

Achtergrondstudie

9 Regulation, Competition and Innovation



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1. Introduction

How does regulation affect innovation? Can something as creative and unpredictable as invention and innovation is often considered to be, be influenced in any positive way by regulation?

The answer regularly given these days by neo-liberal policymakers seems indeed negative: regulation stifles innovation. Regulation, market ordering and market organization, in short institutions, detract from the freedom of enterprise. They reduce both the willingness and the possibilities for creativity, daringness, risk-taking, investment, innovation. Businessmen get bogged down in a plethora of rules and regulations. Furthermore, regulations tend to reduce competition, thus decreasing the incentive for business to remain on its toes, to stay ahead in the race. More in general, regulation produces major costs to business and the economy (see Van Hulst 1996, Van Bergeijk, Sikken and Van Sinderen 1996). As a result, the nation's competitive position risks falling behind in the globalized economy. This is the diagnosis. The recipe is well-known: deregulation, de-organization of markets, more competition, more freedom for entrepreneurs, for imagination, for creativity.

The argument seems plausible and sympathetic. Nevertheless, it contains a series of flaws. The relation between regulation, markets and innovation is more complex than is assumed in neo-liberal reasoning. In this paper I will try to explore the relationship between regulation and innovation in more detail.

I will do so by analyzing the possible influence of regulation on factors and institutions in the business environment that affect both the willingness and the possibility of business to innovate. First I will discuss some general functions of regulation as to innovation: a) their role in providing incentives for innovation, first indirectly through the structuring of markets and competition, and secondly as direct incentives for innovation; b) in reducing risk and uncertainty and in creating trust; and c) in allowing for profitmaking. Subsequently I will discuss how regulation may affect the various elements of 'national systems of innovation', that is, the various factors that facilitate innovation, such as the pattern of industrial organization or the provision of collective goods, in particular pre-competitive research and development and vocational training. Thirdly, I will argue that the manner in which regulation affects innovation - and more in general business - also depends very much on the style of formation and implementation of regulations. In this respect I will contrast the typically Dutch policy style with that prevalent in other countries. Subsequently, I will dwell on the question of the alternatives to regulation. What would be the long-term consequences of deregulation? Finally, I will address the question of the possibilities of regulation by the Dutch nation-state, given the ever-increasing importance of economic, political and legal internationalization. What room for policy choice is left for nation-states? Has not the European Union become the only effective level of regulation regarding innovation?

2. Innovation: Means or End?

But before I address the relation between regulation and innovation first a few words on the value of innovation itself. One often perceives in policy discussions a narrowing down of arguments, leading to means becoming ends in themselves. This happens to concepts such as competition, market functioning, or economic dynamism. These means towards ends such as allocative efficiency, economic growth or general welfare tend to become policy goals in themselves, eventually losing their connection to these further goals. The same threatens to happen to 'innovation'. That too tends to become a value on its own. But one should never overlook that innovation is no good in itself. It is only of value in relation to goals such as attainment or maintenance of competitive advantages, market shares, export positions, productivity, earnings and growth and in the end improvement in the lives of consumers and citizens. These goals are on a par with others, such as the prevention of externalities, e.g. environmental pollution, health risks for workers and consumers, etc. And the latter may be (but of course do not necessarily have to be) negatively affected by innovation.

Newness often seems necessary. Advertising screams the newness of products from labels, billboards and full color glossy magazines. From car manufacturers to potato chips producers, they all try to convince consumers that they have just successfully created a 'new' car or a 'new' 'munchy'. But does a consumer really want 'new' milk, new beer, new tomatoes or new bicycles? And does he want a new car model every year? Isn't newness here fake? It may be that some products have reached the limits of their innovative capacity and that further innovation is either cosmetic - in color, packaging, presentation - or a decrease in quality. Many products owe their value for the consumer to their stable quality, their age-old reputation and image, and innovation of such products may even backfire, as the Coca Cola company found out a while ago. This well-known company felt some years ago that it also had to come up with something new. But did the consumer really want a new coke? Wasn't it dangerous to change the taste of coke? After extensive marketing the firm decided indeed to create a new coke. It turned out to be a tremendous flop, at least if one does not count as a success the huge amount of free publicity the company got. Pretty soon the company had to market the 'old' coke again, now under the name of 'classic coke'. For a while the new and the classic version were produced side by side, but in the meantime the new coke has quietly disappeared from the market and the label 'classic' vanished from the old version. At present the competitor Pepsi is trying innovation again, but in a typical symbolic manner: by changing the color on the can from red to blue. Millions and millions of dollars are being spent on this typical symbolic innovation.

Thus there are still numerous products for which stable quality rather than newness is the most important asset. For many products tradition and old age are important images, exploited at length in advertising. Beer breweries try to find ways to extend their ancestry even further back in time, so that they can print 'since 1652' on their labels; apple pie is sold as 'mother's home-made style' and tradition is also important for champagne, wine, cheese, and many other food products including even modern classics such as coke. The same may hold for musical performances, service in hotels and hospitals, or furniture.

In these cases consumers are well-served by strict quality guarantees. Such goods sell on the basis of a reputation for reliability, sturdiness, healthiness, i.e. stability of quality, rather than on a reputation for change

and dynamics. Such a quality reputation can be built by individual trade marks or by quality certification of private organizations, but for many products of a more generic nature history has shown this to be difficult. In the end, stable quality guarantees seem to require standardization, normalization and regulation by some public authority. This is even more the case when public interests, such as public health, are involved. I will discuss this further in the section below on 'institutions, transactions, and trust'.

Of course new products and new sectors are necessary and useful and have improved living conditions tremendously over the centuries. Our life would not be the same without the fire, the wheel, weaving, the plough, fertilizer, the steam engine and turbine, the rubber tire, the airplane, the car, insurance companies, progress in medical knowledge. On the whole innovation has been to the advantage of humankind and of national economies. The foregoing serves only as a word of caution against the overly extreme and blind pursuit of innovation in any kind of product. The issue now is how such innovation can be influenced by regulation.

3. Basic Functions of Regulation

3.1 Competition

Freedom is considered an essential precondition for innovation: freedom to think, to experiment, to associate, to discover, to try out new and daring, uncommon and not obvious combinations, to travel through unknown lands, to delve into mysterious spaces. Freedom also to exchange information, to travel, to choose one's profession and to follow one's interests. Such freedoms enhance creativity and that is, in the end, where innovation has to come from. Cultural environments which provide for such freedom enhance innovation. It is not without reason that many fundamental inventions have been made in the liberal and individualistic US (or earlier on: Scotland) rather than in a collectivist society such as Japan. The Japanese culture may favor imitation, but apparently it does not stimulate invention, at least radical product innovation (They have been quite good at process and organizational innovation). Collectivism, conformism, group pressure, organization and regulation often hinder if they do not prohibit the creative and random wanderings necessary for radical new innovation. This is of course all very true. However this argument tends to overlook the obvious fact that freedom can exist only in an ordered context, where basic needs are safeguarded.

The same holds for markets and competition. These can provide powerful incentives for innovation indeed. The invention and development of new products opens new markets where there are fewer competitors and hence better possibilities for prices and profits. Similarly, process innovation may help firms to improve the effectiveness and efficiency of production, to enhance quality and cut costs. These may give them a competitive edge over their rivals. Without the pressure of competition firms might sit back and enjoy their comfortable position. There would be no reason for strenuous and exacting efforts for innovation.

However, in the discussion on regulation the obvious point is often overlooked that markets and competition do not come about spontaneously or automatically. Many economists and politicians seem to think that there can never be too much freedom on markets. Maximum freedom, openness and competition provide the optimum allocation of goods and factors of production, including those factors needed for innovation and long-term investment. The self-regulatory capacity of parties on markets is often overrated and there is not enough awareness of the potentially disruptive effect of conflict and competition. There is no room for this in the standard economic models. And neither is there scope for the possible benefits of ordering and moderation. Such economic models often assume that the natural situation is one of 'order'. Intervention, no matter by whatever kind of authority, only disrupts this 'natural' order and impedes an optimal allocation.

By contrast, political theorists and lawyers often start from opposing assumptions. According to them, the 'natural' societal condition is one of chaos, destruction, insecurity, and an unending and all-destructive battle of all against all. The political philosopher Hobbes described the 'natural conditions of humanity' in 1651 with the famous and timeless words: 'Againe, men have no pleasure, (but on the contrary a great deale of grieve) in keeping company, where there is no power able to over-awe them all... So that in the nature of man, we find three principall causes of quarell. First, Competition; Secondly, Diffidence; Thirdly, Glory. The first maketh men invade for Gain; the second, for Safety; and the third, for Reputation... Hereby it is manifest, that during the time men live without a

common Power to keep them all in awe, they are in that condition which is called Warre; and such a warre, as is of every man, against every man.' (Hobbes 1968, orig. 1651: 185).

Conflict, violence and deception are also the 'natural' condition on unregulated markets. They are of all times and places. Just a few out of many examples; the 'robber barons' (Josephson 1934), the railroad magnates, mine owners and steel barons of the late 19th century in the US did not refrain from having their competitors eliminated by professional gunman or from fighting trade unions and their leaders literally with fire and sword. Our own 19th century capitalists went less far, as they were already constrained by regulations, but they too hired a fighting squad once in a while to threaten strikers. Less extreme forms of violence happened even on regulated markets. De Vries (1955) (in *Raadschelders* 1995: 32) on a typical medieval market day: 'This part of the market (the cattle market) used to produce the usual skirmishes. Even though it was strictly forbidden to sell animals with hidden disabilities, this happened from time to time. And once there was a conflict, the passers by found a pleasure in pushing the contenders upon each other and the fighting started. The market master had to personally separate the brawlers, order the 'peace' and take them to the home of the closest sheriff'.

At the moment, capitalism probably shows its most unrestrained face in Eastern Europe, where the institutions that formerly regulated economic exchange have lost their legitimacy and where new ones still have to be developed. The *Volkskrant* reported on the wild-west methods of taxi-drivers in Prague: 'The exorbitant growth of the number of taxi's (there is no legal limit) has led to all out war for the best of the approximately five-hundred taxi-stands. In the tourist center, the law of the jungle reigns. Places at Wenceslas square are defended with all available means. Competitors find their tires slashed or are molested. One driver was kicked to death in broad daylight on Wenceslas square when he challenged a colleague who pushed a lady out of his car because she wanted only a very short drive. Chairman Supert of the official taxi association, who sent out warnings to all foreign embassies, got a price of 300,000 crowns (18,000 guilders) placed on his head for nest befouling.' (*Volkskrant* 3-12-1994). Recently also the battle among Vietnamese cigarette street vendors in Berlin came into the news. The competitive battle at this illicit market has already cost the lives of 28 victims.

Meanwhile, too, more and more economists are again realizing that markets are not spontaneous orders. In particular the disciplines at the margin of economics, such as economic history (North and Thomas 1973, North 1990), institutional economics (Hodgson 1988, 1993a and 1993b, Williamson 1975 and 1985, Eggertson 1990) and economic sociology (Granovetter 1985, Granovetter and Swedberg 1992, Smelser and Swedberg 1994, Etzioni and Lawrence 1991, see for an overview Steiner 1995) keep the idea alive that there can be no markets without rules-of-the-game, that markets are social constructions. Furthermore, in recent years a number of more popular studies have appeared which investigate the institutional and cultural embeddedness of economies and relate this to their performance (Porter 1990, Albert 1993, Whitley 1992, Fukuyama 1995).

Institutions, that is regulations and organizations, are thus necessary to provide for economic order, to make markets and competition possible in the first place. Markets have to be constituted and maintained by public authorities with a political monopoly (sovereignty) who set and supervise

the observation of the rules of the game. Many regulations affecting business do just that: they allow for and facilitate transactions, thus enabling exchange and markets to develop. They do so, for example, by establishing and guaranteeing property rights, by providing a stable and uniform currency for generalized exchange, by setting standard weights and measures and uniform pricing units and by checking the accuracy of measuring instruments, by guaranteeing the observation of agreements and contracts, and more in general by sanctioning opportunistic and dishonest behavior. Much of both civil and public law is concerned with this and many state organizations, varying from the courts to the central bank or the weights and measures office, have an important task in applying such regulations.

This might all be rather obvious, but these positive functions of regulation tend to become overlooked in the deregulation debate, perhaps just because effective regulation has made basic economic order so self-evident that it is not seen as a problem any more; it is assumed that one takes it for granted.

Regulations are not only necessary to constitute markets. There are also specific ones needed to maintain markets and competition. Regulations have to correct for too little and too much competition, both of which reduce the effectiveness of competition as a motor behind innovation.

Markets have an inherent tendency to develop into oligopolies if not monopolies. Competitors have an incentive to try to subjugate their competitors, to acquire a monopoly or at the least to establish an oligopoly. In order to prevent competition from destroying itself, anti-trust legislation is needed, and this at least is well-realized in the policy debate. The current changes in competition law, i.e. more stringent anti-cartel legislation and merger control, serve this purpose. However, people realize less well that overly strict anti-cartel legislation may also have opposite effects. The rather tolerant cartel policy pursued by the Dutch government thus far has allowed for moderate forms of horizontal cooperation between competitors. A ban on such cooperation may force them to replace horizontal by vertical cooperation, i.e. cartels by firm hierarchies. In the absence of stringent merger control this may actually reduce competition more so than moderate forms of cooperation between legally independent companies.

That regulation may be necessary to protect markets from too little competition is well-accepted. However, it is less accepted that markets can also suffer from too much competition and that this also can be detrimental to innovation. Certain sectors may experience ruinous competition. Where market entry and exit is easy, e.g. because little investment is needed, there may be a permanent overcapacity in the market, resulting in all-out war among competitors and sales even below cost price. Firms will go bankrupt all the time, but as they have little to lose because of limited investments, they do not suffer much and may be back in the market the next day with a new name and a few debtors less. This has happened in the past in construction, printing, and retailing for instance. The high turnover of firms and low profit rates may superficially make for a highly dynamic sector. However, such firms lack the continuity needed for long-term investments in innovation. And the pressure on prices does not allow for profits to finance such innovations (or to attract capital to do so). Moreover, the absence of the prospect of gaining a competitive edge through innovation may make such innovation a senseless activity. Finally, unfettered, ruinous competition leaves very little of the much-heralded freedom, necessary for creative innovation. Ruinous competition becomes

a constraint. The only freedom that is left is to adjust to the requirements imposed by competition (Cf. Wöltgens 1996). Thus regulation has been also necessary to moderate ruinous competition. Examples are the 'Establishment Acts', the declaration of collective wage agreements to be generally binding, and specific market entry regulations for sectors such as taxi transportation. However, these forms of market regulation have recently come under attack. Abolition of them could increase competition to the point of it becoming ruinous again, thus also frustrating innovation.

3.2 Standards as Incentives

Competition may be an important incentive for innovation and regulation may be necessary to guarantee competition. Regulation however can also directly be an incentive for innovation. Challenges inciting innovation can come from a variety of demands and stimuli which impinge on the entrepreneur. They may come from the competitor, but also from the client, the supplier, the worker, the provider of capital, and from regulatory authorities, in short, the stakeholders of the firm (Mintzberg 1979).

Customers may demand specific, high-quality products, short, precise, or just-in-time supply, or after sales service. These are all challenges for innovation, whether of a technical or organizational nature. Of course, the importance and intensity of such demands depend on the 'dependence' of the entrepreneur on that particular client. And that varies again with the presence of other customers and other suppliers that compete for the favors of such customers and of course also the business cycle. In other words, the importance of customer demands depends on competition.

Incentives for innovation may also come from demands from workers: for higher wages and better working conditions. Their importance also depends of course on the degree of competition. Do workers have an exit-option (Hirschman 1970), provided by competing employers? By emigration? Or provided by unemployment insurance? Social security arrangements can at times also become competition for the employer. Moreover, workers command other sanctions to back up their demands: the voice-option, in particular the collective organized voice option (unions, works councils), sabotage, strikes, go-slow actions, etc. High wages in particular have been a major driving force behind technical and organizational innovation, designed to reduce the dependence of employers on workers (Braverman 1974). This has been shown both at the macro and micro level. A macro level indication is the higher level of technical advancedness of American industry in the late 19th century compared to European counterparts. This difference was due to the higher wage levels in America, which in turn were due to US workers' alternative of going west. Another indication is the boom in investment sparked off by the 'wage explosion' in the Netherlands after 1963. An example at the micro level: an important innovation in the textile industry in the early 20th century was the development of ring-spinning machines. Unlike their predecessors, the selfactor spinning machines, these could be operated by unskilled and hence not only cheaper but also less well-organized labor. To accentuate this even more, the new ring-spinning machines were explicitly designed to be operated by (cheap) children. They were too low to be operated by adults (Van Waarden 1984). Given the importance of high wages for innovation, Kleinknecht (1995) has recently argued that too much wage restraint could retard the technical development of the Dutch economy.

High wage demands could be useful for getting out of a threatening spiral of low wages and low productivity. Wage levels have been important, but also other demands and sanctions of workers have influenced innovation. Thus the threat of sabotage has occasionally been an incentive for technical innovations that reduced the discretionary space of workers and thus made employers less dependent on them (Dubois 1976, Braverman 1974).

A third category of stakeholders putting demands on business are the suppliers of capital: banks, institutional investors like pension funds and insurance companies, shareholders, family members. They, too, influence innovation by their demands. And the various capital suppliers may have distinct demands which have a different impact on innovation. Many individual shareholders want dividends and a short-term improvement in stock prices. If they are dominant, as in the US, firms may be forced to pursue short-term profits at the expense of long-term investments. Conversely, a dominance of institutional investors who are more interested in a stable and long-term increase in stock value, may allow firms to pursue a long-term strategy, permitting long-term investment, inter alia in research and development, at the cost of short-term profits.

The government, too, is a stakeholder in business. It has to protect the public interest: in jobs, but also in safe products and safe working conditions, or in a clean environment. Its regulations protecting such interests are likely to become incentives for innovation as well. Environmental or product quality standards may have a function comparable to competition: they are challenges for firms to mobilize all their innovative capacities. Such norms may become technology forcing. And indeed they have become so. High automobile emission standards have forced automobile manufacturers to develop engines that satisfy such standards. Countries which were first with such rules, or who had the strictest rules (Japan and Germany), also ended up with car industries that had a competitive edge in producing fuel efficient and emission clean cars (Boehmer-Christiansen and Skea 1991, Heritier, Mingers, Knill and Becka 1993, Arp 1994).

Already the mere threat of regulation has mobilized industry to organize itself on the issue of packaging waste, to develop procedures for recycling, and to redesign products in order to facilitate the separation of different materials at the end of their product life. Similar technology forcing norms may of course also come from private institutions, such as certification bodies or trade associations. Usually, only the government commands the authority to impose such binding standards on industry.

