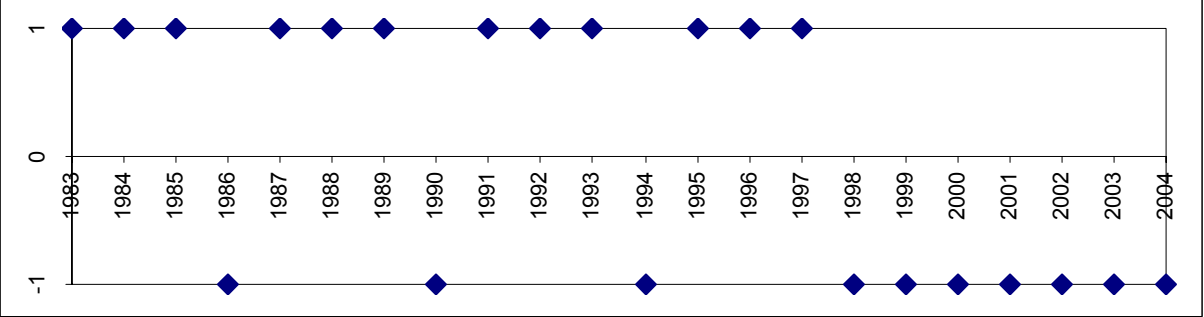
in the CHI and on the other hand, political decisions against the powerful pharmaceutical industry are very popular among the public (see chapter 4). One can suppose that savings at the expense of the pharmaceutical industry are more likely to gain votes than benefit cuts or increasing contribution rates. The dummy variable which reflects opportunistic behaviour takes the value of minus one in years of federal elections and zero in years without elections. Unlike the usual scheduling of federal elections in the second half of the year in 1983 and 1987 the election took place in the year's first quarter. For this contraction politics is already assumed for the pre-election year, i.e. 1986 (no value for 1982 because of the data limitations).

Figure 8: Dummy variable: Opportunistic behaviour.



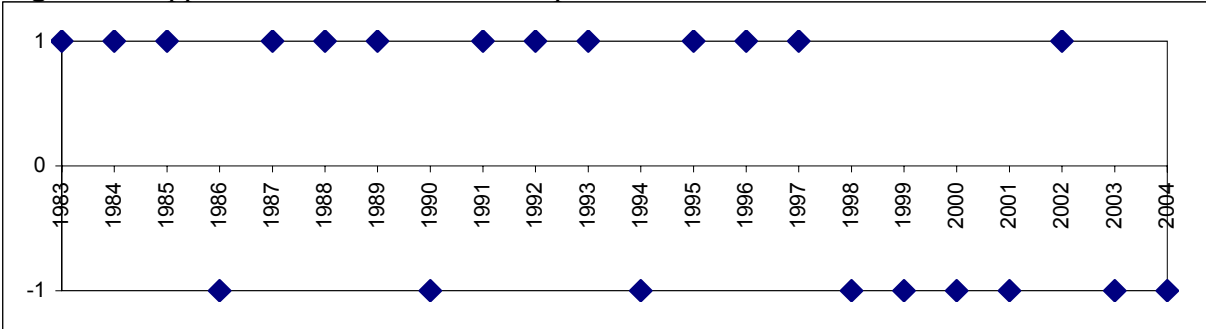
Next we test a combination of partisan and opportunistic motives like Frey and Schneider described in 1978. They showed that political parties serve the interests of their electorate in years without elections, but behave opportunistic in election years. Thus the dummy variable takes the value of one in years when expansionary policies are anticipated, i.e. in years without federal elections and with a right-wing government in power, and minus one when a drug expenditure contraction is expected, i.e. in the years of elections or in years where a left-wing government is in power.

Figure 9: Dummy-variable: Opportunistic & Partisan Behaviour.



