Research Paper

Regulation of the Postgraduate Medical Education

Eveline Berende | Matthias Dehn | Katalin Katona | Ilaria Mosca

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Matthias Dehn

Katalin Katona

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Table of contents

Samenvatting in het Nederlands

De gezondheidszorg is een onderdeel van de samenleving waarvan vele overheden de mening delen dat deze toegankelijk, betaalbaar en van goede kwaliteit moet zijn. De samenstelling van de medisch specialisten is een kernelement van de zorg en kan deze criteria ondersteunen.
Om deze reden wordt getracht een antwoord te vinden op de vraag of er redenen zijn om de opleiding tot medisch specialist te reguleren en wat de effecten zijn van de verschillende reguleringsmethodes.
Een aantal subvragen die kunnen helpen met het beantwoorden van deze vraag zijn de volgende: Zou de overheid zorg moeten dragen voor de opleiding van medisch specialisten of kunnen de sociale doelen gehaald worden met behulp van de marktkrachten? Wie zou de kosten van de medisch specialistische opleiding moeten dragen? Is het nodig om het volume van de medische beroepsgroepen centraal te plannen? Hoe kan het aanbod aangepast worden aan de vraag naar medisch specialisten? Hoe kan gegarandeerd worden dat de opleiding tot medisch specialist van goede kwaliteit is? Deze vragen worden in deel I van dit paper behandeld. In deel II wordt gekeken naar de situatie betreffende de opleidingen tot medisch specialist in twee verschillende landen; Belgi' en Engeland.

Deel I
Om een antwoord te vinden op bovenstaande vragen wordt vooraleerst gekeken naar een aantal reguleringstheorie'n. De *public interest*, *contract*, *capture* en *enforcement* theorie worden allen behandeld waaruit blijkt dat de *enforcement* theorie de meest complete theorie biedt om te analyseren wanneer regulering nodig is. De *enforcement* theorie zet uiteen dat een vrije markt wordt geprefereerd als er voldoende zelfregulering aanwezig is bij de spelers op de markt. Als daarentegen monopolistisch gedrag van spelers of andere vormen van marktfalen niet aangepakt kunnen worden door reguleringsmethoden, is nationalisering de beste optie. In de praktijk is het voorstel van de *enforcement* theorie dat elke overheid een reguleringsstrategie moet kiezen die past in de algemene cultuur van het betreffende marktsegment van het betreffende land.

Bij het volgen van deze theorie blijkt dat er op de markt van opleiding tot medisch specialist marktfalen optreedt wat deels op te lossen is door optreden van de overheid. Dit marktfalen treed op bij de financiering van de opleiding, de kwaliteit hiervan en bij de grootte van de beroepsgroep. De overheid zou zich hierom bezig moeten houden met de financiering van de opleidingen, de mate van kwaliteit en het aantal opleidingsplaatsen om het marktfalen te corrigeren.

Wat de financiering betreft is het wenselijk dat deze kosten zouden in gedeelte gedragen moeten worden door de overheid en gedeeltelijk door de arts in opleiding tot medisch specialist (aios) zelf. Door de kosten van de opleiding in handen te leggen van het opleidingsziekenhuis (en dus geen subsidiering voor het ziekenhuis) ontstaat er een risico van *free-riding behaviour*. Wanneer de aios voor de totale kosten moeten opdraaien bestaat de kans dat te weinig basis artsen kiezen voor een opleiding tot medisch specialist vanwege de risico's horende bij het wel of niet behalen van voldoende eindresultaten en het vinden van een baan die voldoet aan de verwachtingen. Deze problemen kunnen worden opgelost met de juiste vorm van regulering van de kapitaal en verzekeringsmarkt of via subsidies. De manier van financiering zal het meest effectief zijn in de vorm van *human capital* fondsen of wanneer de aios de opleiding moeten betalen maar de mogelijkheid hebben tot een gesubsidieerde lening, waardoor de bovenstaande negatieve effecten vermeden worden en de kracht van vraag en aanbod het voornaamste coördinerende mechanisme kan zijn.

De mate van kwaliteit van de opleiding tot medisch specialist is van belang om de kwaliteit van de te leveren zorg hoog te houden. In een markt van volledige mededinging wordt de mate van kwaliteit op niveau gehouden door middel van concurrentiedruk. Alhoewel er geen volledige mededinging aanwezig is op de markt van medisch specialistische opleidingen, er is wel sprake van enige concurrentiedruk. De beste aios willen een plek in de beste ziekenhuizen en vice versa. Voor ziekenhuisen is het van belang om goede aios te hebben om goede zorg te kunnen leveren en dus beter te kunnen concurreren. Ziekenhuizen hebben daarom een prikkel om te laten zien dat hun opleidingsprogramma van hogere kwaliteit is dan dat van de ander. Om te zorgen dat de algehele kwaliteit en niet alleen de relatieve kwaliteit hoog blijft kan een overheid (verplichte) zelfregulering inzetten. Voorbeelden zijn het gebruik van accreditatie normen, certificering, financiële prikkels en prikkels voor informatievoorziening.