The importance of government regulation for innovation is also illustrated by the fact that many major inventions were developed either during war time or in preparation for war. Examples are cartography, synthetic rubber, radar, aluminum airplanes, the jet engine, antibiotics, nuclear energy. Such products were developed in response to military orders. In this role the government actually combined the pressures of a demanding client (in a monopsonistic relation) and a regulating sovereign authority.

Furthermore, government regulations can influence innovation indirectly in so far as they can influence the demands coming to firms from other stakeholders such as customers, workers or providers of capital. Income, tax and social security policy affect the difference between gross and net wages and may hence influence wage demands and thus indirectly the propensity to innovate. Consumer protection regulations and liability law influence the power of consumers and hence the importance of their demands to firms. And Dutch company law restricting the influ-

ence of shareholders on the board of supervisors and thus also on the executive board of firms allows Dutch firms to pursue more long-term oriented investment policies.

3.3 Risk

3.3.1 Sources of Risk and Uncertainty

Competition may provide important incentives to stimulate economic actors to take initiatives, like innovation. Incentives alone, however, are insufficient to make people engage in transactions, investments and innovation. They also need to believe in the sense in doing so. The chance of success should not be too small. One should see possibilities. It is as with gambling. People gamble, because the chance of winning a lot can be a big incentive. However, it is particularly thrilling and addictive if one indeed wins occasionally, even if it is only a little bit, because that encourages the belief that one day one might win big. If one never wins even a little bit, gaming soon becomes pretty boring. That is known in Las Vegas. People win regularly, and casinos advertise with pay-out ratios of 97 or 98 percent. That makes it so addictive. Meanwhile, the casinos can get rich on the difference of two per cent. In an similar way, entrepreneurs need to perceive the possibilities of technology, or chances on the market. And in particular: they should have some reason to believe that the relevant circumstances will not have changed too drastically in a number of years, when the investments made are finally due to start generating profits.

Belief in the possibility and sense of investment and innovation depends in particular on the nature and degree of uncertainties and risks. (The difference between both being that uncertainty cannot be predicted, whereas risk can to some extent. That implies that probabilities can be calculated - and hence insured. On this subject reference should be made to Knight's still classic statement. Neither risk nor uncertainty should be intolerably high. Reduction of risk and uncertainty brings stability and predictability. It allows people to make sensible choices and, in particular, to make long-term investments. Both are needed for investments and innovations.

In the 'natural' economic disorder, uncertainty and risk are much too great. In a situation where everybody is everybody's competitor - read enemy - no transactions take place and no growth can be generated. In the words of Hobbes: 'In such condition, there is no place for Industry; because the fruit thereof is uncertain: and consequently no Culture of the Earth; no Navigation, nor use of the commodities that may be imported by Sea; no commodions Building; no Instruments of moving, and removing such things as require much force; no Knowledge of the face of the Earth; no account of Time; no Arts; no Letters; no Society; and which is worst of all, continuall feare.' (Hobbes, 1968, orig. 1651: 186).

There are many sources of risk and uncertainty. A major and elementary one regards property rights. Safeguarding those through regulation is not only necessary in order to provide economic actors with incentives, but also to allow transactions to take place at all. A potential buyer will want to be sure that the seller is the real owner of the good to be sold. How uncertainty about property rights can bring an economy to a standstill became apparent at the time of the unification of East and West Germany, when it was unclear for a while who was the rightful owner of real estate: the original owner, who had fled to the west and who had been dis-

owned by a regime which had now lost legitimacy and legality; or the person to whom the DDR-regime had assigned the property and who now lived in it. As long as this remained uncertain, no one wanted to buy real estate and that prevented investment in business as well.

Uncertainty exists also as to the transaction process itself. How should a price be determined? Is the price demanded the price that the seller expects? Or does he start higher in the expectation of coming out at a lower price? Is bargaining expected? Various cultures have developed different unwritten rules for this. At a Turkish bazaar both parties expect lengthy bargaining. In a West European supermarket the practice is considered highly unusual. But with trade in real estate this is again accepted practice in western societies. Will the general means of exchange, money, for which I sell something today, still have the same value tomorrow when I want to buy something else? Like uncertainty about property rights, galloping inflation, too, can halt transactions and completely dislodge an economy.

Futures involve risk by definition. Today an agreement is reached, but delivery will only take place at some time in the future: the house or the ship that has yet to be built; the holiday for which one only has the necessary free days in half a year's time; the raw materials and machines that have to be delivered 'just-in-time' in exactly 40 days from now. Such a contract creates extra risks. The supplier is unsure whether the customer will really accept the product upon delivery and hence presses for prepayment or at least a down payment, also because he has to make costs in the meantime. That creates risks and uncertainty for the buyer. Will the holiday trip come up to expectations? Will the hotel really be as close to the beach as promised? And will there not be a lot of noise because of construction? What if the travel agency goes bankrupt before the trip starts? Will the service be delivered or will I get my money back? It won't even have to be a matter of bad faith on the part of the supplier. What if an oil tanker gets stranded and the beach becomes contaminated with oil only a few days before the holiday is due to start? The service provided then obviously does not come up to expectations, but can the supplier be blamed for it? Future contracts are hence 'incomplete' in the words of Coase (1937), who based his famous 'Coase' theorem on this and became the founder of modern institutional economics. Economists transfer risks in costs: transaction costs, the costs which have to be made to reduce risks and uncertainty to an acceptable level. The term refers to an approach in institutional economics that directs attention at the problems of risk and uncertainty (inter alia Williamson 1975).

More generally, the factor time is a major source of risk and uncertainty (Traxler and Unger 1994). This holds in particular for entrepreneurs who have to invest enormous sums in research and development, or in complex and huge manufacturing technology, which takes years to build and which will only generate profits in, say, ten years from now. Things could be very different by then. Consumer preferences may have changed, new alternative products may have appeared, unforeseeable technical innovations may make one's own investments obsolete, political regimes may have changed. The uncertainty over time implies that the rationality behind short-term investment decisions is often different to the one behind long-term decisions and that hence institutions which help to reduce risk and uncertainty may have a major impact on such rationalities.

Perhaps the most uncertain economic activity is research and development and technical innovation. Often the goal of research is unknown.

Many radical inventions happened by accident or serendipity. The most profitable uses of a major new product in the long run are usually very different from the use first realized or the felt need that gave rise to the search. Steam engines were first used to pump water from mines, rather than to drive machinery and locomotives. Computers were first used mainly for complicated calculations. It took a while before their usefulness in word processing or in consumer electronics was realized. Furthermore, the outcome of the research process is very difficult to predict, nor can the most efficient path to some goal be predetermined. This makes research a particular risky undertaking. As a consequence, normal market conditions tend to lead to underinvestment in research (Rosenberg 1994: 88).

3.3.2 Risk and Culture

Risk and uncertainty reducing institutions have become particularly important in the Netherlands. The Dutch bourgeois culture has come to value security more than in numerous other cultures. There are many indications of this. It is indicated by comparative value studies like the World Values Study project (1994). But it is also apparent from the behavior of citizens and from political-administrative choices. Many institutions have been created to satisfy the need for security. And the existence of these institutions are both indications and reinforcements of this need for security. It is not by chance that the Netherlands has a blooming insurance business and one of the most developed systems of social security in the world. More than other nations, the Dutch do seem to have an inclination to insure themselves against practically anything. Literally from the cradle to the grave everything gets insured. The first thing a proud father of a newborn baby used to do in the past was to conclude an interment insurance. Confinement and contraception are included as standard in the health insurance package. Major and minor risks, all of them are insured. Even the trip abroad that only costs 800 guilders. Insurance has become a routine. One cannot avoid it. An annulment insurance is often obligatorily imposed by travel agencies or airline companies. The need for security is also apparent from trade union demands in this country. Job protection, paid holidays and social security here are as important so as wage increases, if not more so. A slight decline in security, as with the reduction of disability insurance benefits (WAO) from 80 to 75 per cent, led immediately to measures by the unions to 'repair this hole'.

The need for security in the Netherlands becomes especially apparent when one confronts it with its opposite, the American 'high risk society'. Notwithstanding the greater risk - or because of that? - Americans are insuring increasingly lower sums. In most European countries, car drivers insure against liability for 1 or 2 million guilders, and this is even legally required. Not so in the US. The legally required minimum in the state of California is only 10,000 dollars and most insurance schemes do not provide more coverage. This is notwithstanding the custom of American courts to award much higher damage claims, up to several millions of dollars. Americans bear the risk themselves. Europeans are frightened by that. The first thing they do when they rent a car in the US is to agree voluntarily on a much higher coverage.

Many more examples of the lesser need for security in the US can be found. Trade unions and their members care more about higher wages and less about job security, paid holidays or a good pension plan. Retailers are prepared at any time to take sold goods back and give consumers their money back when they do not like the goods for any reason. In a

typical large computer retail store in Palo Alto, California, 30 per cent of all goods sold eventually get returned (personal communication by the manager). When I wanted to rent a TV while being in the US for a few months the advice given was to buy one and to return it after three months. It worked. This would be highly uncommon in the Netherlands. American trade practices are a major trade risk for business, but at least the costs can be calculated. Professionals like lawyers work according to the 'no cure, no pay' principle. For them it is all or nothing, like gambling. One invests time and energy. The risk is that one does not get anything. But if the lawyer wins the case, he may win big: in a civil case a large share of the damages awarded. Nor do Americans refrain from investing in housing in high-risk places: on earthquake faults or directly on beaches frequently visited by hurricanes. What Dutchman would ever think of building his house on sandflats in the sea ('wadden' or 'schorren'). But Americans do. I was once on a peninsula in the Mississippi delta to the south of New Orleans. There a number of people are living in mobile homes, which are fortified on all sides by heavy timber. Several times a year they have to leave their houses because of a hurricane or high floods. On their return they usually find a meter of sand piled up in their houses. But they come back, time and again, clean the sand out and continue to build, that is, on their individual house rather than collectively on a dike around the peninsula.

One can only guess at the causes of these cultural differences in the need to reduce uncertainty. Would the keen need of the Dutch be related to their early exposure to the risks of nature, water and wind? And in their early experience of successfully reducing these risks, e.g. by building dikes and creating the necessary social and organizational infrastructure for it? The experience that such is possible and works out well may have fortified their confidence in the possibility of reducing uncertainty, and all the more so, as history has taught us that with such uncertainty reducing institutions it is possible to take higher risks, to engage in risky investments and innovations.

The American willingness to take risk may be traced back to the population of the country by immigrants. Immigrants were already a positive selection of the more enterprising sections of the European population rich in initiative. They were prepared to take the high risk of immigration to a far and unknown land with strange peoples and strange languages, to opt for an uncertain future. And many of them have experienced that such risk-taking worked out well for them. That may have provided and reinforced a belief in the meaningfulness of risk-taking. Just as the Dutch positive historical experiences with risk reduction may have fortified their confidence in it. In both countries, this original conviction may have gradually become part of the national culture and have found expression in many institutions, which in turn have reinforced this element in the national culture.

3.3.3 Regulations as Reduction of Risk and Uncertainty

For transactions, investments and innovation to happen at all, risk and uncertainty need to be reduced. But not too much either, since that may give rise to the problem of 'moral hazard' (inter alia Kotowitz 1989). Insurance research has shown that people behave more riskily when they feel more secure. That can be advantageous, as they may make more risky investments, which they would not have made otherwise but which may work out well in the long run. However, risky behavior may also lead to

waste of resources as people have less incentive to use these resources economically. The classic example is the travel insurance. People who have concluded such an insurance tend to take less precautions against robberies, as they suffer less from the consequences. Too much security may lead to inertia. This may be the danger of social security, as has been argued. It may reduce the incentive among the unemployed to look actively for work.

Thus the demands from the need for incentives and for uncertainty reduction can be contradictory. Incentives are actually dependent on some degree of insecurity, the insecurity provided by competition. Therefore, institutions have to strike a balance between the need for incentives and flexibility on the one hand, and the need for security and stability on the other. There has to be some fear, but also some security. Economic actors should feel pressurized to invest, but also feel able to do so. And exactly where the balance between these contradictory needs lies depends on the cultural importance of both the need for incentives and for uncertainty reduction.

The history of capitalism and industrialization is one of institutional innovations that reduce intolerable risk and uncertainty to more tolerable levels, thus allowing for greater risks to be taken and for larger amounts of resources to be committed to such undertakings.

Entrepreneurs themselves have been the first to come up with such innovations. A major one was the invention of the limited liability company which gave out shares. This allowed entrepreneurs to reduce their personal risk by 'sharing' it with others. As a result, the group as a whole could take larger risks. Furthermore, the company limited liability by separating private and corporate property. The corporation became a separate legal entity that could own property and enter into transactions and assume commitments and debts. Its property was separated from that of its shareholders. That reduced the risk of bankruptcy for the latter. Claims on the company could no longer be laid on the personal property of the participants as well. Given this significant reduction in the personal risk of the entrepreneur, the latter dared to engage, through his company, in more risky investments than he would probably have done if he had still been liable with all his personal assets. Of course this did imply greater risk for the transaction partner. He was less certain that commitments made in future contracts would be observed, that deliveries would be paid. To reduce such risks in turn formal rules were introduced regarding the procedures to be followed in the case of bankruptcy and the rights of creditors.

An institution that bears resemblance to the stockholding company is the insurance company. Where stockholders shared risks among themselves, the insurance company allowed basically the same on a larger scale: the sharing of risk between all those taking insurance. The insurance company is a go-between, that, on the basis of mathematical knowledge, did the work of calculating the probability of risks. And could hence, by reducing its risk through scientific calculation, risk accepting the risk of others. Hence it is no accident that both developed simultaneously. Nor that it should have happened in the Netherlands, where the emergence of '*partenrederijen*' and '*compagnieschappen*' was linked to large and risky investments in radical innovations, such as the construction and maintenance of windmills, the huge engines of proto-industrialization, or the organization of ship convoys to the Indies.

In the 17th and 18th century the oldest industrial region of the Netherlands, and probably one of the oldest in the world, emerged along the Zaan river to the north-west of Amsterdam. For those days enormous investments were made in capital goods, driven by wind power, producing sawed wood, pressed oil seeds, ground grain, and beat ingredients for paper manufacture. More than 600 windmills dotted the flat and wet Zaan region around 1725 (Boorsma 1950). The growth of this windmill park was made possible by risk distribution. The construction and exploitation of a mill was quite a risky enterprise. The high vertical wooden constructions in the flat countryside were rather vulnerable to storm, lightning and fire. On average a mill burned down once every forty years. Hence the mill-owners had entered into agreements to distribute the risk. Rather than one owner owning one mill, each of thirty owners owned one-thirtieth share in thirty mills. The owners cooperated in so called 'partenrederijen', corporate bodies that formally owned the mills (Van Braam s.a.). Furthermore, they also cooperated in mutual insurance contracts, through which the owners collectively insured their property against fire. Such contracts were also early forms of associational self-regulation. The contracts provided for associations that imposed a number of preventive measures on the members, such as the presence of buckets and rope to fight fires. The associations actively organized supervision of compliance with these rules (Walig 1912).

Earlier on, similar forms of risk distribution had developed in trade, in particular the trade to the Indies. The Dutch East-India Company (VOC) and West India Company (WIC) were also limited liability corporations whose shares were in the hands of municipal chambers in which leading merchants and their families participated. For each individual trip to the Indies separate '*compagnieschappen*' were created within these chambers. A successful return of a ship full of spices could reap extraordinary profits. That was the incentive to invest. However, the risk on these long and dangerous journeys was high. Only one in two ships returned. To reduce this risk, such ships were equipped collectively.

A third important organizational innovation of capitalism was the stock market. This allowed for the easy marketability of ownership shares. 'Marketability of assets and the existence of efficient markets for the sale of these assets meant that owners were not undertaking commitments equal in duration to the life of long-lived capital assets. On the contrary, they could realize their financial gains or cut their financial losses whenever doing so appeared to be expedient. In this way a capitalist proprietor's long-term risk was converted into an investor's short-term risk.' (Rosenberg 1994: 97).

These were major factors facilitating investment in risky undertakings, and hence were major preconditions, provided by capitalism, for industrialization. All these techniques had in common that they made it possible 'to convert a long-term risk involving large amounts of capital into a short-term risk that was limited to small amounts of capital' (Rosenberg 1994: 97).

Insurance companies were commercial solutions to the problem of risk. Enterprising businessmen saw a niche in the market. Others have followed. Research and marketing bureaus now provide future projections, which allow firms, which have to make long-term investments, to transform future uncertainties into reasonably calculable risks. And private trade marks and private certification agencies reduce the risk among con-

sumers regarding the stability and nature of product quality. Thus reduction of risk and uncertainty has become a major business.

Commercial solutions though do have their problems. For many forms of uncertainty reduction they are less appropriate. Private institutions usually cannot do without the backing of an external authority. One can try to build up a trade mark image, but, as long as this is not protected and competitors are free to market products, also of lesser quality, under the same brand name, the image fails to its purpose.

Another problem of market solutions is that where uncertainty reduction requires generally valid and accepted norms and standards, the competition which is typical of market solutions is likely to create difficulties. Commercial organizations compete among others by trying to impose their own technical standard on the market. That may produce a plurality of standards, i.e. confusion. However, the customer is interested in one universal standard, rather than the best one. One can live with less efficient standards after all. The US still has weights and measures which make calculation difficult. Lack of universal standards, however, seriously hinders trade and production, since it reduces complementarity and interchangeability of products, as was the case in the early days when every city and region had its own weights and measures. Efficiency here requires an organization with a monopoly position on setting technical standards.

Furthermore, commercial solutions still imply large transaction costs, albeit that these costs have now to be paid to commercial organizations.

As a result, sooner or later state involvement came to be required. Only the state, with its monopoly on the legitimate exercise of violence, and hence on taxation and on the enactment of binding rules, could solve such problems. Thus the reduction of risk and uncertainty became a major task of government agencies and regulations. A major function of civil law is to back up private property and contracts. In return, the law sets the conditions of contracts. State law also establishes the rights and responsibilities of the limited liability company, the insurance company, or the stock market. State and semi-state agencies implement such regulations. Examples are of course the courts, but also publicly appointed civil law notaries or the cadastral registries for property and ships, that establish property rights. Formal ownership of firms is registered by the Chambers of Commerce.

The most important and most general function of the state regarding the reduction of uncertainty is to provide for a stable and predictable legal, political, and social environment for firms, which allows them to calculate risks better, in the knowledge that the basic parameters in the environment will not change so erratically. The provision of stability and predictability is of course a major function of the rule of law. It reduces the likelihood of arbitrary interventions by the state. Constitutional law limits the authority of the state and provides for procedural rules regarding rule-changing, which guarantee that such rule-changing will take time, be cautious and prudent, and allow for public debate and hearing of the citizens concerned. But it is not only constitutional law that has a function here; social and economic public law also play a role. Labor law reduces strike incidence, and market ordering regulations and social security reduce the chance of erratic and fierce demand fluctuations.