In a last step we try to include the interests of the pharmaceutical industry itself. The industry is aware of the more supply-side friendly orientation of right-wing governments. Especially the Liberals are an important political mediator for the industry. From the manufacturers perspective the probability for unpleasant reform acts would increase with a left-wing government in power. Consequently, we suppose that industry has incentives to support the election chances of a Christian-Liberal coalition. Based on this assumption the development of drug expenditures during the Christian-Liberal era results from a reciprocity of interests. To include corporatistic industry behaviour the dummy variable has only to be modified in the years of a left-wing government. We assume that influence possibilities of industry is narrowed during the Red-Green era. Thus industry is hardly able to counteract cost-cutting ambitions of the Red-Green government continuously. But it is feasible that at least in election years industry can consciously manipulate drug expenditures e.g. by enforced marketing activities. Therefore we lift the dummy variable from minus one to plus one in 2002. Thus we test corporatistic behaviour in combination with partisan as well as opportunistic politics.

Figure 10: Opportunistic & Partisan & Corporatistic behaviour.



Exogenous variable 4: Political Dummy (PolDum). The coefficient of the dummy variable is expected to have a positive sign.

5.3 Unit Root Test

Before we can start the regression analysis first it is necessary to check the time series for stationarity, i.e. if their means and variances are constant over time. If the time series are nonstationary the problem of spurious regressions arises and OLS-results will be inefficient.

Thus we use the Augmented Dickey-Fuller¹³ (ADF) and the Philips-Perron¹⁴ (PP) tests to verify the existence of unit roots. The graphical representations in the previous chapters show that the time series of drug expenditures, age ratios and total wages are probably trend dependent. Accordingly a trend variable has been included into the stationary tests. Whereas co-payments reveal no consistent time trend and hence only the constant term has been considered.

Table 1: Stationarity Tests.

Augmented Dickey-Fuller			
Variable		Regression	t-Statistic
log(rDrugExp)	Level	C, T	-3,2
	1 st difference	C	-4,612***
log(AgeDep60)	Level	C, T	-0,781
	1 st difference	C	-2,851*
log(rBaseWage)	Level	C, T	-0,715
	1 st difference	C	-3,247*
log(CoPayShare)	Level	C	-1,67
	1 st difference	C	-3,944***
Philips-Perron			
Variable		Regression	t-Statistic
log(rDrugExp)	Level	C, T	-2,887
	1 st difference	C	-5,835***
log(AgeDep60)	Level	C, T	-1,047
	1 st difference	C	-2,811*
log(rBaseWage)	Level	C, T	-0,715
	1 st difference	C	-3,215*
log(CoPayShare)	Level	C	-1,67
	1 st difference	C	-4,312***
** Nonstationarity rejected at a 1% critical level; * at a 5% or 10% critical level. C = constant, T = trend; t-statistics based on MacKinnon critical t-values.			

As table 1 shows it is not possible to reject the existence of a unit-root for any of the time series. However nonstationarity can be rejected for all variables in first differences. So we can assume that the variables are I(1), i.e. they are integrated of order one, and follow a random walk.

¹³ The ADF-test is based on the following statistic: $\Delta y_t = a_0 + \gamma y_{t-1} + bt + \sum_{i=1}^p \beta_i \Delta y_{t-i} + \varepsilon_t$. The null hypothesis represents the assumption that the variable is nonstationary (Dickey/Fuller 1979).

¹⁴ The PP-test is based on the following statistic: $\tilde{t}_\alpha = t_\alpha \left(\frac{\gamma_0}{f_0} \right)^{1/2} - \frac{T(f_0 - \gamma_0)(se(\hat{\alpha}))}{2f_0^{1/2}s}$. The null hypothesis represents the assumption that the variable is nonstationary (Philips/Perron 1988).

5.4 Model specification I – First differences

We use OLS-regressions to test the existence of a statistical significant relationship between drug expenditures and political interests. We assume that the amount of drug expenditures per insured person are dependent on the age structure of the insurants, the basic wage total per CHI-Member, the share of co-payments on total drug expenditures and politicians' interests. Since the estimations are based on annual values we presume static relationships. All monetary variables represent real values deflated with the pharmaceutical price index (2000 = 100 percent). The data for the new German Laender are included starting in 1993. We hypothesize the following relationship:

$$\begin{aligned} r\text{DrugExp}_t = f(\text{AgeDep60}_t, r\text{BasWage}_t, r\text{CoPayShare}_t, \text{PolDum}_t). \\ (+) \qquad \qquad (+) \qquad \qquad (-) \qquad \qquad (+) \end{aligned}$$

Since the variables are I(1) we run the model in first differences. The theoretical equation is specified in a double-log functional form including no constant but an error term:

$$\begin{aligned} \Delta \log(r\text{DrugExp}_t) = \beta_1 \Delta \log(\text{AgeDep60}_t) + \beta_2 \Delta \log(r\text{BaseWage}_t) + \beta_3 \Delta \log(r\text{CoPayShare}_t) \\ + \beta_4 \text{PolDum}_t + \varepsilon. \end{aligned}$$

The double-log form has been chosen because of considerable objects to a linear relationship between the independent and the dependent variables, especially due to the influence of the demographic structure.