De planning van het aanbod van medisch specialisten zodat er een aansluiting is op de vraag naar hen is een volgend dilemma.
Als dit niet overgelaten kan worden aan de kracht van vraag en aanbod vanwege de zogenaamde *time lags* zoals de varkenscyclus theorie voorspeld, in welke mate moet de overheid dan ingrijpen? Allereerst moet gekeken worden hoeveel aios opgeleid moeten worden om aan de vraag in de toekomst te kunnen voldoen. De juiste overeenkomst tussen aanbod en vraag is van belang om wachtlijsten als gevolg van een tekort en aanbod geïnduceerde vraag als gevolg van een overschot te voorkomen. Voor landen waar de overheid een groot aandeel van de kosten op zich neemt voor de opleidingen tot medisch specialist, is planning van belang om te voorkomen dat specialisten worden opgeleid (op kosten van de

overheid) om uiteindelijk het beroep niet uit te kunnen voeren. Aan de andere kant maakt een grotere rol van de overheid de totale hoeveelheid opleidingsplaatsen afhankelijk van de hedendaagse politiek. Dit is niet optimaal omdat men binnen de politiek vaak naar de korte termijn kijkt en minder oog heeft voor de lange termijn. Het is daarom van belang om objectieve methodes te gebruiken bij het plannen van de beroepsgroep van medisch specialisten en deze te ontkoppelen van de dag-tot-dag beslissingen binnen de politieke arena.

Naar aanleiding van de analyses en resultaten van deel I is te concluderen dat er inderdaad redenen zijn voor regulering op de markt van opleidingen tot medisch specialisten.

Deel II
De effecten van regulering zijn afhankelijk van verschillende factoren die per land kunnen verschillen. Te denken valt aan culturele kenmerken of de vorm van de regering. Om deze reden wordt de situatie met betrekking tot de opleiding van medisch specialisten in twee landen geanalyseerd, namelijk België en Engeland. Voor beide landen is gekeken naar de manier van financiering, behouden/vergroten van kwaliteit en de methodes om het volume van de beroepsgroep te plannen.

Het systeem van de opleidingen tot medisch specialist in België heeft in de jaren '90 een grote verandering doorgemaakt. Het ging van een systeem dat vertrouwde op de krachten van vraag en aanbod naar een systeem met regulering. De *laissez-faire* strategie in de Belgische markt van opleidingen van medisch specialisten veroorzaakte negatieve welvaartseffecten vanwege een dalende kwaliteit van de zorg en een stijging in aanbod geïnduceerde vraag. Het totale aantal aios is gedaald sinds de introductie van reguleringsinstrumenten in deze markt. Er wordt wel verwacht dat een gerationaliseerde planning van de beroepsgroep kan leiden tot een stijging in de welvaart. Het is echter te vroeg om vast te stellen wat de precieze effecten zijn van de toenemende regulering in deze sector.

In Engeland worden de opleidingen tot medisch specialist gereguleerd door de overheid. Deze regulering heeft een groot effect op de grootte van de beroepsgroep doordat budgetten worden toegewezen aan de opleidingen. De gemaakte beslissingen in de afgelopen tien jaar laten zien dat de beroepsgroep zeer afhankelijk is van politieke besluiten.
Deze worden niet genomen op basis van rationele planning maar laten zich leiden door budgetbeperkingen. Doordat de besluiten politiek gevoelig zijn heeft Engeland als gevolg te maken met hevige fluctuaties in het aantal opleidingsplaatsen voor alle soorten medische specialisaties en zo ook in het aantal medische specialisten. Met dit in het achterhoofd is de recent

genomen stap die Engeland heeft gezet door een onafhankelijke autoriteit op te zetten die de kwaliteit van de opleiding tot medisch specialist overziet, een stap in de richting om de opleidingen tot medisch specialist onafhankelijk te maken van de dag-tot-dag beslissingen van de overheid.

Abstract

In this paper we analyse three aspects of the postgraduate medical education programmes – financing, quality assurance, and workforce planning – and investigate whether these activities should be regulated by the government or left to market forces.