3.3.4 Regulations as a Source of Uncertainty

Hence regulation is a source of risk and uncertainty reduction, of stability. But regulation can also be or become a source of uncertainty itself. That is the case when rules are too vague or change too frequently and in an unpredictable manner.

Regulations are often ridiculed for being too detailed, too minute, and even trivial. Such rules are alleged to be too complex and in their detail unable either to take account of the great diversity of problems and situations found in reality. More general rules would offer not only the aesthetic beauty of simplicity, but would allow for different interpretations in different situations. Thus suggestions have been made drastically to reduce the detail of product quality or health and safety regulation, by De Ru (1991, 1993) for one. Rather than stipulating the precise contents and the food additives allowed, legislation could be limited to a general rule that 'food products should be safe'. However, such a general rule would provide great uncertainty for producers. Consumers could use such a general rule to file liability claims, and in the absence of case law, the producer would not know whether he will be held liable or not. Eventually of course, court decisions would provide such case law, but then the detail of the case law would become the functional equivalent of the detail of the statutory regulations. Detailed regulations may indeed sometimes be a nuisance, but one should not overlook their positive function of providing certainty. Producers know in detail what is expected of them, what is allowed and what not. And they also know where their liability ends.

Rules are also ridiculed for being too inflexible. It takes time to formulate them and time to change them. Hence it is often said that they are incapable of adjusting to all the 'fast' technological and economic changes taking place. They are frequently overtaken by external developments at the very moment when they are finally enacted. Such an argument overlooks the fact that slow change of regulations also has a positive function: it reduces the insecurity that would stem from frequent and erratic changes in the law. Business might actually be better off with stable regulations, even if it does not find them optimal. They at least allow business to calculate the costs of risks in prices. Continuous change in legislation may make such calculations senseless.

With all the hype going on about 'fast change', the need to adapt, globalization etc. there is the serious danger of overlooking the need for stability, continuity, predictability. Of course it is neither possible, nor desirable, to keep all the factors in the business environment permanently stable. Too many factors are beyond the control of business, of national governments, even of international organizations and treaties. Who could have predicted the oil crisis? Or the changes on the currency markets, the international financial markets, the stock markets? Nevertheless, it should be said that not all change of this kind is something that just happens to us. Much change is the product of human intervention. The oil crisis resulted from policy measures by the OPEC; globalization and internationalization are the consequences of international treaties such as NAFTA and the EU. Many changes that are experienced as constraints, are actually collectively self-imposed constraints. That for one.

Given the dynamics already present in the environment, adding to them by frequent and profound regulatory and policy changes may produce too much turbulence. Some regulatory changes may be necessary adaptations to changes in the environment. One has to be careful though with introducing more changes than are really necessary. Business

requires a stable political, monetary, and regulatory environment to plan long-term investments, also in innovation. One of the major criteria for locating large scale investments is a stable political and legal environment. That is a major asset of democratic nation-states with a legal system based on the principle of the rule of law. Such a legal system offers minimal predictability. Laws and interpretations of the law by the courts do not change at random or erratically. The absence of such a stable legal and political environment implies that there are not enough anchors or points of orientation for business. That may reduce the incentives for long-term investment, as risks can no longer be calculated.

Monetary stability is also extremely important, in particular for exporting countries and for firms operating on dollar markets. The vulnerability to changes in these environmental factors is vividly illustrated by the problems of Fokker, which sells its airplanes in dollars. The unpredictability of the exchange rates must make planning very difficult for such a firm. Regrettably enough, such factors are beyond the control of most regulatory authorities. The European Monetary Union will at least reduce the uncertainties somewhat, if only by reducing the number of currencies in existence.

To sum up: Innovation can be furthered by regulations that reduce risk and uncertainty, in particular in the growth phase of the product life-cycle, when large and long-term investments for product development may have to be made. Such regulations provide a minimum stability in the environment. Much of the body of civil law and public economic law has come about to serve this function, thus facilitating transactions and investment. Hence one should be careful about deregulating some of these regulations. They do serve important functions, which is often insufficiently appreciated in the policy discussion on deregulation. Furthermore, the state can stimulate innovation further, by developing new risk-reducing institutions, as new risks arise. In the past, the state has done so. When international trade increased, also to less solid third world countries in the 1950s, the state assumed part of the risk by developing export credit insurances, which allow businesses to insure the political uncertainties of exports, which banks and insurance companies are unwilling to bear. Now, new possibilities for communications and economic transactions, including payment over the Internet, may produce new kinds of risks - theft in an international space difficult to control by national governments. New risks of this kind call for new organizations and regulations to reduce them. Some may come from private business - the new 'scrambled credit card' - but here too public monopoly power might be needed.

3.4 Trust

3.4.1 Distrust, Transaction Costs, and Institutions

An important and specific source of uncertainty concerns the behavior of transaction partners. Can they be trusted? Will they deceive me? Will they live up to their promises? Or should I expect them to be opportunists? In case of a futures contract: will they deliver the expected goods in time and of the expected quality and on the conditions agreed? Even in a direct exchange this is far from being certain. Do I really get 40 liters of gasoline in my tank when the meter indicates so? Can the meter be trusted or has it been manipulated? Is the meat hormone free, the eggs without salmo-

nella, and do they really come from free range chickens? How much room do the latter actually have? What if we do not agree on a transaction? How will conflicts be settled? Is there any chance of me getting an honest process or will the law of the jungle reign? Distrust reigns in relations between transaction partners, but also between competitors. History abounds with examples of distrust escalating even into all out war between competitors. To get the monopoly on the trade in cloves, the Dutch exterminated the complete population of a Moluccan island. To oust the Portuguese from Asia, wars were entered into. And the 'Dutch' Antilles exist because of the habit of raiding the Spanish gold galleons which had just left South America. Competition does not make for trust. It is a stimulus to serve self-interest, if necessary by fraud and violence. Distrust is the 'natural' state on any unregulated market. And uncertainty and risk produced by distrust, will block transactions, including those necessary for innovations.

Economic actors can, in the absence of trust, conduct their own checks. They can gather information from the neighbors of the transaction partner to find out whether the latter really owns the house he wants to sell, or whether he is often drunk. One can hire body-guards and threaten to move in the fighting squads which is not an uncommon method in criminal circles to reduce the uncertainty of transactions. A less drastic move is to demand securities from the trading partner, like a bank guarantee or a bank deposit. Loans are given against collaterals or after inquiries have been made with the employer. Landlords demand a deposit from lessees. And customers could take a scale to the supermarket to check on the real weight of the chocolate in the box. But can you see yourself filling a five liter jerrycan with gasoline eight times over, to be sure that you tanked forty liters? Or taking a microscope along to the butcher to check the meat on salmonella? It seems far fetched, but in the past, when institutions that provided for such control were still lacking, this was not uncommon behavior, because the chance of opportunistic behavior on the part of the other party is so great on markets. On medieval markets, gold and silver pieces were weighed very carefully because others had often tried to file off a little bit.

An interesting example is provided by the early Dutch cotton trade. There was a time, around the middle of the 18th century when travelling salesmen put out yarn to home weavers to have it woven into fabric. Yarns and fabrics formally remained the property of the putter out. The weavers tried, by weaving a little less tightly, to keep some yarn for themselves. The putter out was of course aware of this and hence weighed the yarn carefully before and the fabric after. The weavers counteracted by making the cloth a little damp, in order to make it heavier. That forced the putter out not only to weigh the fabric, but also to estimate its degree of humidity, an exercise that required time, energy, and skill and easily led to conflicts between weaver and putter out. Records of many of them can be found in the archives.

Fighting squads cost money, the measuring of gasoline takes time, and salmonella are difficult for the layman to recognize. Individual strategies to counter distrust and reduce uncertainty cost time and money. They are 'transaction costs', which can, if they are high, seriously frustrate transactions.

Thus transactions require the reduction of distrust. Transactions require trust, and trust requires institutions. Institutions that control and sanction opportunistic behavior are the dikes of any economy. They allow for minimal trust, security and predictability. Only if these are present,

does it make sense to engage in the long-term investments needed for innovation. Just as farmers and house-owners only invest behind safe dikes.

There are various sources of such norms controlling opportunistic behavior in transactions. First of all, they may be provided by the cultural values of a society. Hence cheating strategies differ between societies. Just as Americans are used to taking large risks and winning only big, thus transaction partners in that country try to deceive each other on a grand scale. In the Netherlands, transaction partners try to cheat more in the margin, by chafing a bit on product quality or price, like the 'chafers' on the gold coins, the weavers who only took a little bit of yarn at a time, and the cheesemakers who put bit by bit less fat in the cheese. All in line with the famous small shopkeeper mentality. The 'can it be a little bit more' may just as well be 'may it be a little less', but then without asking. Was it not Huizinga who wrote: 'Our national culture is bourgeois in every sense of the word ... In '*burgerlijkheid*' root also our most irritating national shortcomings, among them our often deplored appalling frugality.' (quoted in Phillips 1985: 19)

Norms that control behavior and allow partners to build up stable and reliable expectations regarding each others behavior may come from informal social groups, families, clans, tribes, or any other tightly knit group making for social control. Even among transaction partners that do not share the same culture, but who know each other from repeated face to face contact, relations of trust may develop. Game theoretical experiments have shown that cooperation and trust can be rational strategies between players who know that they will also remain dependent upon each other in the future ('iterative games'). But of course this is not likely to happen in any extended anonymous market. Such markets require regulations, backed up by authoritative organizations.

The market has also provided for commercial solutions to the problem of distrust. On medieval markets, special services and professions, such as those of gold- and silver weighers developed. Private detectives and central credit registration bureaus offer control of the reliability of trade partners. Psychological consultants investigate the quality of job candidates. And accountants control the financial administration on behalf of the shareholders.

However, as with risk reduction in general, commercial solutions have their problems and limitations. For one thing, commercial agencies may be prey to opportunistic and fraudulent behavior. Someone has to control the controllers and the risk-analysts.

For such reasons, the state had to step in, as history shows. The weighing of goods in transaction in medieval cities eventually became a monopoly of the state: the institution of the '*stadswaag*' was introduced. Later, the weights and measures office (*IJkwezen*) evolved out of this. Private individuals started doing the weighing again themselves, but with instruments calibrated by state agencies. Similarly, the state monopolized the provision of a generalized medium of exchange, in this case money, and guaranteed its value. The use of coins in transactions reflects a trust in the Central Bank - notwithstanding the circumscription 'in God we trust'. Similarly, courts control the observation of contracts and sanction breaches. The Insurance Supervisory Authority supervises insurance companies, and professional associations of lawyers, accountants, and civil law notaries exercise disciplinary authority under the protection of the state. Product quality is also controlled by public authorities. The Leyden

fabric controllers ('*lakenkeurders*') of the 16th century have evolved into a variety of control agencies: the Food Inspectorate, the Meat Control, the Drug Inspectorate. And they supervise detailed standards laid down by public law, varying from the '*Vleeskeuringswet*', to the '*Conserveermiddelenbesluit*' or the '*Beschikking Zuigelingenvoeding*'. Actually, a large body of law, both civil and economic public law, serves to discourage corrupt and opportunistic behavior and to mediate in conflicts over transactions. The knowledge that there are fixed procedures for conflict mediation which minimize the chance of arbitrariness and make outcomes a little more predictable reduces the frequency with which mediation is called upon, and that in turn lowers transaction costs and facilitates transactions.

Many regulations, organizations, and procedures may irritate businesses at times. And while such irritations may be justified, one should not overlook the very important functions such regulations and control agencies have for the very nature of business itself.

3.4.2 Trust and Innovations

The commercial success of innovations very much depends on public acceptance and trust. State regulation may enhance such trust and acceptance, and may also play an important positive role in stimulating innovation.

Neo-classical economics assumes the sovereignty of the consumer. But, as Schumpeter has pointed out, such theories cannot explain technical innovation and have to assume that it is exogenous. Would consumers demand new products and thus entice business to introduce them? They might sometimes demand a new version of an existing product which is more healthy or produced in a more environmentally-responsible way, as with eggs and free-range chickens. But most innovations in history have had to be forced on consumers by business. As Schumpeter observed:

'Innovations in the economic system do not as a rule take place in such a way that first new wants arise spontaneously in consumers and then the productive apparatus swings around through their pressure. It is the producer who as a rule initiates economic change, and consumers are educated by him if necessary; they are, as it were, taught to want new things, or things which differ in some respect or other from those which they have been in the habit of using.' (1949: 65)

and:

'Railroads have not emerged because any consumers took the initiative in displaying an effective demand for their service in preference to the services of mail coaches. Nor did the consumers display any such initiative wish to have electric lamps or rayon stockings, or to travel by motorcar or airplane, or to listen to radios of chew gum. There is obviously no lack of realism in the proposition that the great majority of changes in commodities consumed has been forced by producers on consumers who, more often than not, have resisted the change and have had to be educated up by elaborate psychotechnics of advertising'. (1939, vol. I: 73; both quoted in Rosenberg 1994: 56).

Innovations, and radical ones in particular, force consumers to break with habits, routines, and traditions, and that is not always easy. Frequently, consumers have perceived radical innovations to be threatening and have

resisted them, sometimes not without reason. History has also shown that in the absence of regulation, serious accidents with new products tend to happen frequently, making the public even more wary of such novelties. Steam engines exploded, trains were derailed, people were electrocuted by electricity, airplanes crashed, bridges collapsed, pharmaceuticals like Thalidomide had unforeseen and horrific unpleasant side-effects.

To give just one example: when the steam tram was introduced around 1880 it met with great hostility and opposition from farmers and other citizens. Farmers complained that their horses were frightened by the trams and that they caused frequent accidents. Citizens were wary of using the tram, because it became derailed so often. For instance on the line between Leyden and Haarlem a tram derailed 30 times in one day on a track of only 1 kilometer. To improve confidence in the new means of transportation, the entrepreneurs founded the *Nederlandse Vereeniging van Localspoorwegen en Tramwegen* (Association of regional rail- and tramroads) in 1881 to fight the opposition. They tried to do so first of all by making propaganda for the steam tram, but soon discovered that propaganda alone could not do the work, as long as steam trams became derailed so often. The association then turned to supplementing its lobbying by self-regulation. It set safety standards and provided expert technical advice to its members to reduce the wavelike wear of the rails, which caused these derailments (Burgersdijk 1956: 22-4).

Now history seems to be repeating itself in the case of biotechnology, and in particular gene engineering. This radical innovation is again encountering great anxiety, distrust and opposition. As in the case of the steam tram, the opposition to the innovation has less rational causes as well, which are often difficult to understand for those directly involved in the innovation. Fear among the general public often stems from lack of knowledge, emotional reactions, and irrational sentiments. What kind of science fiction monsters will gene engineering produce? Opponents to such innovations reinforce such irrational fears by disseminating misinformation. A while ago the animal protection organizations hung the bus shelters across the country full with posters of a four breasted woman. Just as the opponents of the steam train once distributed posters of an aggressive and steaming iron horse. Moreover, it is typical of irrational sentiments that resistance is greatest to gene engineering with large animals like cows, rather than with small entities like bacteria and yeasts, even though the latter may actually be more risky. People identify with cows, but not with yeasts. And yet yeasts may escape the laboratory much more easily and multiply faster than cows. Genetically changed yeasts could wreak havoc in nature much more readily. Respite such irrational fears, the risk of upsetting ecological systems is of course always present. The risk may be astronomically small, but the consequences may be astronomically great. After all, technological development has made us live in a high-risk society (Beck 1986). When someone introduced a rabbit in Australia, he could not have foreseen the damage the fast-breeding animal would cause to the balanced ecosystem. Knowledge of consequences is by definition limited. One can never be absolutely sure about the long-term effects.

Unless such insecurity and distrust surrounding new products is reduced, the innovations may fail. Institutions, i.e. regulations and organizations, have to be created to generate the necessary trust in the new processes or products among prospective users, whether they be workers or consumers.

Historically this has proved to be typically a task of the state. Disasters with new products forced the state to intervene. Explosions of steam engines led to legislation regulating the construction and use of such machines (the precursor of the present Health and Safety at Work Act (*Arbeidsomstandighedenwet*)) and the Steam Office (*Dienst Stoomwezen*) was created to control the observation of these rules. The Thalidomide scandal in the early 1960s forced the state to create statutory legislation regulating the testing, control and admission of new pharmaceuticals to the market. And more recently a number of deaths caused by the consumption of shrimps infected with salmonella led to a tightening of regulations regarding shrimp peeling.

Historically the need for trust-creating institutions has often been felt first by industry itself. While industry tried to regulate, in the end the help of the state was needed to set authoritative and generally binding quality standards so as to secure the trust of consumers in the products. This phenomenon holds by the way both for traditional products, whose image depends on stable quality characteristics (see section 1); as well as for new products, where consumer trust has yet to be established.

The history of dairy regulation is a good example. Just before the turn of the last century, a chain of events was set in motion - through innovation by the way - which led to a speedy loss of the quality image of century-old Dutch dairy products.

The new Alva-Laval milk centrifuge, introduced around the turn of the century, made it easier to skim the fat off the milk and hence also to make both butter and cheese from the same amount of milk. The milk was first creamed for butter manufacturing. Subsequently the skimmed milk was used again for cheese production. Such cheeses however, consisted almost entirely out of water. Hence they became known as 'civil engineering works'. The difference with good cheese was not visible as long as the cheese was still young. However, after a number of weeks the cheese collapsed. Such adulterations entailed risks for the consumer, and therefore threatened the reputation and the exports of the Dutch dairy industry. The issue came to a crisis with a widely-publicized court case in Britain in 1903 concerning a Gouda cheese that was made up of only 1.6 per cent fat and 57 per cent water.

Similar problems emerged in butter manufacture where, after the invention of margarine in the late 19th century, it became possible to mix cheaper margarine with the more expensive butter. The difference passed unnoticed by consumers. This became a particular problem in the Netherlands, for one thing due to the emergence of a large margarine industry (Van de Berg and Jurgens) alongside an existing extensive butter industry. The practice became so prevalent in the Netherlands that the mixture of margarine and butter became known internationally as 'Dutch butter'.

Both adulterations were, by the way, typically collective action problems. Chances of individual short-term profit motivated producers to make choices that were disastrous for the long-term interests of the sector as a whole. But individually producers could not change this logic. As long as there were dishonest producers, or rather, as long as one feared the presence of dishonest producers on the market, price competition forced even the producers originally inclined to honesty to join in the adulteration practices. An individual strategy, such as the creation of a company trade mark, was difficult if not impossible for generic bulk products such as butter and cheese. Thus the market was unable to correct itself. Only collective measures could provide a solution. The scandal of 1903 triggered

the creation of a number of collective institutions for the regulation of dairy quality control: dairy cooperatives, closed butter auctions, associations that introduced trade marks for Dutch butter and cheese, quality control institutes, and eventually state trade marks. However, the system became only really effective after significant state involvement: the compulsory quality control as condition for export licenses, instituted during World War I (Geluk 1967). With the Agricultural Produce Quality Law ('*Landbouwkwaliteitswet*') of the 1930s this system was extended to many other branches of the agricultural industry.