5.5 Results

The results of the estimated regressions are presented in table 2. The age dependency ratio (AgeDep60) and the share of co-payments (CoPayShare) are the only variables which are highly significant in all regressions. Thus already at the first glance we can state that population ageing enforces drug consumption whereas higher co-payments entail demand reductions. For further interpretations we must look at the models in more detail.

Table 2: Regression results.

	Dependent variable: Real Drug Expenditures per Insured Person				
Independent variables:	Model 1 (Basic)	Model 2 (Opportunistic)	Model 3 (Partisan)	Model 4 (Partisan & Opportunistic)	Model 5 (Partisan & Opportunistic & Corporatistic)
AgeDep60	1,228 (2,63)**	1,049 (2,135)**	1,378 (3,404)***	1,477 (3,145)***	1,466 (3,29)***
rBaseWage	0,921 (2,651)**	0,658 (1,57)	0,44 (1,267)	0,915 (2,759)**	0,906 (2,828)**
CoPayShare	-0,184 (-5,052)***	-0,177 (-4,813)***	-0,196 (-6,193)***	-0,198 (-5,533)***	-0,197 (-5,763)***
PolDum		-0,025 (-1,11)	0,023 (2,717)**	0,014 (1,668)	0,016 (2,05)*
Adj. R ²	0,476798	0,483401	0,613737	0,595365	0,622468
Durbin/Watson	1,808	1,838	1,967	2,142	2,362
N	21	21	21	21	21

Estimated t-values in brackets. *** 1% critical level, ** 5% critical level, * 10% critical level. All regressions have been checked for heteroscedasticity.

We start with the basic model 1 that contains no political dummy variable. The value of the coefficient of determination, the adjusted R^2 , shows with less than 50 percent a quite unsatisfying fit, indicating that at least one additional explanatory variable might be missing. Including opportunistic behaviour (model 2) hardly improves the results. Neither the political dummy variable nor wages (rBaseWage) show significance. Additionally the dummy has a negative sign, what is extremely implausible. It must be assumed that the pure opportunistic model is not adequately specified. In contrast, all estimations that consider partisan behaviour (models 3, 4 and 5) deliver clear improved outcomes. The adjusted R^2 rises to around 60 percent. The pure partisan model 3 provides compared to all regressions the highest degree of significance of the dummy variable, but still exhibits problems with the pertinence of wages. Model 4 overcomes this obstacle but in turn loses significance of the political dummy. Altogether model 5, which combines opportunistic, partisan and corporatistic behaviour, delivers best results, not only in respect to the R^2 but also regarding the significance of the exogenous variables.

Recapitulating we found evidence for partisan politics as well as for the combination of partisan, opportunistic and corporatistic behaviour. Furthermore age structure of population and co-payments of the insureds obviously influence drug expenditures whereas the effects of income on expenditure developments is ambiguous. The last point can be easily explained. The data-set we used in the regression predominantly consider prescribed drugs. In Germany

prescription requirement depends on the degree of adverse reactions of a pharmaceutical product. Thus in contrast to drugs for the heightening of general well-being there exist hardly any incentives to consume reimbursed drugs, i.e. drugs with adverse reactions, without being ill. People consume prescribed drugs primarily in case of health disturbance and not because of higher incomes. Furthermore physicians and not patients decide on the medical therapy. It can be supposed that physicians reach their prescription decisions independent from the financial situation of patients.

5.6 Model specification II: Error-Correction Model (ECM)

Taking first differences to correct for nonstationarity leads to a loss of valuable information especially concerning the long-run trend in the variables. To override this problem and as an additional test of significance we also estimated an error-correction model (ECM). Before it is necessary to examine whether the variables are cointegrated, i.e. that there exists at least one linear combination that is $I(0)$.¹⁵ If the variables are cointegrated then the nonstationarity in the variables cancel each other out. Since we have more than two variables we use the method of Johansen to test for cointegration (Johansen 1988).