Quality maintenance of staple products hence requires regulation. The German *Reinheitsgebot* for beer, although certainly no longer necessary to maintain purity and health (as it perhaps has been in the past), has provided German beer with a quality image which allows it to maintain its position on the (large) domestic market, even in the face of the opening up of the market to imported beers that do not satisfy this regulation. French wines maintain quality images through a well-organized system of 'appellation contrôlée'.

The recent mad cow disease affair in Britain has shown just how costly loss of trust of consumers can be. The British government deregulated and industry chose an 'economic solution': it turned herbivorous animals into carnivorous ones, by feeding them with cheap bone meal from sheep. Short-term profits reaped long-term loss. It is estimated that the cow cull in Britain, to regain the confidence of consumers in beef, would cost several billions of pounds. Seen in this light, might not the protective regulation in Germany which is very much hampering biotechnology in that country, turn out to be a rather rational measure in a romantic culture which is so very distrustful of anything artificial, anything non-natural? Isn't the loss of consumer confidence a far greater danger than remaining 'backward', retarding innovation? Would this not be a risk one runs with new products such as transgene cattle? The enormous investments the Federal Republic made in nuclear energy have largely been wasted because there was not enough support for such innovations among the population. The fast breeder reactor in Kalkar never became operational. It may be turned into a tourist attraction, but it will never make up for the losses.

What could the state do to enhance the acceptance of innovation in the domain of biotechnology? It can - and does - set strict rules regarding processes and laboratories where gene engineering is carried out, as well as regarding the products and their use. Such regulations also require a good inspection system. Furthermore, the state could counter the irrational anti-propaganda by clear and sober information and could try to keep the debate as rational as possible. An ethical debate on gene engineering might seem to be a hindrance rather than a help by the industry concerned, but in the long run such a debate could serve to promote acceptance of such an innovation. In the process the state could try to change the terminology used. Words like 'transgene cattle' (trans = over the border, 'one bridge too far'?) have science fiction-like connotations, and genetic manipulation or biotechnology suggest something terribly artificial. Furthermore, the state could advise the industry on how to deal with public fears. The technologists involved often have no understanding of this. Is it wise to start introducing a genetically-created substance like human lactoferrine first in baby food, of all things? Would not the public be more prepared to accept such a new substance first in pharmaceuticals, where the public already acknowledges that these are necessarily 'chemi-

cals', 'synthetics'? Food by contrast should be 'healthy', and to many people: natural.

One should realize however that regulatory measures may also backfire. That happened with the European E-numbers for food additives. The rationale behind this measure was to create a system of registration and controlled admission as well as customer information regarding synthetic additives. Manufacturers could apply for permission to add certain chemicals to foodstuffs, for preservation, coloring, etc. Admitted additives got an E-number which the manufacturers were required to put on the product label. The numbers however scared the public and led to a buyers-strike. Thus producers no longer wanted E-numbers on their products. Instead of using synthetic additives they added the same chemical, but now derived from natural biological processes. These were much less pure than the synthetic versions, but did not require an E-number. (Information from former Unilever executive.)

Regulation of product standards is not only important for acceptance of new products by the public. It also provides a 'technical infrastructure' that facilitates diffusion. Ever since early industrialization made it possible to manufacture a large number of completely similar products, and ever since division of labor made different products interdependent, the establishment of technical standards has been important in order that parts could be interchanged and integrated in larger wholes. Such standards are only effective if they are universally applied and accepted. Hence the state, the only agency that could impose such standards authoritatively and uniformly, became involved in standardization over time. The actual development of standards was delegated to semi-private institutions such as the NNI in the Netherlands or the DIN and the *Verein Deutscher Ingenieure* in Germany. They acquired the exclusive right to develop such standards. These standards are still extremely important for industry and in particular for the diffusion of new products. Where such 'statutory' standards are (still) lacking, as may be the case with new products, the competitive struggle tends to become a struggle about whose standard will prevail, as is illustrated by the fight between the three video standards. As long as no standard wins the battle, and that may at times be a long time, customers will be confronted with a plurality of standards, which produces many practical problems and costs. Such a deadlock may be overcome, and has been in the past, by standards provided by the state and backed by its monopoly over regulation. Such standardization regulation is of utmost importance for the diffusion of new products. The present tendency of government to privatize standardization further, e.g. to various private certification bodies, without giving any one a statutory monopoly, might imperil the need for uniform technical standards. Competing certification bodies may develop competing standards, thus confronting firms and customers again with problems and the costs of technical integration.

3.5 Patents and Profits

Risk reduction and trust are of course by themselves not enough of an incentive to innovate. The entrepreneur needs also the prospect of a large financial reward, in order to engage in investment and innovation. And the greater the risk still remaining, the larger the required reward. The members of the Chambers of the Dutch East India Company (VOC) who sent out ships to the Indies spread their risk by forming '*partenrederijen*' for

every voyage. But they only engaged in the investment, because of the prospect of huge profits. The sale of Indian spices could provide returns on investment from 300 to 400 per cent.

Capitalism produces such incentives by its very nature. Profits can be made, and are not only tolerated but even encouraged by its set of basic values. The point does not need much further elaboration. But it is not as self-evident as one might think. Capitalism too is dependent on regulation, on religious rules for example. Weber demonstrated that protestantism was conducive to production for profit. By contrast, catholicism (originally), judaism, and the islam frown(ed) upon the making of profits by investing money, or required (periodic) compensation. Secular regulation is equally important.

There have to be institutions that safeguard profits, such as property rights or a stock market. And these are influenced by regulation. Some of these institutions have already been discussed above in the section on risk. As far as innovation is concerned, there is an additional specific kind of property rights that needs protection, in order guarantee investors that they can reap profits from innovation. That is of course patent law and trade mark law, which protect intellectual property rights.

Entrepreneurs may be forced to innovate by strict technology-forcing standards; they should also be enticed to innovate by the prospect of a temporary monopoly on a newly- developed product or process, which allows for a temporary monopoly on prices and profits, which in turn also allow firms to earn back the investments made on research and development. Patents protect inventors.

Patents though tend to retard the diffusion of innovations. New products to begin with are priced high which reduces their widespread use. And competitors are unable to produce similar products, that is, without a license from the patent holder. Patent law thus has to strike a balance between the public interests in invention and diffusion. If a national government wants to stimulate innovation (because it assumes the domestic industry can innovate), it needs to enact strict patent protection laws and facilitate the administrative procedures involved without running the danger of easily impinging on existing patents. However, a government that wants to stimulate diffusion by allowing imitation of foreign patents (in the belief that domestic industry may not be able to come up with original innovations), may enact much less strict patent laws or provide no protection of intellectual property rights at all.

The dilemma between stimulating innovation or diffusion is converted in patent policy to a choice between allowing the registration of broad or narrow patents. Broad patents of course provide more protection and hence stimulate original innovation. But they make it more difficult for other competing firms to register related patents and thus to diffuse the innovation. Furthermore, broad patents reduce the pressure of competition on innovation and may inhibit the further development of existing innovations into new related ones. Apparently, this is currently a lively, contested issue in patent law circles. Patent offices are apparently trying to solve this dilemma by providing a rather broad and generally formulated patent for a radically new innovation to begin with. This then gets successively trimmed down in the process of delineating the borders of the patent as competitors apply for related patents.

The choice for more or less protection may depend on the phase of development national industries are in (assuming that nation-states actually have a choice, given the international economic relations and treaties).

Many nations go through a phase of economic development in which they industrialize by imitating, if not robbing, foreign inventions. The Chinese, who are entering a phase of sustained industrialization, are doing so now, by 'illegally' (according to US law) copying computer hardware and software. The conflict over this may set off a trade war between China and the US. However, the Chinese are doing nothing new. In the past the present major players in the world market have done the same. In the 1930s and 1950s the Japanese did so - and they turned out to be very good at copying - and before them the Dutch. Until 1912 our country did not have any law protecting patents. This allowed Philips to launch its growth by copying the electric lightbulb invented and patented by Edison, without paying royalties. Now that Philips has become well-established and large, and invests much in research and development itself, it has acquired an interest in protecting of intellectual property. And so has the Dutch government.

These considerations over patent law may seem somewhat far-fetched, as it would be difficult to imagine the Dutch government deregulating patent law. International relations for one would not allow for that. However, the issue is less academic than it may seem. First of all, there is indeed a tendency for the state, in the person of the patent offices, to withdraw somewhat. Patent offices in the US, but also in Munich and Rijswijk, are less willing to do research themselves and refer firms more and more to the courts, where they have to challenge existing patents by presenting their own research. Furthermore, governments are also influencing the importance of patent rights for innovation in other ways. Will the Dutch government, for instance, allow or even stimulate parallel imports in pharmaceuticals or the production of generic medicines? By forcing (through the health insurance scheme) doctors and hospitals to prescribe generic medicines where these are available and by fixing low prices for medicines they are detracting from the privileges pharmaceutical companies enjoy according to patent law. This could reduce their incentive to innovate.

4. Regulation and National Systems of Innovation

4.1 'Factors of Innovation and Diffusion'

Risk of innovation, and possible profitability, is of course also affected by the price and availability of the factors of production: labor, capital, knowledge. All in turn are influenced by regulation: wage policy, monetary policy, training, science policy. It is not my intention to discuss all these policies at length here. That would require a book length study. Besides, libraries full have been already written on each of these issues. What I want to do here is first of all stress the importance of such policies for innovation as well; and second to say a word or two on some specific issues.

The capacity to innovate depends of course not only on the invention and development of new technology, nor solely on the willingness to innovate. There must also be possibilities of transforming inventions into profitable production. This in turn depends on a number of environmental factors, which are somewhat similar to the well-known 'factors of production'. Innovation requires a sufficient supply of capital willing to invest in risky undertakings; it requires qualified labor to do the research and development work, to operate pilot plants and to handle new technologies (e.g. chips manufacture), and that in turn may require favorable working conditions and a pleasant living environment to attract such highly qualified labor; and innovation makes greater general demands of logistics and infrastructure. One could perhaps speak of factors of innovation. And as regulation may influence all these factors, it can indirectly influence the innovation process in quite a number of ways.

More precisely, innovation is dependent on:

- the internal organization of the industry, both at the sector and at the firm level. Is it well-suited to utilize challenges and opportunities emanating from the environment? And if necessary also to generate its own facilities to satisfy its demand for knowledge, instruments, capital, and labor?
- the situation on specific markets and in specific organizations that provide for the factors of innovation: scientific knowledge, scientific instruments, machinery, capital, and labor.
- the links between these markets and organizations on the one hand and the sector and its firms on the other.

As many of these markets and organizations are shaped at the national level, and as they seem to differ between countries, several authors have summarized these institutions and their interlinkages in the concept of 'national system of innovation' (NSI) (Lundvall 1992, Nelson 1993), a variation on 'social systems of production' (in Hollingsworth and Boyer 1995) or 'business systems' (Whitley 1992). Innovating firms are considered to be 'embedded' (cf. also Granovetter 1985) in such a system of institutions. In this section I will discuss several institutions that make up the NSI and reflect on how regulation may affect them and thus indirectly the innovative process.

4.2 Industrial Organization

First and closest at hand (seen from firms) is the organization of an industrial sector. It is often thought that large firms are needed for a sector to have the capacity to finance research and development on any significant scale, in particular more fundamental R & D. After all, most of R & D investment by industry in this country can be attributed to only a few very large

firms: Philips, Shell, Akzo, Unilever, DSM. Furthermore, there are many indications that large firms are better able to apply technically-advanced production processes, or at least, that they use more capital intensive methods and hence have higher labor productivity. Schumpeter saw the big organization, rather than markets and competition, as the driving force for technical progress (1943: 106). The large scale of American enterprise has been seen as one explanation for the comparatively high labor productivity per working hour in the United States in between 1900 and 1979, as compared to Western Europe (Maddison 1982: 281). In my own study of the Dutch construction industry, I found that labor productivity of firms with more than 500 employees was considerably higher than for smaller firms (Van Waarden 1989).

Since market regulation may affect the degree of concentration of a sector, such regulation may indirectly affect the capacity for innovation. If large firms were indeed to be more innovative, the present deregulation drive of the government might have positive effects on capital intensity and labor productivity. This is, because new, market-oriented economic policy is likely to be haunted by a familiar paradox of regulation: policies directed at making more room for the market principle, may in the end lead to a reduction rather than an increase in the number of firms and the degree of competition in the market. Deregulation of the Establishment act will lower market entry barriers, and might at first increase the number of firms. A stricter anti-cartel regime might also make market entry easier. But both will also increase the fierceness of competition, and, as many deregulations elsewhere have shown, while this may initially lead to an increase in the number of firms, subsequently a shake out, amalgamation, and consolidation will follow. This is particularly likely where there are significant economies of scale and scope, and where large firms thus have a competitive advantage. The history of American airline deregulation is a good example. At present, the threat of liberalization of the European air space is leading to a nervous merger scramble among European airlines. Past history has seen similar processes for almost all industries: engineering, aircraft manufacturing, shipbuilding, consumer electronics, banking, chemistry, car manufacturing (see for the latter Chandler's (1963) classic accounts on Standard Oil, DuPont, and General Motors). In the Netherlands, the concentration wave has stopped short in some sectors at least, as a result of legislation protecting horizontal cooperation between firms, in cartels, statutory trade associations (the 'product- and bedrijfschappen') and other associations. If such horizontal cooperation is outlawed as the government intends, it will in all probability be eventually replaced by vertical cooperation. That is exactly what the small retailers and franchisers fear.

The assumed positive function of large scale for innovation seems an accepted wisdom. It underlies the tension between industrial and competition policy. Many governments have used scale enlargement as an argument to permit mergers even though they were clear violations of competition policy. The German Minister of Economic Affairs allowed Daimler Benz to take control of almost the complete German military engineering industry, thus overruling a negative decision of the Bundeskartellamt.

However, one has to be careful about assuming that 'large is always beautiful'. Large firms may have more financial resources to command and raise labor productivity. But more and more comparative studies of sectors are coming to the conclusion that large firms lack the necessary flexibility to be innovative in time. Smaller firms seem to adapt quicker to

changing constraints and opportunities, in particular when they are integrated in horizontal forms of cooperation such as networks and associations, right up to cartels. I will mention by way of example two recent comparative studies.

Herrigel (1994) compared the machine tools sector in Germany and in the United States. For a long time, the world-wide supply of machine tools was dominated by these countries, who pioneered technology in this sector. The two, though, have a very different organizational structure because they responded differently in the past to the major problem in this industry: the machine tool industry suffers, as a capital goods producer from highly volatile demand, more so than other sectors.

American anti-trust legislation and business culture forbade cooperation among producers. This meant that no floor on prices could be set during the frequent and short slumps. When prices fell, the smaller, flexible firms specialized in customized machine tools were either competed out of the market or bought up by high volume standardized machine tool producers. Already in the 1920s, there were no more than four firms producing the same product in the entire industry. Over time, the US machine tool industry became organized in large, hierarchic firms independent from each other and specialized in mass production and price competition.

The German industry, by contrast, consisted of many smaller and medium-sized firms, organized among others in trade associations. Less strict anti-cartel legislation and *Handwerksrecht* allowed associations of industrial producers and artisans to agree on mutual specialization (and hence market partition) and on a ban on poaching other members' technology even during recessions. Such arrangements, which would be illegal under American anti-trust law, stabilized the environment, mitigated competition, and allowed the smaller firms to survive during slumps. Through these associations, industry also cooperated closely with the public authorities. Artisan organizations were entrusted by the state to organize the training of skilled workers. Special institutes for applied technology (*Fachhochschulen*) were established by the industry to train technicians and engineers. The major trade association, the *Verein Deutscher Werkzeugmaschinenfabriken*, coordinated research projects.

Around 1980 these industries found themselves confronted with a serious threat to their world market shares: the introduction of numerically-controlled machine tools by Japanese firms. It forced the established industries to adapt to changing technology.

The American industry was incapable of doing so. The concentrated industry had performed well as long as highly standardized products were needed. However, with the end of mass production in the 1980s, the US dramatically lost market shares to Japan and Germany and ended up being highly dependent on machine tool imports. By 1984 the US imported fifty per cent of its machine tools. 'Years of bureaucratic conservatism, concentration, and vertical insulation left U.S. machine tool companies, despite their many resources, frozen in their tracks.' (Herrigel 1994: 112)

The Germans were also taken by surprise by the appearance of numerically-controlled machine tools. In 1980 73 per cent of the domestic demand for CNC equipment had to be imported, mainly from Japan. But the German machine tool industry caught up quickly. Trade associations joined forces, and created a special subsidy program for research on and application of CNC technology with the Ministry of Research and Technology. The broader engineering trade association cooperated with the metalworkers union (*IG Metall*) to train workers skilled in computer program-

ming. Technical universities and *Fachhochschulen* stimulated projects on CNC technology. Collaboration between core firms and their suppliers helped to transfer technical know-how within the industry. Thus the smaller firm size, the diversity of specialties, and the major role of horizontal cooperation in associations allowed the Germans to react fast and flexibly and to innovate effectively. By 1984 only 30 per cent of machine tools had to be imported.

A second case, which I will discuss in less detail, concerns the American computer industry. Annalee Saxenian in her book 'Regional Advantage' (1995) compared two American regions with a computer industry, Silicon Valley in California and Route 128 near Boston. Both regions had much in common: a defense industry tradition, close proximity to famous universities, i.e. good supply of highly qualified labor. For years both regions were characterized by entrepreneurship, vitality and growth. But from 1980 onwards the development diverged. Silicon Valley still has a blooming industry, but Route 128 is in decline. Why? The industries were differently organized. In California the industry is small-scale, and there is a lot of horizontal cooperation in networks and trade associations. In addition, there are close and stable relations with local, financial, educational and government agencies. By contrast, the firms near Boston are large and centralized and there is little cooperation. Firms 'communicate' through the market. And the public institutions that should have provided support had been impoverished due to cut backs.

Other studies that testify to the innovative capacity and flexibility of horizontally integrated sectors are the studies of Piore and Sabel (1984) and Sabel (1989) on the industrial districts of central Italy. The classical examples, mentioned by Piore and Sabel (1984) are the small-scale textile industry in Prato and the ceramic tile industry around Sassuolo. These regions harbor larger numbers of small companies, connected through family ties, other informal networks, and formal associations. They have also proven to be highly successful in world competition, among others through regular product innovation.

Finally, one could point to our own agricultural industry. Many branches of it are made up of numerous smaller firms, well-organized in statutory trade associations ('*product-* and '*bedrijfschappen*'), voluntary trade associations, auction cooperatives, and many specialized agencies for research, vocational training, information gathering and dissemination, collective advertising for generic products, etc. These branches have been highly successful. The statutory trade associations organize 27 exporting industries. Of these, 18 are among the top-50 of the most competitive Dutch industrial and agricultural sectors, as measured by their share in world export markets. The top scorers are cut flowers (world market share of 64 per cent), followed by eggs (61), pigs (57), plants and bulbs (56), condensed milk (53), cocoa powder (49), tomatoes (43), potatoes (36).

What do these cases show?

1. The competitiveness and adaptive capacity of a sector depends on the way in which it is organized. The cases compare two organizational forms: coordination through 'association' and through 'hierarchy'. However, there are more principles for coordinating the activities of firms within an industry and for allocating resources among firms. The five basic principles are: a) the market; b) the state; c) multi-plant firm hierarchies (vertical coordination); d) associations (formal horizontal cooperation); e) networks and clans (informal ties, family relations).

2. Sectors, countries, and even regions differ in the way in which their industries are organized. And hence differ in their economic performance.
3. Vertical integration of industries in large firms does not always lead to greater innovative capacity, flexibility, and adaptive power as is often assumed. Horizontal cooperation of smaller firms, in trade associations, networks, and stable customer-supplier relations seems to lead to better performance, as it is a more flexible structure.
4. The organizational structure of a sector is influenced by state regulation. The centralized American machine tools industry was the unintended outcome of US anti-trust law.
5. One should be careful with deregulatory measures that destroy such horizontal forms of cooperation. One the face of it, they may increase the role of markets and intensify competition. However, in the long run they might end up replacing the market principle with bureaucratic firm hierarchies as a basic principle of coordination and allocation within sectors.
6. Much is to be said for more regulations that encourage cooperation among firms and among firms and external relevant public and private associations, institutes and agencies, if one wants to stimulate innovation. That might even include tolerating cartels and collective wage agreements (which are nothing more than cartels on the labor market!), that provide for such cooperation.

Close horizontal cooperation between smaller firms might also be a superior organizational form in that it combines the best of both: competition (it does not completely disappear as with vertical integration) and cooperation; and smallness and largeness. Thus it might be possible to combine different kinds of innovative activity, for which different organizational sizes are important. Kenneth Arrow (1983: 16, quoted in Rosenberg 1994: 106) noted 'that there is likely to be a tendency toward specialization - less costly and more original innovations will come from small firms, and those involving higher development costs but less radical departures in principle will come from larger firms'. Tightly knit associations of small firms might perhaps be well suited to both.

The different organizational forms of sectors are also expressions of different strategies of handling risk. The US machine tool industry responded to the risk of demand volatility by risk internalization and risk minimization. They took up as many relevant phases in their own organization; and they minimized risk by mass production of highly standardized goods, made of interchangeable components, produced by specialized machinery, or, what has been called since 1851 'the American system of manufactures' (Rosenberg 1994: 110). By contrast, the German machine tool industry tried to cope with demand fluctuations through risk distribution strategies: distributing tasks and risks over different firms, associations, and special training and research organizations. Backed by external services from associations and the state, German firms could more easily adopt long-term innovative strategies.

Let me now turn to a discussion of such external institutions for the provision of knowledge, labor and training, and finance and their relations to business.

4.3 Knowledge

The view of the risks and profits of innovations are very much influenced by the price and availability of knowledge. This depends in turn on how the production of knowledge is organized, in what kinds of institutions, how close or distant to business. And through its influence on the system of research organizations regulation can once again influence innovation.

As there is probably already a great deal of expertise on the subsystem of research organizations concentrated at AWT, I will not dwell on it at any length.

Knowledge can be produced and allocated according to the various principles of coordination and allocation: the market (commercial institutions), the state and substate (universities, other public research organizations), associations, networks, and even perhaps clans (families). All can be influenced by regulation.

The problem with basic and pre-competitive research (and perhaps also some development) is that it has the nature of a collective good. Research that does not lead to concrete findings and products that can be patented, is not protected. Everyone can profit from it. For fear of free riders, individual firms may not be willing to invest in it. Thus, the dominance of the market principle tends to lead to underinvestment in basic research.

Large firms may have the resources to invest in it. And they do. A major share of R & D investments in the Netherlands is accounted for by the four multinationals. But as long as they have no monopoly, they have only a limited incentive to invest in basic research.

It comes as no surprise, therefore, that the state, as the agency that has the fewest free-rider problems, can and has taxed citizens, among others, to finance basic research. Indirectly the state does so through its own investment in large projects, e.g. military equipment or civil engineering works, which include contributions for research and development. A major share of R & D investments comes direct from public funds in most countries. But why should all the population pay for a resource from which only one specific industry is likely to profit? Would it not make more sense to tax only that industry? And by levying such taxes through compulsory levies any undercutting by free-riders could be pre-empted.

This option would be available where there are trade associations with the capacity to discipline their members, to compel them to pay a compulsory levy. They might owe at disciplinary capacity to state backing or to the provision of selective goods (the BOVAG guarantee) that make membership de facto compulsory. The Netherlands has had good experience with both. The Dutch statutory trade associations (*product- en bedrijfsschappen*) have formal state backing, resulting in compulsory membership and the authority to levy taxes. And some, like the *Produktschap Zuivel*, taxes its own sector for collective research and development. The Dutch Institute for Dairy Research NIZO is financed from these levies. The good performance of the Dutch agricultural industry on world markets is certainly in part related to such effective institutions for collective R & D. Is it then a sensible policy line to abolish instruments for selective taxation, for e.g. research and development? Elsewhere, industries (e.g. construction, metalworking) finance collective research and development (including economic research) out of the compulsory levies for the 'O and O' training fund, which forms part of the sector-wide collective agreement, and which becomes compulsory for the whole industry, when the government

declares them to be generally binding, thus giving the contracts statutory status. Again this is an important regulatory instrument which enhances the 'national system of innovation', but which is nevertheless under attack from neo-liberal policymakers.

The state can also influence knowledge production through regulations pertaining to the organization of universities and research institutes. However, here one sometimes wonders whether the right tone is caught. A study of the organizational structure of research institutes that have won Nobel prizes in the bio-medical sciences (Hollingsworth 1995) has shown that informal relations and procedures and plenty of fora for free roaming discussions is what distinguishes such institutes from other research institutes. Thus, productive institutes have canteens with tables for up to but not more than eight persons. This tends to stimulate informal discussion over lunch. However, present-day Dutch government policy towards universities rather seems to stimulate formal procedures, more complicated application procedures to obtain research funds, and larger and often fake research groups, such as research schools that do not even have a building to meet in.

Finally it may be useful to remark that of course we cannot make all our own inventions nor do we need to do so. Much knowledge can and has to be acquired from abroad. Hence, regulations that facilitate international contacts, information exchange and learning, and that allow for the construction of large and efficient libraries with up-to-date book stocks, and for specific information for business can favorably affect the national system of innovation.

4.4 Labor and Training

The risk and potential profit of investments in innovation are of course also very much determined by the price, skill-level, and availability of labor. Labor should be skilled to produce internal knowledge for product and process development, and to operate new technology.

This again is a specialty in itself, on which much can and has been said. How innovation is affected by vocational training is a topic of a study on its own. I will not attempt to tackle it here. Besides, the AWT has probably much more expertise on this matter.

I will restrict myself to emphasizing that a lot of training and education like pre-competitive research and development, is a collective good, which the market has difficulty in producing. Hence the state has become very active in the provision of this resource over time. However, as with R & D, a lot of vocational training is also provided through horizontal forms of cooperation in industry, like trade associations, statutory trade associations, and collective wage agreements. What has been said under the heading of R & D regarding the foolishness of abolishing such forms of cooperation in the name of deregulation holds also for vocational training.

Regulations that stimulate firms to invest in their 'human resources' can also enhance flexibility and innovative capacity. In this respect the legal requirement to get permission for mass lay-offs should be mentioned. A study of the automobile industry in Germany and Britain showed that in Germany, where dismissal protection is even stricter than in the Netherlands, the skill level of workers is much higher than in Britain (Streeck 1992). That makes sense. By making it more difficult for firms to lay-off people, entrepreneurs are stimulated to invest more in them. They

make a virtue out of a necessity. As the management guru Peter Drucker once said: 'If one cannot sell, one must care'. A ban on lay-offs increases the tie between worker and employer. That makes an individual investment of firms in training of their workers a better investment. The lower the external mobility, the smaller the chance that the competitor is going to profit from one's own investments. And, as employers have more invested in their workers, they have a greater incentive to keep them, and thus to make working conditions more favorable and to provide workers with further opportunities to develop themselves at work. Consequently, investments in human resources and close ties between employers and workers tend to reinforce one another. Higher skill levels are a very important asset. Not only because skill in general is an important 'factor of innovation', but also because workers can be employable in various tasks. Such flexibility is also a necessary requirement for modern 'diversified quality production' (Streeck 1992). The paradox is that external rigidity - dismissal regulation - produces internal flexibility.

4.5 Finance

Finance is another major 'factor of innovation'. Here the state may assist in the first place through direct subsidies or tax rebates, and it does indeed do so. There are many such funds, such as the '*Programmatiese Bedrijfsgerichte Technologiestimulering (PBTS)*' or the '*Technische Ontwikkelingskredieten (TOK)*'. More indirectly, the state subsidizes innovation by commissioning major new military products and projects or major public works, the price of which includes funds for innovation. Whereas the US has a tradition of supporting research and development in industry through military orders, the Dutch government has traditionally done so for a typically Dutch product: major civil engineering works. First the government commissioned the *Zuiderzeewerken*, then the Delta Works, and now it has just commissioned new major railroad connections which are intended to develop and use new technology for drilling tunnels in very soft ground.

Such financing also entails regulations, regulations providing for the funds, the conditions attached to their provision, and culminating in general conditions for public works ('*Algemene besteksvoorwaarden*').

Furthermore, the state affects funding indirectly through its regulations of capital markets. Venture capital, so important for new firms and new products in the US, is difficult to attract in the Netherlands, because of the way capital markets are organized and regulated and because traditionally firms have financed themselves. The stock market is a much less important source of capital for investments in innovation than in the US. Banks are hardly a source either. We do not have a tradition of industrial banks like the Belgians (*Société Générale*) or the Germans do. And for a long time banks were even forbidden to own more than a minor share in industrial enterprises. Stock markets and banks were unnecessary because Dutch firms traditionally financed investments out of their own profits and cash flow. The first major industry in this country, the cotton industry of Twente, financed all its investments with its own money. For a long time they were family firms with complete integration of family and firm property. It was only towards the end of their existence that some of them went to the stock market. They used banks only to provide variable capital, i.e. to finance stocks of finished products on their way ('in consignatie') to the

markets in the Indies. One of our major banks, the ABN, traces its roots back to the banks and trading companies created around this industry and is still thought of as a trading bank rather than an industrial bank.

Dutch regulations award shareholders fewer rights. They cannot appoint (or dismiss) members of the supervisory board or the executive board. The latter can thus set aside large reserves, at the expense of dividends, to finance investments in innovation for one. Whereas US companies pay a large share of the profits out in dividends to shareholders, who subsequently invest again in these but also in other firms, in the Netherlands a lot of money stays outside the stock market and is ploughed back directly by the management of the firms.

Individual shareholders play a much more modest role in capital markets than in the US. Dutchmen typically do not put their savings in shares, as Americans may do, but in pension plans, life insurance and if they buy shares they do so in investment funds which spread the risk by reinvesting in a large variety of stocks and bonds. These organizations then are the real investors in capital markets. The capital market is hence dominated by large institutional investors: pension funds, insurance companies, share funds. Regulations restrict their investment policies. To protect their clients, there are limits on the amounts they can invest in risky undertakings. As has been said, Dutchmen are historically risk averse. This tradition may make it difficult at times to mobilize financial resources for risky innovations.

Hence it is perhaps no accident that major investments in industrial undertakings have been launched by the government, since private business (trading interests) was not interested in starting new industries. Thus the government took the lead in developing the textile industry (the '*Nederlandse Handelsmaatschappij*' of King Willem I was instrumental in developing this industry), in exploiting the coal deposits (and founded the present-day chemical firm DSM), the salt deposits (also the basis for an extensive chemical industry, now Akzo), as well as the blast furnaces (by the state, province and city of Amsterdam) and the rolling mills of Hoogovens. The state has also played a leading role in the service industry, as with KLM. This risk aversion and lack of interest in industrial undertakings still seems to be very much with us. A recent indication was the refusal of the banks and other institutional investors to form an alliance with Stork Engineering to save Fokker.

4.6 Production Clusters

The effectiveness of such elements of a national system of innovation is increased through clustering. Research indicates that industries are particularly dynamic, innovative and competitive where small and larger firms are located close together and where facilities such as for research, training, and finance, as well as active and interested state agencies, are close at hand, and where good transport and communication infrastructure exists. Examples are Baden-Württemberg, or more precisely, the Stuttgart region, or the Rhine valley between Frankfurt and Karlsruhe, Northern Italy, Silicon Valley, the Lyon area. In our own country the Rotterdam harbor, the region around the national airport Schiphol, and perhaps in a sense, the country as a whole can, in the European context, be considered such a region. It is about the size and importance of similar regions in Germany (North-Rhine Westfalia, Baden Württemberg). There is an exten-

sive literature by now on such industrial clusters or districts and I do not want to dwell at any length on it. Suffice it to point out that state regulation can also favorably influence innovation by enhancing such clustering, for one thing by a 'negative' regional policy. Rather than stimulating industry to invest in poor and outlying regions, it might make more sense to encourage them to invest in central regions.

4.7 National Systems and their Performance

Nations do differ in their capacity to innovate and the way they do it. In this respect, the sharply contrasting histories of German and US firms, may serve as an illustration. Germany has continued to be enormously innovative in industries in which it was already competitive before World War II: paper, printing, materials, machinery, electrotechnical products, motor vehicles, chemicals, textiles. But it has been much less successful in biotechnology, electronics, telecommunications, aircraft manufacturing. The Americans by contrast have in more recent years made radical innovations in these and other industries which have short lives and have technologies which change rapidly and are complex. In doing so they have also created totally new industries.

How can such differences be explained? Why do some countries, time and time again, create totally new products and new industries while others rarely create either? Why do some countries make radical innovations but fail to commercially market these successfully, while others make more incremental ones, but with more commercial success? Why do countries differ in their styles of innovativeness and in the industries in which they have been successful?

Authors such as Nelson, Lundvall, Hollingsworth and Hage look for differences in the institutional make up of these countries, which they have called the 'national system of innovation'. The various institutions discussed in the foregoing sections make up such systems. As I have tried to demonstrate, they are all affected either positively or negatively by state regulation.

Furthermore, path dependency of course plays an important role. The invention of the steam engine and its ever increasing applications in England, from the Cornish tin mines to the railroad locomotive to engines for manufacturing led to the emergence of a well-developed engineering and metalworking industry, with all its supportive institutions. Similarly, the discovery in Germany that a wide array of pharmaceuticals and dyes could be developed from aniline sparked the development of an extensive chemical industry (BASF, Bayer, before the war merged in IG-Farben), also with attending financial, educational, research, and regulatory institutions. This industrial infrastructure: large firms, know-how, experience with specific product development, research laboratories, networks among different firms, reputation of quality and reliability among customers, trust among financiers that new innovations in such an existing industry would again be successful, industrial standards, quality norms and other regulatory protections, all such institutions gave the country a competitive advantage over other countries, also in the development of further innovations within this sector. Once a country became 'good' in one sector, it could for a while become even better. Until the sector-institutions turned from asset into liability: when they started to hamper further development outside the sector.

It is not easy to characterize the national systems of innovation of different countries and to relate this to their economic performance. Much comparative research is still being done on this issue. However one can say something about the Netherlands. Ever since the 1890s, reinforced in the 1930s and 1950s, the Netherlands has had a relatively highly regulated economy, with regulations also providing for 'factors of innovation' such as research and training. Such regulation has not thwarted economic growth. On the contrary, Van Zanden and Griffiths (1989) consider as most characteristic of the 20th century economic history of the Netherlands the fact that: 'Over the whole period 1900-1985 the growth of the Gross National Product was practically nowhere else as large, while overall inflation was nowhere else as low as in Holland. Furthermore, although the Netherlands, measured by the national product per head cannot be considered to be among the richest countries of Europe, nevertheless, the production per worker and per working hour was by European standards extremely high.' (1989: 15) They base themselves on data collected by Angus Maddison. At present, the economy is performing rather well, notwithstanding its 'rigidities'. Inflation is still relatively low and so is unemployment. The growth in number of jobs was higher over the last ten years than in almost all other OECD countries and between 1989 and 1993 even higher than in the US. Our exports grew in 1994 by 6.5 per cent and came to 275 billion guilders. Labor productivity is among the highest in the world and wages are lower than in most surrounding countries. Only the income per head is relatively low, owing to the low labor participation rate. The competitive position is not bad. The country scores among the top six or seven in the bi-annual rating of the World Competitiveness Report of the World Economic Forum. A recent comparative study of the attractiveness of 267 regions in Europe for the location of firms rated one Dutch region, the area around Arnhem/Nijmegen, as the number 1, and two other Dutch regions also high: Overijssel ranked number 6 and North-Holland ranked number 7 (Study of Research Bureau Empirica, commissioned by the German 'Wirtschaftswoche', reported in *Vastgoed*, March 1993). Many sectors perform well in world markets, and have large shares in world exports, as already mentioned.

The acceptance of technical innovations, like the cultural dimension of the national system of innovation, also differs very much from country to country. The French rationalist tradition, going back to the Enlightenment, provides for a positive attitude towards technology and science. There is a strongly felt belief that technology can provide solutions for societal problems, and new technologies are easily accepted, witness for instance the importance of nuclear energy for French electricity production. The opposite is true of Germany, and this distrust of technology can perhaps be traced back to the romantic tradition in Germany. The Netherlands fits somewhere in between. Given our geo-political location we have in many respects borrowed eclectically from the three main surrounding cultures. There is both a rationalist and a romantic streak in our culture. This implies that, as regards the acceptance of technical innovations, we may be sitting on the fence. There may be more room for steering the public debate on innovation. That is much more difficult in Germany, where one has to row against a strong age-old romantic current.

5. Regulatory Styles

Whether or not rules and regulations inhibit or enhance innovation, whether they are experienced by industry as irritating obstacles, depends perhaps less on the actual rules and norms themselves. As a matter of fact, the large majority of such rules have actually come about at the request of business. What does often seem to be the obstacle is: a) the degree of detail of the regulations; b) the manner or style in which state agencies prepare, decide on, administer, and sanction such regulations; and c) the accessibility, internal differentiation and bureaucracy of the agencies doing the implementing.