Table 3: Johansen Cointegration Test.

	Maximum Eigenvalue Statistics	Trace Statistics
None	36,52149 (27,58434)*	60,53204 (47,85613)**
At most 1	15,70111 (21,13162)	24,01055 (29,79707)
At most 2	6,826851 (14,26460)	8,309441 (15,49471)
At most 3	1,482590 (3,841466)	1,482590 (3,841466)

The values in parentheses show the 5 % critical value. Trend assumption: Linear deterministic trend (unrestricted). *Maximum-Eigenvalue test indicates 1 cointegrating equation at the 5 percent level. **Trace test indicates 1 cointegrating equation at the 5 percent level.

Both the maximum eigenvalue and the trace test indicate that there exists a single cointegration relationship.¹⁶ Thus we should apply the Engle-Granger two-step method for specifying an ECM.¹⁷

¹⁵ For more on cointegration see Engle/Granger (1987).

¹⁶ Since the Johansen Cointegration Test indicates a single cointegration relationship we also tested the residuals of the OLS regression for an unit root (Engle/Granger 1987). The Augmented Dickey-Fuller as well as the Phillips-Perron test confirm the existence of a cointegration relationship.

¹⁷ Whenever there exists a single cointegrating relationship, the Engle-Granger two-step method delivers more robust results than the Johansen one-step method (Kennedy 2003, p. 340).

In the first step the cointegration relationship reflecting long-run equilibrium must be estimated. We test the following relationship:

$$\log(rDrugExp_t) = c + \beta_1 \log(AgeDep60_t) + \beta_2 \log(rBaseWage_t) + \beta_3 \log(rCoPayShare_t) + \beta_4 \log(year_t) + \varepsilon.$$

A time trend has been included assuming that particularly age structure of the population and the wages of CHI-members are following a trend. Additionally it can be supposed that drug expenditures are also trend afflicted due to technological progress which is not totally represented by the wage development. Including a time trend means that if the system were always in equilibrium, then the variables would be growing over time (Kennedy 2003, p. 339).

In the second step we formulate an ECM by extending the first-differenced model (chapter 5.4) with a constant and the lagged residuals (ε) of the cointegration relationship:

$$\Delta \log(rDrugExp_t) = c + \beta_1 \Delta \log(AgeDep60_t) + \beta_2 \Delta \log(rBaseWage_t) + \beta_3 \Delta \log(rCoPayShare_t) + \beta_4 PolDum_t + \beta_5 \varepsilon_{t-1} + \mu.$$

The lagged residuals of the cointegration relationship (ε_{t-1}) represent the error-correction term in the ECM. The coefficient is expected to have a negative sign. The error-correction term balances deviations from the long-run equilibrium. In contrast the first-difference term shows short-run relationships.¹⁸

In total the results of the ECM (table 5) approve the outcomes of the afore estimated first-differenced regressions in chapter 5.4. Once again, best results deliver the pure partisan model 3 and the combined behaviour model 5. In both regressions the dummy variable is significant and the adjusted R^2 shows a very good fit with 75 and 72 percent respectively. Age structure as well as co-payments are highly significant on a 1 percent level. All other estimations are inferior. Once again the pure opportunistic model 2 suggests with a critical low Durbin/Watson statistic and non-significance of age structure arguable specification. Model 4 improves the results but stays below model 2 and 5. The error-correction term is clearly

¹⁸ For further information about ECM see Engle/Granger (1987).

different from zero indicating again that the variables are co-integrated and hence using an ECM is possible.

Table 4: Regression results, cointegration relationship.

Independent variables:	Dependent variable: Real Drug Expenditures per Insured Person
Constant Term	-2,44 (-1,414)
AgeDep60	1,148 (7,703)***
rBaseWage	1,006 (5,727)***
CoPayShare	-0,133 (-3,996)***
Trend	0,051 (2,09)*
Adj. R ²	0,985708
Durbin/Watson	1,662
N	22

Estimated t-values in brackets. *** 1% critical level, ** 5% critical level, * 10% critical level.

Table 5: Regression results, error-correction model (ECM).