Too many detailed regulations, overly rigid implementation, excessively close control, and overly strict and severe sanctions, or, more in general, lack of flexibility in the rules and their application, these are the causes for complaints about 'excessive regulation', 'bureaucratic needling' or 'regulatory unreasonableness'. Bardach and Kagan (1982) give many examples of such regulatory unreasonableness in the US in their study Going by the Book.

The practice of state intervention in the economy, as expressed in the degree of detail of the regulations or the strictness of their implementation can be called a regulatory or policy style (Vogel 1986, Van Waarden 1995). These styles differ: between agencies, between policy fields, and also between nations. In this section I will investigate such differences and their possible influence on the capacity for innovation. In particular, I will try to characterize the Dutch regulatory style by contrasting it to that of other nation-states. Subsequently I will reflect upon its consequences for economic performance and in particular the nation's innovative capacity.

5.1 The Concept of Regulatory Style

The concept of regulatory or policy style refers to the routine choice behavior or 'standard operating procedures' which policymakers tend to develop in the policy process. Any individual develops routines in order to reduce the complexities of (social) life, so as not to be overburdened by the need to make endless conscious choices. Policymakers are burdened by additional complexities, resulting from lack of time and information, ambiguity of policy preferences, incomplete understanding of causal relationships, and other constraints which limit rationality. Given the uncertainties, created by such problems and constraints, task definitions and problem solutions which have proved to draw at least minimally-acceptable responses from the environment in the past, tend to become repeated over and over again. Members learn from past experiences and they will communicate and popularize these experiences to colleagues and newcomers in their organization. Thus organizations learn and in the process generate and store conventions of action, more or less predictable responses to challenges from the environment, internally recognized rules of the game. Subsequently, the main task of policymakers becomes less to make 'rational choices' than to identify the appropriate rules, i.e. the rules that govern a specific combination of roles and choice situation, the so-called 'logic of appropriateness' (March and Olsen 1989). These rules become modified often only after they have become manifestly dysfunctional. Any change is likely to be incremental, as organization members will tend to cling as much as possible to the familiar, using the tried solutions, if not as a whole at least in part, for as long as possible. Furthermore, specific styles find more and more expression over time in legal,

political and administrative institutions in the sanctions usually connected to legislation, in agency-directives on the discretionary authority of administrators who actually deal with the clientele, or in the recruitment and socialization patterns within agencies and administrations. This will further enhance their endurance over time.

Several types of policy styles have been proposed in the literature. Lindblom's (1959) famous article on 'muddling through' can be seen as the introduction of an incremental, as opposed to a rational-synoptic policy approach. Hayward's (1974) distinction of radical-heroic and incremental-humdrum approaches is a modification thereof, as is Wilson's (1973) differentiation between policy innovation and policy adaptation. More recently, typologies have been proposed by Richardson, Gustafsson and Jordan (1982), who coined the concept of 'policy style', and by Feick and Jann (1988).

Elaborating on these typologies, I distinguish three main dimensions of regulatory styles, the answers to the 'what', 'how', and 'who' questions of the policy process:

- a. What is the substance, content, or the 'intensity' of the policy intervention? i.e. the *routine intervention modus*.
- b. How do policies come about? How do they get formulated and implemented? i.e. the *routine procedures*
- c. Who is involved in these processes of policy formulation and implementation? Or: What do *routinely-created policy networks* look like?

Elsewhere I have elaborated a number of subdimensions of regulatory styles under these headings. However, here I will limit myself to several main variables of styles.

Regarding the intervention modus I distinguish 'activist from reactivist' styles and 'comprehensive versus fragmented or incremental' interventions. Under the heading of routine procedures, I classify 'pragmatic versus legalist' styles and 'consensual versus adversarial' ones. And under the heading of policy networks, i.e. the main actors involved in regulation, I differentiate between 'liberal-pluralist, etatist, and corporatist' styles and between 'formal and informal' network structures.

Data to identify national regulatory styles can be found in a number of comparative studies on policy analysis and state - industry relations. Such studies are Ashford and Heaton 1982, Asimov 1983, Badaracco 1985, Brickman, Jasanoff and Ilgen 1985, Chick 1990, Derthick and Quirk 1985, Döhler 1990, Duchene and Shepherd 1987, Dunlop 1980, Dyson and Wilks 1983, Hall 1986, Hancher 1990, Hayward 1972, 1975 and 1983, Hirst and Zeitlin 1989, Katzenstein 1987, Kelman 1981, Lundqvist 1980, Nef 1962, Peacock 1985, Premfors 1980, Richardson 1982, Schneider 1985 and 1988, Süllow 1982, Vogel 1986, 1987 and 1992, Wilks and Wright 1987, Graham Wilson 1985 and 1985a, James Wilson 1980 and 1989, Windhoff-Héritier 1989, van de Wijngaart 1991, and Zysman 1983. In the following, the various national styles will be discussed along the six variables distinguished above.

5.2 Active versus Reactive Interventionism

The typical Dutch style of state intervention in society and economy can be characterized as active interventionism. Law is considered to be an important instrument of order and social change. The tradition is one of

legal activism. Much more so than in Britain, which should be identified as reactivist, but less activist than in France and the US.

France is often considered the ideal-typical activist country. The state has its own goals regarding the structure and future development of society, it takes many policy initiatives, that is, it does not wait for civil society to generate demands as regards policy goals, and uses any legitimate means to reach such goals, including in particular regulations. Of the two basic functions of law, policy instrument and protector ('waarborg') of rights, the first one is relatively important. Over time, the state, its agencies and civil servants have acquired a relatively high status in civil society, which facilitate them taking such initiatives. The activism can be observed in many policy fields, in particular industrial and science policy. The state believes that it has an active role to play in furthering science, technology and industry, also in the interest of the state and its power in international relations. There is still very much a mercantilist element in French policymaking. Thus the government takes initiatives in founding industries, in steering and sponsoring research and development, and in getting new technology accepted by the public.

The tradition is old, and dates back even to the days of the *ancien regime* with its *Colbertisme*. However, the tradition was given a mayor boost by the Enlightenment and the Revolution. Symbols dating from that time are the Conservatoire des Arts et Metiers in Paris, a museum on which the Teylers Museum in Haarlem is based, and which had the ambition to educate and familiarize citizens with modern technology, by visually presenting technical instruments to them. The state has taken a leading role in establishing industry. In the past, for instance, the textile industry and the introduction of the Jacquard loom or the French East India Company, which was much more state-led than the Dutch VOC; now the nuclear energy industry (Electricité de France) or the telecommunications and computer industry. Thus telematics was successfully pushed by the French government by giving all citizens a free instrument to use the technology. The government also spends a lot of tax resources on industrial and technological policy while introducing regulations to protect such policies. French industrial activism is supported by various elements in French popular culture: the high status accorded to the state and its 'servants', and the rationalist tradition which makes for a positive attitude towards technology.

The United States has also a preference for activist policies. The state might interfere less than the French in civil society; however when it does, it does so intensely. American regulations tend to be strict and detailed. The authorities closely intervene in society and the economy. Businessmen are confronted with strict and detailed rules regarding competitive practices, product safety and liability, or environmental effects. Americans were pumping unleaded gasoline already decades before it was introduced in Europe. By setting high and strict standards, US administrators try to be technology forcing. Sanctions are heavy and often applied.

There is a belief in the American culture that problems are there to be solved and that strict laws and heavy sanctions serve this purpose. That law can and should be used to shape the direction of society and to solve social ills, whether it be drug addiction, crime, racial discrimination and inequality, environmental pollution, or business fraud. Prison terms of thousands of years are imposed, and believed to be instrumental in reaching societal goals such as the eradication of drug abuse and crime. This belief has been present in the US for as long as the country exists; it may

actually date from its founding phase. The US was the 'first new nation' (Lipset 1963), the first consciously constructed nation with the first constitution. The 'founding fathers' created a nation and a state. This experience may have given Americans a basic belief that their culture and institutions in society can be constructed at will, that they are 'makeable'. This tradition was fortified by later political, legal, and social scientific movements, the populist and the legal and social engineering movements from around the turn of the century.

Like France, the US emerged out of a Revolution, but much more so than in France a revolution against unwanted centralization of state power by the British Tudor governments. It was the time when the British monarchs too tried to come close to absolutism. This is what the Americans revolted against. When they created a state of their own, they made sure that it would never evolve into a central power like the one the British state of that day was trying to be. Thus they created a weak state, where political power was widely distributed and controlled by many checks and balances. As a result, state power in the US is much more limited by its fragmentation, and, the public administration has much less status, the opposite to France. American public agencies as a result always have somewhat of an underdog feeling, of being distrusted. And they counter that distrust by pursuing their congressionally given tasks with the greatest possible zeal.

Britain by contrast can be considered the typical reactive state. The government does not so much have goals and interests of its own, it lets them emanate from civil society. It does not try to prevent the emergence of problems in the first place, but reacts only after they have manifested themselves, and the government intervenes only if it cannot avoid doing so any longer. It tries to postpone that as long as possible, and to that end it denies the problem as long as possible. Such was the case with poor working conditions in the 19th century, with environmental pollution in the 20th, and now the present BSE case is again a nice example. The conflicts on the issue in the EU reflect the different traditions of state intervention, in this case in particular between Germany and Britain. The reactive policy style is linked to weak differentiation of the state from the rest of society, much less so than in France. That is reflected in legal, political and administrative institutions. The legal system, for instance, derives both its functionaries (judges, magistrates) from civil society (they do not receive any special state training and learn in legal practice), as well as many of its standards. The common law assumes that legal rules and principles are 'concealed embedded' in civil society from 'time immemorial', and that the only task of policymakers, judges and magistrates is to discover such law, not to 'make' it.

Germany and the Netherlands fit somewhere in between the activist countries France and the US and the reactive country Britain. The states in these nations have relatively high ambitions as regards regulating and steering their societies. They have assumed responsibility for a multitude of policy goals, including a well-ordered and stable economy and a just income distribution. However, state functionaries frequently wait for the public debate to develop on the various aspects of a policy matter, rather than taking initiatives as the French would do. The government does try to steer the debate somewhat. We have seen this with environmental policy, and now with euthanasia policy for instance. The semi-activism in these countries has led to a major role for the public sector. The nations are

among the most developed welfare states. In the Netherlands, the public sector, including transfer payments, accounts for almost sixty per cent of GDP.

In the past the Dutch government has also taken an active lead in industrialization and the acceptance of new technologies and industries. While the established merchant capitalism was less interested in developing industry, the state assumed the initiative. King Willem I was noted for his active mercantilism, and built infrastructure (canals), founded the '*Nederlandse Handelsmaatschappij*' on the model of the Société Générale to expand colonial trade and agriculture, and stimulated industrialization in the Dutch cotton industry for instance. Following a period of more passive liberalism, the state again took the initiatives, where private business had little if any interest: the coal mines in the south around 1900 (DSM), the extraction and exploitation of the salt deposits in the east (1917, Kon. Zout; later Akzo), the blast furnaces and steel mills in the west (1930s-1950s). It also played a leading role in large infrastructural projects: the draining of the Zuiderzee, the Deltaworks, and even some railroads in the mid-19th century.

Furthermore, industry and innovation have been encouraged by active regulatory measures, such as an active agricultural policy, that did not merely protect agriculture, but allowed and stimulated it to modernize as well. There has been a long-standing belief in 'ordered markets', in the usefulness of institutions that mitigate, but do not abolish competition: market entry barriers, establishment legislation, qualification requirements for entrepreneurs, product quality standards, statutory trade associations, legislation supporting collective wage agreements, and specific legislation for specific markets, such as inland shipping or the professions. In general, Dutch semi-activism produced a number of interventions and regulations that provided industry with institutions to reduce risk and uncertainty. A lenient cartel policy and statutory trade associations stimulated horizontal cooperation of firms. That allowed also for the development of many technical and organizational innovations, such as advanced housing construction methods, or one of the most efficient national payment systems in the world.

5.3 Temporal and Intersectoral Comprehensiveness versus Fragmentation

Whether the regulatory environment facilitates innovation through risk and uncertainty reduction depends also on the degree to which individual policy measures and regulations are stable over time and on the degree to which regulations emanating from various agencies and departments are consistent with each other. Is there long-term continuity and inter-policy consistency? That is, to what degree are regulations integrated into more comprehensive plans? In this respect too countries differ, and that is partly the result of the make-up of their political and administrative institutions.

The policy analysis literature, since Lindblom's (1959) famous article, may have sufficiently discredited the view that policymaking can be rationally planned, synoptic, or comprehensive. Most policymaking has to be done under conditions of bounded rationality, ambiguity of goals, incomplete understanding of causal relationships, etc. and will tend to be of an incremental nature. Nevertheless, many policymakers will at least try to design their policies rationally, even if they do not always succeed in real-

izing rational policies. This ambition to integrate individual policies into more comprehensive plans, as well as the capacity to do so, will differ between countries.

France's activist policies are usually given the form of rather comprehensive plans, as is generally known. The planning ambition is more prevalent than in other societies. Furthermore, the organizational preconditions for realization of such plans are better than in other nations. The centralization of political power in the state bureaucracy, the latter's status and influence in society, and the long-term office of politicians, in particular the president, facilitate integration and long-term consistency of policies.

By contrast, the US may often pursue activist policies, but they are usually less integrated in comprehensive plans. The concept of planning has certainly much less legitimacy than in France. Furthermore, the extreme fragmentation of political power, the relatively low status of government bureaucrats and their high turnover, the short-term policy orientation of American politicians, the lack of party discipline, resulting in log-rolling and pork barrel, all frustrate any attempts at more comprehensive and stable policies. US policies are typically fragmented and short-lived.

The other countries fit somewhere in between these extremes. Britain shares with the US a belief that planning is synonymous with socialism, which lends the concept low legitimacy among the bureaucracy. The belief in the wisdom of stepwise, incremental policies is even stronger than in the US and fits in with the legal system and general political culture. On the other hand, the political institutions allow for greater integration and stability over time. Such institutions are the centralization of political power in this union-state; the parliamentary system and the voting rules which provide for one party dominating the executive and the legislature; party discipline and the authority of the prime minister, and, perhaps most importantly, the lifetime career civil service, its status and image of neutrality, and the regular circulation of top civil servants among the ministries.

In the Netherlands, planning is more legitimate and a clear ambition of the executive, as is reflected in the presence of several influential state agencies for geographic, for economic, and for social-cultural planning. Even though planning has become discredited lately, for one thing due to the influence of American public administration theory, there are still regular attempts made at presenting comprehensive plans, like the 'National Environmental Policy Plan', or various national zoning plans. Planning has a long tradition, which is related to the importance of hydraulics in the country. The Netherlands is perhaps the only man-made country: wrested from the sea by comprehensive hydraulic policies ever since the 13th century. Drainage of the land was a large and long-term enterprise, and had to be followed by spatial planning and land zoning in the newly-created reclaimed *polders*. (This even led to the development of the science of spatial planning coming to be called 'planology' in the Netherlands). Planning is facilitated on the one hand by the centralized polity and a professional bureaucracy with a relatively high status in society and politics. However, institutional factors which frustrate policy integration are consociationalism and coalition governments, requiring often extended and complicated policy negotiations, and the segmentation of the executive in relatively independent ministries. Holland has nothing like the British, German or French integrated civil service. Each department has its own hiring and training policies and there is no circulation of personnel between minis-

tries. Germany shares with Holland a certain planning ambition, which is reinforced by German legalism and perfectionism. The integration and status of the national bureaucracy facilitates its realization. However, federalism results in complicated forms of vertical 'Politikverflechtung' which may complicate policy integration and frustrate stability over time.

5.4 Regulatory Pragmatism versus Fundamentalism

It has often been noted that there can be quite a distance between the 'law-in-the-books' and the 'law-in-action', as sociologists of law use to say. Whatever is formal law does not have to be exactly the same as the law in actual practice. That depends among other things on the strictness of regulatory implementation. And whether rules are strictly or flexibly enforced determines to a large extent whether they are experienced as a nuisance. The nature of implementation differs from country to country, some being more strict and fundamentalistic, others more flexible and pragmatic. The

American public authorities tend to 'go by the books' (Bardach and Kagan 1982, Wilson 1989). They implement regulations rather formally and inflexibly, and are unwilling to take account of specific circumstances of individual firms. They frequently give orders and injunctions and do not hesitate to impose fines. Great value is attached to universal rule application to all citizens or organizations alike. By contrast, British civil servants are flexible in rule formulation and application. They are much more open to negotiations with business over the observation of the rules. Transgressions on one issue may be overlooked in exchange for strict observation of other standards. There is usually more understanding for the technical and financial problems of firms in meeting strict air or water emission standards. Rules may be temporarily suspended, and exemptions or deferrals granted. Good intentions count.

Kelman (1981) compared American and Swedish factory inspectors and Wilson (1985) did the same for British and American regulation of health and safety at work. They found American inspectors to be much more formal, easier given to citations and fines, and less willing to listen to arguments of employers as to why they could not abide by the rules. Swedish and British inspectors see themselves much more as advisers and educators than as policemen. They tend to give advance notice to the employer so as to allow him to show his best, advise him on how to improve conditions, rarely impose fines, are willing to listen to the problems he may have with the rules, are flexible in allowing him time to bring the situation in line with the rules, and try to promote cooperation between the local trade union representatives and the employer as a way of providing a more localized and hence more permanent control system. The inspectors have a much greater discretionary authority. The rules to which the Swedish agencies bind their inspectors are contained in a six-page booklet, whereas American factory inspectors are provided with a sizable manual which prescribes in great detail the procedures they have to follow in dealing with employers.

German authorities are more like American ones. They also attach importance to universal and equal rule application. Civil servants have relatively little discretionary authority in negotiating with business over the observation of the rules. Most of them are trained lawyers or had to pass legal exams. This gives them a legalist orientation to policymaking.

But unlike their American counterparts, the system as a whole does allow for more flexibility than in the US, because of the involvement of private interest associations in policy formulation and implementation. Although these semi-private policy implementors do find themselves confronted with statutory constraints and obligations, the absence of a civil servant status gives them more leeway. Furthermore, the peculiarities of German federalism, often requiring the collaboration of authorities at the federal, state, and even county or municipal level in the implementation of a single measure, also creates more room for negotiation, even if only within the state organization.