	Dependent variable: Real Drug Expenditures per Insured Person				
Independent variables:	Model 1 (Basic)	Model 2 (Opportunistic)	Model 3 (Partisan)	Model 4 (Partisan & Opportunistic)	Model 5 (Partisan & Opportunistic & Corporatistic)
Constant term	0,021 (1,759)*	0,023 (1,933)*	0,015 (1,415)	0,013 (1,021)	0,009 (0,644)
AgeDep60	1,043 (2,261)**	0,828 (1,657)	1,241 (2,971)***	1,399 (2,698)**	1,513 (2,976)***
rBaseWage	0,329 (0,823)	0,069 (0,148)	0,131 (0,36)	0,516 (1,252)	0,623 (1,517)
CoPayShare	-0,146 (-4,798)***	-0,141 (-4,621)***	-0,161 (-5,807)***	-0,159 (-5,11)***	-0,163 (-5,404)***
Error-correction term	-0,928 (-3,241)***	-0,861 (-2,956)***	-0,806 (-3,111)***	-0,92 (-3,297)***	-0,915 (-3,397)***
PolDum		-0,02 (-1,087)	0,017 (2,322)**	0,01 (1,374)	0,013 (1,769)*
Adj. R ²	0,681896	0,685465	0,750411	0,698607	0,71924
Durbin/Watson	1,579	1,533	1,764	1,88	2,044
N	21	21	21	21	21

Estimated t-values in brackets. *** 1% critical level, ** 5% critical level, * 10% critical level.

Prima facie the persistent non-significance of wages astonishes. But this can be explained quite easily. The ECM represents only short-term effects. The long-run equilibrium, demonstrated by the cointegration relationship (table 4), indeed finds high significance for the total base wage of the CHI-members. Consequently, in the long run, income development is

connected to pharmaceutical expenditures showing that higher society prosperity leads to higher health care expenditures.¹⁹ But drug consumption does not vary with short-term income alterations.

The results confirm the hypothesis that governments use health policy for achieving selfish intentions especially to serve the interests of their clientele.²⁰ According to partisan theory right-wing governments show no cost-cutting ambitions at the expense of the suppliers but encourage increasing drug expenditures to strengthen the international position of the pharmaceutical industry and of the economical prosperity of the health care suppliers, respectively. In contrast left-wing governments try to disburden the CHI-insurants at the expense of the industry to avoid financial overloads of their electorate that belongs largely to low-income social classes. Additionally evidence can be found for the combination of partisan, opportunistic and corporatistic behaviour. During the Christian-Liberal coalition before elections, votes-maximizing strategy dominates and leads to temporary cost-containment. This behaviour complies with opportunistic theory. For left-wing governments opportunistic behaviour cannot explicitly be identified, because partisan and opportunistic politics act into the same direction. The explanation will be completed by considering the interests of the pharmaceutical business companies. Industry has no ambition to deteriorate the re-election chances of the right-wing coalition and accept decreasing drug expenditures before elections, anticipating re-increasing drug turnovers afterwards. Since the government change in 1998 the political position of the manufacturers has declined. Actually our regression results give rise to the supposition that the suppliers consciously counteracted the re-election chances of the Red-Green government. At least they have no ambition to support the left-wing coalition.