Dutch regulatory application is like the British, pragmatic, tolerant and lenient, even more so perhaps. This tends to mitigate the intensity of state intervention in the economy. Rules are usually not very strictly applied. They are not rigidly imposed and there is no strict control on precise observation of the rules. Inspectors are usually willing to take account of the specific problems and circumstances of specific businesses. Exemptions are easily granted. A recent study of the National Accounts Office (1996) found that less than two per cent of 80,000 applications for permits (under a wide variety of regulations) were refused. Regulatory implementation is also often the subject of negotiations. (Temporary) transgressions of the environmental or health and safety legislation may be accepted in exchange for other concessions or in order to build up a trust relation with the clientele. Attempts are made to make the clientele internalize the regulations, to convince them of the reasonability of the rules and to acquire their voluntary cooperation. And to this end the rules are sometimes bent during interpretation. Coercion is only rarely resorted to, sanctions not often imposed. And cases are seldom brought to court. This style finds expression in terms such as 'governance by negotiation' (*onderhandelend bestuur*) or 'tolerant governance' (*gedogend besturen*).

To this end, policy implementors, whether they be inspectors and other 'street level bureaucrats', officials from private associations involved in implementation, or judges have a relatively large discretionary authority. There are various legal provisions for this. The Dutch legal system recognises the 'opportunity principle', which gives the public prosecutor the discretion to prosecute a case or not. His German colleague does not have this freedom. The legalist principle forbids this. All cases which have come to the attention of the prosecutor have to be presented in court.

Policymakers have used this discretion to develop a tradition of tolerant rule application, if it is considered that this will increase the effectiveness of reaching certain policy goals. The Dutch use the term '*gedogen*' for this style of implementation. It is a kind of 'policy of the lesser evil'. A less serious transgression is tolerated if a more serious one can be fought more effectively. It is not an informal policy, of *de facto* toleration which one sees in other countries, even in the US. No, in the Netherlands this is official policy. The famous example is soft drugs. They are tolerated and regulated and can be sold in registered 'coffee shops', in order to fight hard drug abuse more effectively. Prostitutes work in recognized brothels, checked by health inspectors, in order to fight aids and other sexually transmitted diseases more effectively. An illegal Polish prostitute is not extradited, but works for the police as informant and thus assists in fighting a greater evil, the trade in women. But one finds it also in many other policy fields. Formal cartels were tolerated and registered, in the expectation that inevitable, informal (and more harmful) collusion between firms would be less necessary. A study of a few thousand violations of environ-

mental law in 1986 found that only half of these had been checked by the municipal authorities, and of this half only 36 percent were sanctioned. The Dutch policy of the lesser evil is related to corporatism. It has favored self-regulation in cartels and trade associations. In order to have an interlocutor and partner in regulating and fighting abuses, the authorities have even actively encouraged the relevant industries to organize. Thus there are official business' associations of brothels and 'coffee shops' which trade soft drugs. Such associations try to control and prevent excesses, which could threaten their hard-won recognition or could precipitate state intervention. Thus the Coffeeshop Association forbids and tries to control the sale of hard drugs in the coffee shops.

The Dutch lately have also had extensive experience with policy experimentation. This is found in a wide variety of policy fields, health policy, housing, culture, education, etc. New policy measures and instruments are tried out first on a small scale, in order to learn from these experiences, and to subsequently adapt regulations in a stepwise, incremental manner. Often such innovations are given official 'experimentation' status, which does not only provide subsidies for the programme, but also exempts the organizations involved from certain obstructing regulations. Such exemptions and subsidies also help in winning the cooperation of the policy clientele. It is important for the legitimacy of new programmes that by giving a policy an experimental status, the impression is given that it is only a temporary measure and that changes are still possible.

Many rules also have loopholes, which make them more acceptable to society. The country has had a ban on collective dismissals since 1945 with the BBA-1945. Employers who want to lay off workers have to apply for permission from the director of the regional labor bureau. This rule is often quoted as a labor market 'rigidity', hindering flexibility and innovation. But does it really? For one thing, the procedure via the labor bureau is much less formal and time-consuming than a similar procedure in court would be (employees could challenge the decision in court, as they do elsewhere, e.g. in the US). Furthermore, permissions are easily granted. Blankenburg and Bruinsma (1994) showed that 95 percent of 90,000 annual applications are granted. It is often feared that a strict ban on dismissals would make employers wary of hiring new people. But the Dutch economy has created a loophole. Employers may put people temporarily to work who are formally employed by commercial labor offices ('*uitzend-bureaus*'). Dutch law allows for this, while other European countries, notably Germany, do not. Over time this has become quite a business. In 1995 almost 1 million people found work through such agencies, and on average 170,000 are employed by them each day.

It is not only the application of administrative rules that is very flexible. So is the procedure in court. First of all, there is very little litigation. Not many societal conflicts reach the court. Holland, after Japan, scores lowest on the number of court cases, lawyers and judges. Just to make the comparison with Germany: Holland has only 47 attorneys, 10 judges, and 1,550 court cases per 100,000 inhabitants; Germany has 93 attorneys, 29 judges, and 3120 cases (data 1992. Blankenburg and Bruinsma 1994). There is a tradition of conflict avoidance. Many conflicts are handled out of court. That holds both for civil law and criminal law cases. Conflicts among economic transaction partners are usually handled in various specialized sectoral arbitration institutes, often run by the relevant trade associations. When cases do come in court, they are handled flexibly. The Dutch judge has relatively wide discretion. In substantive civil law cases,

the judge can circumvent a legalistic outcome by means of a general escape clause based on the principles of 'fairness and reasonableness'. Furthermore, there is an inexpensive, quick informal summary proceeding, handled only by the court's president (the '*kort geding*') in lieu of a longer and more costly ordinary civil procedure. In criminal law, the Dutch legal system is also very tolerant. The incarceration rate in the US is 217 per 100,000 inhabitants, in Japan 44, and in the Netherlands only 21. The average jail sentence in the late 1970s was 1.3 months, as against 16 months in the US.

The prudent and tolerant style of rule-application is so much part of national culture, that it has even found expression in the Dutch word for policy, *beleid*. While other languages use the more neutral word 'policy' or 'Politik', deduced from the polis, the Dutch word is less neutral. It already implies a policy style. 'Beleid' does not only mean 'course of action' but also prudence, discretion, tact, and is related to the word *overleg* which means both deliberation, judgement, forethought, consideration and consultation, concertation, to take council together. A token of its esteem is apparent from its inclusion in the highest state decoration. The motto of the Military Willemsorde is: 'for courage, *beleid* and loyalty'.

5.5 Consensualism versus Adversarialism

The strictness of the US authorities' policymaking influences their relation to their clientele. Rather than avoiding conflict they seem to look for it. Hence their relation to private business has also been called an adversarial one (inter alia Chandler 1980, Fritschler and Ross 1980, Marcus 1984). American authorities are relatively less interested in listening to and involving collective interest representatives. They dislike being dependent on particularistic interests for information and feel less need to legitimize their policies since they are less interested in consensus building.

The flexible and pragmatic style of the British authorities makes them look for cooperation and consultation with the subjects to be regulated. Officials tend to rely more on persuasion than on coercion in implementing policies. Their style is a consensual one. In their search for consensus and conciliation, they are keen on building and maintaining close contact and cooperation with representatives of what is to be regulated. They listen to their problems, work on building trust relations, involve them in and make them co-responsible for implementation, and by convincing them of the reasonableness of the policy goals and means, try to acquire voluntary compliance. In time, cooperation with interest groups has become routinized and 'a mere form of courtesy and good manners' (Ehrmann 1968: 259). American authorities on the other hand see it as a good democratic practice to keep special interests at arms' length.

The French authorities have their own version of adversarialism. They are much less enthusiastic about involving private interests in public policy, as they fear that the particularism of these interests will threaten the 'national interest' for which they themselves stand guard. Their attitude towards such particularistic interests has been characterized by a certain contempt, haughtiness, superiority, and paternalism. As Hayward wrote, in France 'paternalistic government officials have generally regarded the private sector as composed at best of 'partners' and at worst of satellites ... The relationship between the public authorities and business is conceived primarily in hierarchical and unilateral terms, with gov-

ernment bodies exercising regulatory tutelage over their private sector clientele.' (Hayward 1975: 119)

Legalism can go together with consensualism, as the German case shows. This indicates that legalism-pragmatism and adversarialism-consensualism are different and relatively independent policy dimensions. Dyson (1982) and Katzenstein (1987) saw a search for consensus as typical for the German administration, but if necessary, and probably more so than in Britain and the Netherlands, administrators do resort to force in the case of enduring conflicts over policy solutions. Then, matters are decided either authoritatively (through decisions at higher levels) or formally through the courts. The legalism of German law and administration requires this.

The Netherlands, like Britain and unlike Germany, combines pragmatism with consensualism. The country shares with Britain an inclination to involve societal interests in the formulation and implementation of public policy. Policymakers search for compromise and consensus, they consult, negotiate, and cooperate. Much value is attached to acquiring the cooperation of the subjects concerned. Their wishes are recorded, account is taken of their interests, and concessions are made in a process of give and take, and in attempts to make them co-responsible for policy. Such consultation exists both within and between organizations, in particular between state agencies and associations of industry. Compromise and agreement is everywhere the norm.

Everywhere, group or collegiate government reigns, rather than monocratic decisionmaking. In the Cabinet, where the prime minister is only a 'primus inter pares', quite unlike e.g. the American president, the British prime minister, or the German *Bundeskanzler*, who have much more power. Business firms, too, are governed by anonymous 'Executive Boards' and 'Supervisory Boards' rather than by individual captains of industry. The same holds for government agencies, interest associations, and other organizations of civil society. The importance of the group and of egalitarianism is an old bourgeois tradition. Already in the 17th century the elite liked to portray itself in groups: in militias like the Nightwatch, rather than as individuals. Only the collective decisions of such groups are made public. The deliberations and opinions of the various Cabinet members is top secret. Only the agreements reached are published. The same holds for decisions of courts in which a collegiate of judges presides. Dissenting opinions are never published, as is not uncommon in the US. The same holds for decisions of Central Executive Boards of business.

Concertation and consensualism seem to be ingrained in our culture. They have been dominant since the days of the Dutch Republic, when various merchant elites, none of which had a majority, were condemned to cooperate and to reach new mutual understandings time and again in order to be able to govern the various 'city republics' (Daalder 1966). Pillarization, pacification, and the permanent necessity to form coalition cabinets have made concertation a second nature of policymakers in this country. Conflict is avoided or is preferably handled out of court, as pointed out above. The American observer Derek Phillips wrote: 'Rather than risk a conflict with others in the group, someone whose ideas do not agree with the point of view of the group will tone down his own opinion and make it known in a mild and quiet manner. And in extreme cases may turn away from the group. Open conflict, opinions presented with much conviction, a high level of verbal aggression and emotional scenes are

much less common in Dutch society than in the US.' (1985: 29). We nurture concepts such as the 'consensus economy' and the 'harmony model'.

5.6 Corporatism, Liberal-Pluralism, and Etatism

Consensualism is hence closely related to corporatism. Consensualism refers to the style of interaction among policymakers and between them and their clientele. Corporatism refers to the organizational structure of the policy networks that policymakers develop. Who are the major actors in these networks? Which agencies do the regulating? What are the dominant principles of coordination and allocation?

In this respect, the commonly-made distinction is that between liberal-pluralism, étatism and corporatism, étatism being typical for France, liberal-pluralism for Britain and the US, and corporatism for Germany and some of the smaller European countries, such as the Netherlands, Austria, and Sweden (e.g. Katzenstein 1985). Less well-known is how these different conceptions of social order are elaborated and reflected in legislation in specific policy areas. Elsewhere (Van Waarden 1995) I have demonstrated how these types of state intervention are apparent in the state regulation of labor relations. Let me just summarize the findings by way of example.

In France the state is the dominant actor in economic regulation, including labor market regulation. There is far-reaching state regulation of the substance of working conditions, vocational training, conditions for union recognition, collective negotiations, and compulsory conflict mediation. There is a preference for policy solutions through state regulation. Interest associations play a minor role. Unions are weak in terms of membership, density ratio, and finance, and they are divided along ideological and other lines. Hence they are not taken very seriously by employers and state agencies.

In England, state abstention, voluntariness, and informality reign in the central areas of negotiations, strikes and union rights. The right to strike is practically unlimited, collective wage agreements cannot be enforced in state courts and cannot be declared generally binding, unions and their shop stewards do not want any state support, mediation and arbitration are possible but not compulsory, and the state is much less involved with vocational training than elsewhere. 'There is, perhaps, no major country in the world in which the law has played a less significant role in the shaping of the labor relations than in Great Britain' wrote Kahn-Freund (1967: 44). The state leaves room for the 'market' as the main principle of allocation and coordination and provides at most a legal framework for private organizations such as firms and interest associations. American policy-makers have also a preference for 'market' solutions to policy problems. Moreover, in both countries there are many and many different trade unions and employers' associations, with overlapping memberships, competing for members and for influence with interlocutors. The associational systems are hence fragmented and pluralist in character.

In Germany and in the Netherlands there is, as in France, a conception of active state involvement in civil society, but here the state uses the organizations of civil society itself, such as interest associations, as intermediaries and 'assistants' in policy formulation and implementation. Therefore, the state actively supports the emergence and existence of interest associations and their mutual agreements. It leaves room for, and

sustains, interest associations as important principles of allocation and coordination in society. Thus unions and employers' associations have a legally guaranteed autonomy, but their structure and functioning is regulated in detail by law. There are limitations to the right to strike and formal conditions for the recognition of interest associations and their mutual contracts. Much regulation of labor and labor relations takes place at the initiative of interest associations and first acquires the form of private contracts. They can however be subsequently transformed into statutory regulations by them being declared to be generally binding. Furthermore, interest associations play an important role in the formulation and implementation of public policy, e.g. in the areas of the labor market and vocational training. They have substantial resources (membership, density ratios, finance, access to interlocutors) and are relatively comprehensively organized. Such delegation of regulation and self-regulation by industry is also found in many other policy fields, whether incomes, health, social security, vocational training, or industrial policy. Associations even play a role in litigation in the Netherlands. In other corporatist countries, like Germany and Austria this is not found. Corporatism has been under attack lately, and several official corporatist institutions are currently under review, being abolished, or their authorities reduced. However, the principle is so strongly present, that elsewhere, for instance in environmental policy, new forms of corporatism are reappearing, albeit under a different name, such as 'covenants', formal voluntary negotiated agreements between the state and associations of industry to reduce air pollution, packaging waste or to recycle cars. Sometimes such agreements have been given a statutory status. By now there are already 82 of such 'covenants' in environmental policy. The strategy is rather effective. Legitimacy is high, and so are compliance rates.

5.7 Formalism and Informalism

The accessibility (and subsequent flexibility) of regulatory authorities is in part determined by the degree of formality of the relations in policy networks. In this respect again, countries differ.

American authorities are not only formal in the substance and form of their regulations, but also in their contacts with organized interests. In so far as American public authorities make themselves accessible to organized interests, they apply the same universal criteria that they use in their interaction with individual firms. They are careful not to give privileged access to specific groups, for fear of being accused of favoritism and bias. To ensure such universalism, relations with interest representatives are formalized. Procedures at public hearings and lobbying activities are strictly regulated. Hence every interest group has more or less equal access and the number of participants in policy networks is in principle unlimited. That is, the boundaries of such networks are extremely open and fluid.

British state agencies, by comparison, are not only informal in their regulatory style, but also in their relations with organized interests. They are rather selective about whom they deal with and give privileged access to those interests of most strategic importance to policy implementation. Particularism rather than universalism is the norm. As a result, the policy networks they create, have only a limited number of participants and have relatively closed boundaries.

Dutch administrators combine pragmatism (as in Britain) with formalism in relations to organized interests (unlike Britain and in common with the US). Interlocutors of state agencies are mostly interest organizations, whereas British civil servants also like to deal with individual leading businessmen or firms. Such interest associations are often formally recognized and have been given formal access to the state, such as a statutory right to be consulted before policy decisions are made, or the legal right to a number of seats in an advisory committee to the government. At the interface between state agencies and interest associations, a great number of bi-, tri- or multipartite semi-state agencies have been created. Relations within the networks are intense, multiple and relatively symmetric; unions for instance, are involved at many levels and in many sectors.

The informality of relations in policy networks in France is in line with French paternalism. In so far as interest associations are consulted at all by civil servants, this happens in an ad hoc and arbitrary manner. It is up to the discretion of the civil servants. Interest associations are not formally recognized and have no formally guaranteed access to the state. More in general, the sovereignty and status, which public administrators have as representatives of the French *état*, give them substantial leeway in implementing public policy towards societal clientele. This informality in relations between state and civil society stands in marked contrast to the formality which reigns within the French public administration (Crozier 1964).

5.8 The Institutional Bases of National Regulatory Styles

The elements of Dutch regulatory style are strongly rooted in various state institutions and in popular, political, legal and administrative culture. In passing I have already given several examples. Thus pragmatism is reflected and bolstered in the legal 'opportunity principle', in the limited control over and supervision of judges, state administrators and other policymakers and the relatively great public trust in them, allowing them great discretionary authority. Consensualism is institutionalized in a voting system based on proportional representation, in coalition cabinets, in the dominance of collegiate as against monocratic government, and in important values and principles in the legal system. Corporatism is rooted in the constitution and in many laws, formal bi- and tripartite bodies; and of course in a traditionally (since the 16th century) well-organized civil society. Many such institutions have old, strong and deep historic roots. Hence the specific regulatory style of nations is not likely to change easily.

5.9 Regulatory Styles, Flexibility, and Innovation

The different dimensions of regulatory styles all affect the flexibility of policy formulation and rule application. Thus they also affect the experience of 'overregulation', of 'regulatory unreasonableness', and also the manner in which regulations are able to satisfy the economic need of reduction of risk and uncertainty. In this way they influence a society's capacity for innovation. In a way, regulatory styles can be considered an important element of national systems of innovation.

That pragmatic rule application is conducive to flexibility will be obvious. Less obvious is that consensualism and corporatism may also enhance flexibility. It is often thought that more distant and adversarial

relations between regulatory agencies and their clientele make for greater decisiveness and faster and more adequate adaptation to changed conditions. Consensualism on the other hand is supposed to require lengthy and viscous consultations and deliberations, to produce crowded agendas and bargaining tables, to slow down decision-making, and to retard a society's capacity to respond adequately to new opportunities, to adopt new technologies and to reallocate resources in response to changing conditions, thus reducing innovativeness and economic growth.