6. Empirical observations

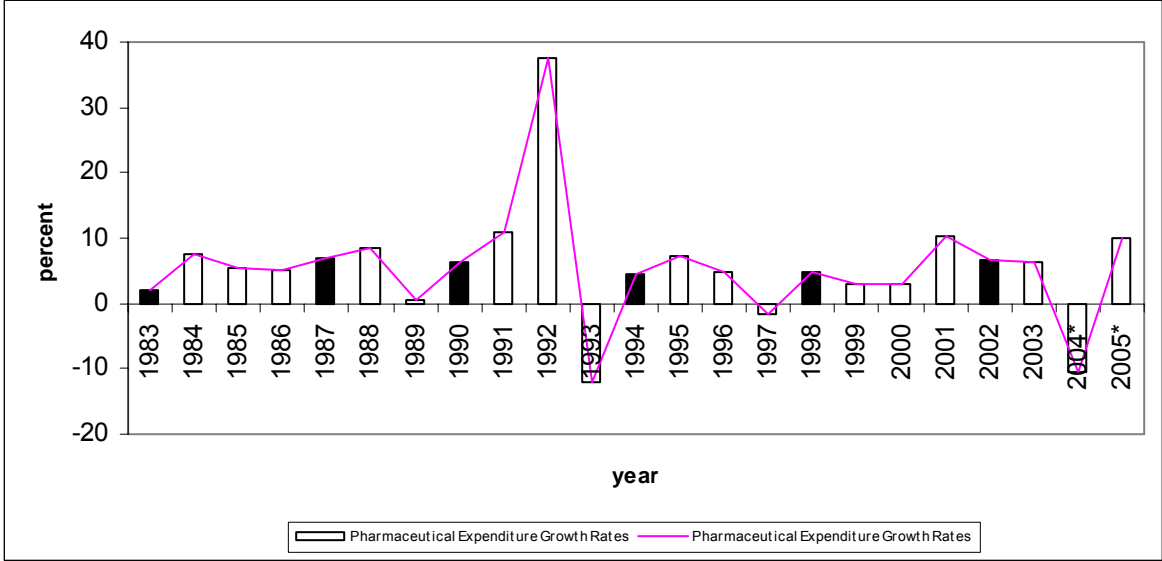
In spite of the unequal decision-making processes of the several health care acts (Blankart/Wolf 2005), we can identify astonishing regularities in the trend of pharmaceutical expenditures (figure 12). During the era of the Christian-Liberal coalition, which lasted until 1998, after two to three years of growth one year with comparable drastically low or even

¹⁹ This result coincides to the findings of Breyer and Ulrich (1999) for total health care expenditures.

²⁰ The model also has been run including an additional dummy variable representing German reunification. In so doing the results don't change qualitatively, i.e. the significances of the exogenous variables are throughout the same.

negative growth rates follows. Thus the health care reform acts of 1989 (Health Care Reform Act), 1993 (Health Care Structure Act) and 1997(1st and 2nd CHI Restructuring Act) did indeed have cost-cutting short term influences on the expenditure growth rates. But this recovery always remained only in the year of the introduction of the reform act and afterwards it disappeared again in support of a new cost increasing. This observation allows three conclusions: Firstly, the government is able to affect the drug expenditures. Secondly, the cost-driving protagonists of the health care system need only some months to find new ways of strategic behaviour to circumvent the recently established control instruments, and thirdly, the legislator was either not able or not willing to intervene into the market every year, but rather in important years. Considering the elections for the Bundestag (the black pillars in figure 12) we can find a remarkable interrelation.

Figure 12: Pharmaceutical Expenditure Growth Rates and Elections for the Bundestag.

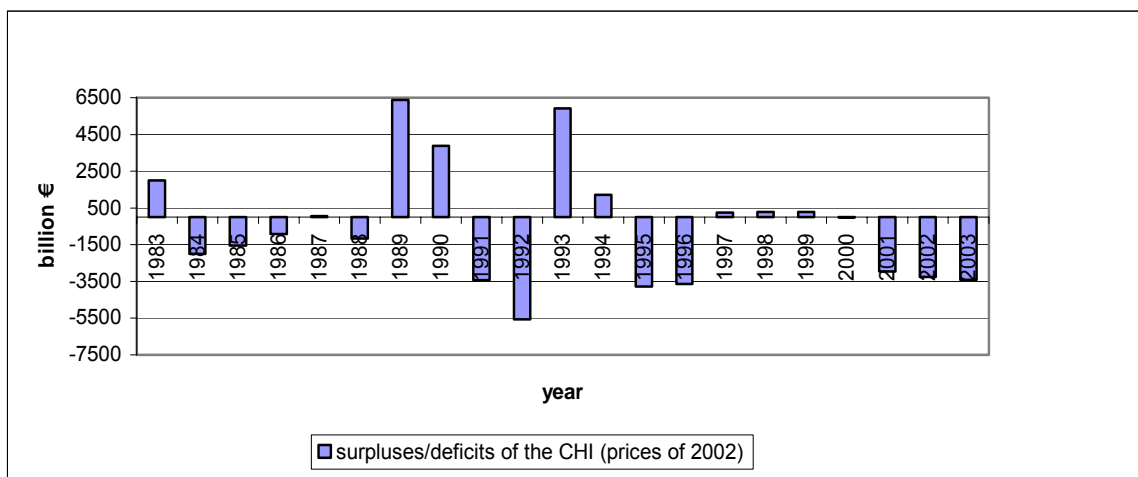


Source: Based on data from the Federal Statistic Office and Schwabe/Paffrath (various volumes). From 1992 including the new German Laender. * Estimated.

During the Christian-Liberal coalition the local minima of the growth rates are always to be found in the year before the next election. We can adhere to the statement that apparently the right-wing government tried to cut down drug expenditures before elections but afterwards it had no reasons anymore to prevent increasing pharmaceutical costs. This observation leads us to the presumption that it seem to be attractive for politicians to cut the costs at the expense of the pharmaceutical industry to gain votes. After the elections the interests of the providers attain political prevalence over the cost-containment aims of the government and the growth rates increase again.

One could object that the relevant variable for the voters is not the amount of pharmaceutical expenditures but the amount of contribution rates. Indeed the development of CHI contribution rates is not interrelated with the federal elections. However this argument ignores that the sickness funds and not the government account for the determination of contribution rates. Health insurances are only bounded by the basic principle of contribution rate stability. This principle allows increasing contribution rates if otherwise the necessary level of medical care cannot be ensured (§ 71 SGB V). Accordingly government can only try to disburden the sickness funds hoping for decreasing rates. A closer look at the financial situation of the CHI demonstrates that according to this the health care reform acts until 1998 consistently disburdened the sickness funds (figure 13). Comparable to the development of the expenditure growth rates, the surpluses and deficits of the CHI revealed a cyclical trend. The reform acts of 1989, 1993 and 1997 always caused a surplus of the CHI that persisted until the next federal election. Even in 1987 we can observe a surplus although there had been no state-run intervention. Consequently the votes-maximizing strategy of the Christian-Liberal coalition is not based on decreasing contribution rates but on the disburdening of the CHI. Hence the government establishes the framework for decreasing premium rates and shifts the responsibility on to the self-administration of the CHI.

Figure 13: Surplus/Deficit of the CHI 1983 – 2003.



Source: Federal Statistic Office.

With the accession of power of the Red-Green coalition the interrelation between the growth cycles and the elections reversed (figure 12). Decreasing growth rates for drug expenditures in 1999 and 2000 and a higher frequency of health reform acts (from 1999 to 2004 every year a reform act was introduced) indicate a minor political influence of the cost-driving

protagonists of the health care sector and narrow the time for strategic adjustments. This indicates that – in contrast to the Christian-Liberal coalition - the left-wing government is not willing to fulfil the ambition of the pharmaceutical industry for increasing drug expenditures due to their own clientele of low-income population classes. However before the elections of 2002 and 2005 local maxima of growth rates can be observed, showing that the pharmaceutical industries as well as physicians have no interests in supporting the Red-Green government with low expenditures, but furthermore try to counteract their re-election chances. Consequently we must also consider corporatistic behaviour of the suppliers.

7. Conclusion

The inability of government to contain disproportional cost increases for pharmaceuticals is mostly attributed to the complex political negotiation and decision-making processes within the German CHI. As a major reason for the unassertive reform process it is usually alleged that politicians are not able to accomplish strong control instruments against the will of the powerful interest groups of the health care sector. A closer look however reveals a different picture. We see political cycles in expenditure developments with strong amplitudes – reflecting the ability of government to influence costs despite the restrictions in decision-making. But if it is possible to affect expenditure development, it is obviously necessary to consider the interests of the controlling protagonists. These are health care suppliers, especially the powerful pharmaceutical industry, and politicians.

Regarding politicians' interests scientific literature usually distinguishes between partisan and opportunistic incitements. Partisan theory says that politicians try to serve the interests of their clienteles. According to opportunistic theory politicians temporarily modify politics to improve their election chances. Our econometric tests have shown that health policy in Germany is especially affected by partisan politics. We also find indication for partisan as well as opportunistic politics in combination with ambitions of the pharmaceutical industry itself. These econometric results have been approved by empirical observations.

Consequently disproportional cost increases do not arise from the helplessness of politicians but from deliberately pursuing of votes-oriented interests.

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