However, research has indicated that the opposite is often true. Vogel (1986) compared environmental policy making and policy implementation in the adversarial US with consensual Britain and found that in the end, decision-making is slower and less clear and decisive in an adversarial environment than in a consensual one. In adversarial state-industry relations, like the American ones, it may indeed require less time to take decisions and to introduce regulations, so that they can be adequately related to the most recent state of technology. However, such decisions and regulations often lack legitimacy among the business sectors to be regulated. If the legal and political institutions then also allow for plenty of lengthy appeal procedures, that is what the subjects of regulation do. Wilson (1989) reports on environmental regulations that were challenged by industry in court. One such case that was investigated in detail took ten years before it was finally settled in court and it filled 100,000 pages of text, transcripts of hearings and testimonials, arguments for decisions, etc. The formulation of the official regulation may not have taken much time, but actual implementation was very slow. It was also rather bureaucratic in that a lot of paper and ink was wasted. In this particular case it remained unclear for ten years what the regulations really meant, how they would be interpreted by the courts. The decisiveness of the early phase was somehow deceptive and superficial. All those years business remained uncertain as to the implications of the regulation. Adversarialism may hence give rise to protracted decision-making and increase uncertainty for business.

By contrast, consensualism may require time in the phases of policy formulation and decision-making. But once the decisions have been taken, the regulations introduced, they carry legitimacy and are rarely challenged in court. The more so as such would be incompatible with consensual state-industry relations. Business often cooperates in the actual implementation through its trade associations. That is, the implementation phase is much shorter and there is less uncertainty as to the meaning of the regulations. Additionally the involvement of industry in the formulation of the regulations may have led to an operationalization of the rules and norms, which fits in better with actual industrial practice.

Given the positive effects of pragmatism, consensualism, and corporatism on regulatory flexibility, these elements of regulatory styles should be safeguarded. All of them are currently under attack. Pragmatic rule application by the police has been severely criticized by the Van Traa Commission, and corporatist arrangements are the victim of various new policy measures. All of this is being done in the name of improving flexibility, innovative capacity and economic growth. The remarks made here should serve as a warning against such policies. They are based on mistaken causal assumptions. However, changing regulatory styles will not be easy. Given their strong rootedness in state institutions and culture, they may turn out to be more resistant to change than expected.

5.10 Differential Treatment of Firms

Pragmatic policymaking and implementation may imply a more formal differential treatment of products, sectors, and firms. The same regulation may be more frustrating or challenging to one industry or firm than to another. One such difference may be the age and size of firms. Newly-established firms still suffer from a 'liability of newness' (Stinchcombe 1965, Lammers 1983). Such organizations are still not very stable, as it is not easy to establish oneself in the midst of well-established competing organizations. Too many administrative burdens may discourage them from entering industries and markets. Hence it has been suggested that certain legal requirements should be relaxed (establishment licenses, statistical forms) for 'starters' or in certain 'regulation free zones' like inner cities. An attempt has also been made to do so. Young firms need temporary protection from regulations, like trade protectionism (for 'breeding') has been the argument and practice in industrializing countries, whether it was our own in the 19th century, or the newly-industrializing countries in the third world today.

One should realize however that such measures may be fraught with problems. Young organizations need also the protection of regulations, the reduction of risk and uncertainty. Furthermore, since market entry barriers may sometimes be necessary to maintain a viable industry, relaxing the rules may create problems of ruinous competition in the industry. Moreover, for how long should firms be exempt? And what if firms close down and start again the next day after the exemption period? This has happened in Italy, where small firms (9 employees or less) have special regulatory privileges. The effect has been for firms that grow beyond the size of 10 employees to start a second firm, to stay within the terms of the law. This explains in part why many Italian sectors have numerous very small firms (Grote 1992).

6. Alternatives to Regulation

What is the alternative to regulation? Is it really no regulation or less? Would deregulation indeed reduce the amount of rules and regulations confronting businesses, as the neo-liberals assume? That would be a serious miscalculation indeed. It is quite likely in fact that deregulation leads to more rather than less regulation in the long run. This has been called the paradox of regulation.

Society, and in particular the economy, is full of conflicts of interests. In business, between firms and their workers, customers, suppliers, financiers, shareholders, subcontractors, and last but not least among competitors in markets. There will always be conflicts about the quality of products, the safety of workplaces, the price of services provided, the delivery period agreed, etc. Deregulation does not reduce such conflict. On the contrary: a less regulated economy implies greater uncertainty, less stability, less ordered relations, and hence more frequent and more manifest conflict between economic actors. Such conflicts have to be settled. Parties will take their conflicts to the courts and these cannot avoid deciding the cases presented to them. As a result, in the absence of statutory regulations an ever-increasing and ever-more complicated body of case law is likely to emerge.

Some Dutch lawyers have even explicitly proposed replacing statutory regulation by civil liability claims. The Kortmann Commission recommended minimizing the Health and Safety at Work Act ('*Arbeidsomstandighedenwet*') in its report '*Van keurslijf naar keurmerk*' (1994). Firms should be forced to provide safe and healthy workplaces in the face of the threat of costly liability claims based on civil law, submitted by workers whose health had been negatively affected by their working conditions. The same trend can be seen in patent registration. Again the ideas for it seem to come from the US, with its greater litigious tradition. The American patent office registers less and less and often refuses to hire its own experts to do research, e.g. in electronics. The example is being followed by other patent offices in Munich and Rijswijk. Patent offices are referring firms more and more to the courts, where they have to challenge existing patents by presenting their own research findings and arguments.

Would this trend be advantageous to business? Would it enhance innovation? I do not think so. Case law binds business just as much as statutory regulations. However, it has additional disadvantages. First of all, as the amount of case law increases with the number of cases, the regulations become increasingly more complicated and opaque, and perhaps more ambiguous as well because of the plurality of decisions. Which of the many concrete precedents applies in any particular case? Secondly, this creates uncertainty for business and increases the risk of investment and innovation. Will a new product be challenged for its quality in court? Thirdly, the uncertainty increases the transaction costs for firms. They will have to secure legal council and perhaps also legal defense and that can become quite costly indeed. Furthermore, firms will try to reduce uncertainty by concluding liability insurance, which again adds to the costs of uncertainty. Finally, the increasing use of litigation may produce new inequalities in the marketplace. Large and rich firms have more resources to finance the often lengthy and expensive court cases and have an advantage over smaller firms (as well as new market entrants) who lack such resources.

The American legal system provides a vivid example of the crazy and costly situation such a development could lead to. Decades after the introduction of their new products, American manufacturers of silicon breast

implants suddenly find themselves confronted with liability claims from women all over the world amounting to billions and billions of dollars. The Japanese firm Mitsubishi would appear to be completely fazed about how to handle the peculiarities of a very different legal culture: liability claims running in to millions of dollars from women who claim to have been sexually harassed in the workplace. Even if such cases never come to court, they cost firms millions if not billions of dollars in out-of-court settlements. In addition firms seriously suffer from loss of public image and public trust in their products and organization. The only ones who seem to profit from these enormous transaction costs are the law firms and insurance companies. In 1989 the legal industry in America had a turnover of 80 billion dollars (Kagan 1991). This made the legal profession a bigger industry than the American automobile industry for instance. Firms also pay huge liability insurance premiums. A director of Ikea in Los Angeles, who had been Ikea director in Austria before, told me once that he spent as much on liability insurance in the US as he did formerly on social security in Austria. That is, 'fringe benefits' for workers cost about the same. With the difference that in Austria any worker who got laid off was sure of an unemployment benefit. Whereas for the laid off American worker it is a gamble. He can win big with a claim of discrimination or sexual harassment. But he can also lose and get nothing. It is indicative of the high risks involved that nowadays some US firms that produce 'high risk' products, such as pharmaceuticals, start marketing new products in Europe rather than in the US. Clearly, civil liability claims can hamper innovation and diffusion much more than statutory regulations. If the Dutch government wants to stimulate new industries, deregulation could indeed do the job. It could create a boom in the legal and insurance industries.

Of course, American 'situations' are not likely to occur in the Netherlands for the foreseeable future, even with deregulation. Too many of the ingredients of the American 'litigious society' are lacking in the Netherlands, such as the jury system, a plurality of courts with overlapping jurisdictions, the importance of legal precedent in the common law countries, and an adversarial societal, business and legal culture. Dutchmen are much less prone to bring conflicts to court than Americans. So far at least, we have very different legal institutions and a very different legal culture. There would be a long distance to travel. Dutch legal culture is almost at the opposite end of the spectrum as I have pointed out before. Given this other, beneficial tradition, it is dangerous to promote the idea of replacing statutory law by civil liability claims. If there is one thing American sociologists of law will warn you about, then it is to avoid such a litigious society at any price.

If deregulation were to lead to increasing civil liability claims, Dutch business would be likely to try to fill the void left by deregulation, given its manifest need to reduce uncertainty. This could take various forms: contractual agreements between firms, agreements through joint ventures, the emergence and strengthening of private certification institutions, self-regulation by trade associations and cartels, the reinforcement of private arbitration institutions, etc. That is, business will try to reregulate where the government has withdrawn. They have done so in the past. Then the need for uncertainty reduction produced a rich variety of private institutions for certification, standardization, regulation, arbitration. There is no reason to believe that business would act differently now.

However, both the proliferation of case law and private self-regulation are in time likely to produce pressure again for the reinstatement of statutory regulation. As case law becomes ever more complex, pressures will mount for the codification of legal precedent in statutes. And, as history has shown, self-regulation by business has some serious setbacks: free rider problems, lack of transparency because of a plurality of private regulations, disregard of the public interest. Thus historically, business has sought public support for its private regulations. Much of socio-economic legislation has actually come about at the instigation of private business and was a form of public codification of formerly private regulations. In turn, the state has intervened in private regulations in order to secure the public interest involved. This has happened in the past, and is likely to happen again in the future. Thus deregulation now over time will again produce pressure for regulation, because businesses prefer clear and relatively simple rules which minimize their liability, rather than a proliferation of case law and self-regulation, hampered in their effectiveness by free rider problems. This explains the other paradox that business is usually in favor of deregulation as long as the discussion is kept in general terms. However, as soon as proposals for deregulation become concrete and concern regulations that reduce their own specific uncertainties, enthusiasm rapidly wanes.

7. Conclusion. Nation-States in World Markets

Regulation may have positive (as well as negative) effects on the innovative capacity of industry. But who is to be the source of such regulation? The nation-state? Is it still a relevant unit for regulation pertaining to innovation? And in particular a small nation-state such as the Netherlands? Does it still have enough discretion, enough policy options at a time of increasing economic, political and legal internationalization? Can nation-states provide stability in a turbulent international world? Can they still reduce risk and uncertainty by regulation? Can they protect property rights by national patent laws? Can nation-states force or stimulate technical innovation by enacting stiff product or environmental standards, or would that prompt business to leave the jurisdiction of that state and invest elsewhere? Doesn't policy competition between nation-states produce a 'race-to-the-bottom', a competition, whereby the lowest common denominator becomes the international standard? Is such policy competition really the threat, or is it only an argument used by policymakers who want to deregulate nevertheless, but, by referring to international necessities have less need to put forward arguments to support the substance of their policies?

Many recent studies indicate that the degree of policy competition is limited and that there is certainly no 'race-to-the-bottom' in many policy fields. Large states can and do set standards, high standards. Vogel (1995) has challenged the conventional wisdom that trade liberalization and agreements to promote free trade invariably undermine national health, safety, and environmental standards. He demonstrates on the contrary that liberal trade policies often produce the opposite effect, that of strengthening regulatory standards. Large states in world markets can and do set standards, high standards. And any other national industry that wants to export to such a country has to satisfy those standards. Thus the norms of such large countries become international norms. Vogel has called this the 'California effect', after the largest American state, that has stiff product quality, health and safety, and environmental standards. These standards tend to become the norm elsewhere in the US too, for those industries that want to sell in California as well.

An example: 'The California effect can be seen literally in the history of American automobile emission standards. The 1970 Clean Air Act Amendments specifically permitted California the option of enacting stricter emission standards than those required for the rest of the US, an option which California chose. Consequently, its standards remained stricter than those of any other state. In 1990, Congress brought national emission standards up to California's and once again permitted California to impose stricter standards. It also gave other states the option of choosing either national or California standards. In 1994 twelve eastern states requested that the federal government permit them to adopt California's new standards. These standards in turn are likely to become the basis for the next round of minimum federal requirements. California has now had America's strictest automotive pollution control standards for more than three decades. Thus, instead of states with laxer standards undermining those with stricter ones, in the case of automobile emissions precisely the opposite has occurred: California has helped make American mobile emissions standards stronger'. (1995: 259).

He then explains how it works: 'The California effect connotes a much broader phenomenon. The general pattern, the ratcheting upward of regulatory standards in competing political jurisdictions, applies to many national regulations as well. This pattern has three components: two relate

to market forces, and the third has to do with politics. First, to the extent that stricter regulations represent a source of competitive advantage for domestic firms, the latter may be more likely to support them. Second, rich nations which have enacted greener product standards force foreign producers to adjust to them in order to continue to enjoy market access, thus helping in turn to raise foreign product standards. Third, agreements to reduce trade barriers can provide richer and more powerful greener nations with the opportunity to pressure other nations into adopting stricter product and production standards.' (1995: 260).

In Europe Vogel perceives Germany as playing the role of California. It has a tradition of stiff product quality, health and safety, and environmental standards. German industry often derives competitive advantages from these rules, and hence in general tends to support them. And Germany, with 81 million wealthy inhabitants, is a major market that no exporter in and to Europe can afford to neglect. Thus the country is willing and has the power to force its standards upon its trading partners. And indeed, just as the smaller neighboring countries like Austria and the Netherlands have tied their currency to the D-mark, so there is a tendency to tie their regulatory standards to the German ones. The covenant on the recycling of used cars was able to succeed, because Germany also had a compulsory arrangement for such recycling. But a similar plan of the Dutch government to do the same with kitchen appliances (refrigerators, etc.) failed to go ahead, because the Germans had not yet reached agreement on the matter. Recent studies of harmonization of European standards in the European standardization bodies CEN and CENELEC also show that these new European standards often tend to lie at high levels (cf. Voelzkow and Eichener 1992 and 1993, Eichener 1995). They are much higher than the 'lowest common denominator' in Europe. As far as protective standards are concerned, this is because of the political importance attached to high standards by such powerful countries as Germany. Where merely technical standards are concerned, German influence is high because of the lead in expertise of German officials at the DIN, VDI, (*Verein Deutscher Ingenieure*), and TÜV (*Technische Überwachungs Verein*).

Given the importance of large countries, it should come as no surprise that Dutch hi-tech firms mainly apply for patents in the larger countries or at the EU-office in Munich. Thus the transgene cattle firm Pharming never filed applications in Holland, but only in the US, Japan, and the European Union (TNO-STB 1996). It is not alone in this. If firms apply for patent registration in the Netherlands they usually do so in order to fix an earlier application date.

While large states can play a role as in the 'California effect', small states can opt for a role in the 'Delaware effect'. While California is America's largest and most powerful state, Delaware is the smallest. It has been most successful in a 'race to the bottom' game of corporate chartering. Corporate charters are given by the individual states in the US and all states are legally required to accept one another's charters. (Vogel calls this the American version of the European principle of mutual recognition 1995: 5). Thus in the past states have competed on the liberalization of chartering requirements. Delaware has won this game. Its chartering law is preferred by American business, with the result that the large majority of larger companies are chartered in Delaware. The European counterpart is the 'Luxembourg' or the 'Dutch Antilles' effect.

It is not by chance that these states are small. They can play this game effectively, because they can free ride on the larger surrounding nation-

states. The surrounding or overarching nation (the US in the case of Delaware, the EU in the case of Luxembourg and the EU and the Netherlands in the case of the Dutch Antilles) provide the basic regulation that satisfies the business need for reducing risk and uncertainty and for political and legal stability. By lowering their standards just a bit, firms chartered or registered in these small nations profit from the collective good of stability, but can get an additional benefit from the laxer rules on some particular points. They could not play such a game without their big brothers. There is no 'Burundi effect': a country with little regulation, but with extremely high risk, uncertainties, and instabilities.

What now are the possibilities for intermediate sized countries like the Netherlands (in terms of population)? Can we set and maintain high standards and make them stimulate innovation in industry rather than prompt industry to move to laxer regimes? And can we force our standards on countries that want to export to us? Of course, the latter will be difficult, given the relatively small size of the domestic market. But the former is not impossible. If industry realizes that high statutory standards, that they can meet at limited costs (i.e. standards that have been agreed upon in a pragmatic and consensual policy style), can be an asset rather than a liability in the competitive struggle, such standards could win the support of industry and help in keeping industry innovative and competitive.

Furthermore, we can follow the leading regulatory state in Europe in helping both our own and European industry to acquire a competitive edge. In the US other states have followed California for this reason for one. In Europe, the Spanish Gonzalez government has rather explicitly used the high norms of the EU to modernize Spain. In an earlier age Ataturk did the same for Turkey. It has been one of several strategies for countries trying to 'catch up'.

Actually, we can do more than follow: we can ally ourselves to a leading state like Germany in working towards high European standards. And indeed, Holland has done so in the past. It has allied itself to Germany, Austria, and the Scandinavian countries in advancing high standards. It still does so in the CEN and in the making of European environmental policy. However, the new liberal cabinet, which has made deregulation such a major policy issue, has been less of a reliable ally of Germany lately. Some leading policymakers still seem to believe in the traditional idea of policy competition and the race to the bottom. They do not realize that this country is too large to play a role in a 'Delaware effect' game. Free riding, if at all possible would be sanctioned by the larger states, if only because our products would still have to satisfy their standards. Furthermore, Dutch public opinion would never accept extreme social and environmental dumping.

It would seem to be in the interests of Dutch and European industry to pursue a policy of stable and high standards for products, working conditions, and the environment. Such standards will stimulate industry to innovate and to acquire a competitive edge. The Netherlands has the option of following German standards (after all, a majority of our exports go to Germany), or cooperating with Germany and like-minded nations in the formulation of challenging European standards. Given the importance of Germany, we have relatively little room for manoeuvre here.

There is more room for manoeuvre for national policy in other measures that can stimulate innovativeness. There is more choice in developing the elements of our national system of innovation further, in providing for 'factors of innovation': regulations that enhance or protect the industrial

organization most conducive to innovation, facilities for vocational training and collective pre-competitive research and development, facilities for risk-seeking finance; and a pragmatic and consensual manner of implementing regulations, including European ones. In all these areas there may be more room for a typical national innovation policy through sensible regulation.

Ultimately it is perhaps still useful to stress the obvious point that many of our laws and regulations have of course other goals: they are there to provide for social order, to protect the weak, to guard against risks threatening life and limb, to protect the environment and the open spaces still left in this country, etc. Many such norms, that serve the values of equity or civil rights ('*burgerlijke rechtswaarborgen*') may have a trade-off. It could be that they reduce the allocative or dynamic efficiency of an economy somewhat, that they incur welfare costs. However, I have tried to argue here that the opposite is often also true. Protective regulation may reduce risk, uncertainty, and transaction costs, and may challenge firms to innovate. Experience has shown that such will in particular be the case when norms and standards are being developed in close cooperation with the industry concerned, and when they are implemented in a pragmatic and flexible manner. In this we have a long tradition. We should nurture that.

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