To answer this question we rely on the framework offered by different regulation theories. The approaches of the public interest, contract, capture and enforcement theory have all been used. From our analysis it appears that the enforcement theory offers the best means to deal with this market.

Our findings show that governmental intervention is desirable in the financing of postgraduate medical education; to guarantee qualitatively good educational programmes both regulation and enforced self-regulation can be used according to the specific situation of a country; and the planning of workforce via regulation is especially important in that group of professions, like specialists, exhibiting time lags.

We further investigate the situation of the postgraduate medical education programme in two countries, Belgium and England, to understand how the issues of financing, quality assurance, and workforce planning in these two different set-ups have been tackled.

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Introduction

Many governments of different countries and international organisations such as the Organisation for Economic Co-operation and Development (OECD) share the view that healthcare must be accessible, affordable, and of good quality for their citizens. The composition of the medical workforce is a key element that sustains a healthcare delivery system fulfilling these criteria. To assure a suitable educational system, the training of professionals over all medical specialties needs to be organised; concerns arise about the regulation and subsidisation of this field. Should the government support postgraduate medical education, or can market forces provide socially desirable outcomes? Who should bear the costs of postgraduate medical training? Is it necessary to centrally plan the volume of healthcare workforce supply? How can the supply be matched with the demand for the services of physicians over time? How can the quality of the education of specialists be guaranteed?

In this research paper we analyse the postgraduate medical education market taking into consideration different regulation theories.
On completion of medical school, graduates enter as interns in the hospital system, where intern trainings are provided. The fundamental aim of the intern year, and thus of the postgraduate medical education programme, is to provide the practical knowledge and skills necessary for medical practice through on the job training in a supervised environment.
Our major research questions are: Are there reasons to regulate the postgraduate medical education market? If yes, what are the effects of the different regulatory tools?

Each country has applied different solutions to the above mentioned concerns; they either regulate or leave to the market forces different aspects of the postgraduate medical education. In the market of postgraduate medical education there are several issues that can occur: first, for some specialties there are constantly too few residents while for other specialties too many residents are educated. This indicates a constant under- and oversupply for certain specialties; second, it is often not clear whether the education should be paid out by public means or be self-financed; and third, the quality of the specialists can be either self-enforced or regulated by law.

We can learn a lot from the international experiences but it is not possible to copy the strategy of the most successful country, as no golden rule applies. The medical education system is very complex, it involves several

aspects (e.g. financing, quality, planning) and actors, and it interrelates with other healthcare markets, making it difficult to predict the effects and consequences of decisions.
Furthermore, besides economic principles, cultural and socio-economic factors determine the regulation strategies.
Because of these differences between states we have decided to describe two countries that differ in their culture and structure but that both use regulation in the postgraduate medical education market, namely Belgium and England.

The Belgian health system is characterised by a Bismarckian-type of compulsory national health insurance, which covers the whole population and has a very broad benefits package. Compulsory health insurance is combined with a private system of health care delivery, based on independent medical practice, free choice of physician and predominantly fee-for-service payment. Belgium introduced in 1996 a *numerus clausus* to limit the number of GPs and specialists who may apply for getting a licence to practise under the national health insurance system. The main reasons of the *numerus clausus* introduction were twofold: first, to contain the rising of healthcare costs and second, to avoid the supplier induced demand phenomenon.

England has a National Health Service (NHS) and belongs to the Beveridge type of healthcare system organisation. Candidates that want to enter the postgraduate medical education must meet eligibility criteria to send their application to so-called Deaneries that work as clearing houses for Specialty Registrar (SpR) training posts in hospitals, dentistry, mental health, public health and primary care. Specialists in the various medical disciplines within Deaneries keep track of training vacancies that arise within the NHS institutions in their Deanery's area. The process to get a post is competitive.

Part I of the research paper answers the research questions in a theoretical manner. Chapter 1 discusses different theories of regulation, from the classical welfare economics through the contract and capture theory, to the most recent enforcement theory. The recommended policy options range from total market-based solutions to full government regulation. We apply the enforcement theory to analyse the postgraduate medical education. First, we look at possible market failures and we examine those segments where the free market principle is likely to not assure a social optimum outcome. After detecting the candidate fields for government intervention, we analyse them more deeply one by one. Chapter 2 deals with different methods of the financing of medical specialists' training. Chapter 3 will link medical specialist education with the aspect of desired quality.

Chapter 4 describes current workforce regulation strategies, puts forward its limitations and provides strategies to receive a balanced planning of medical specialist education.
Part II of the research paper focuses on country cases, more specifically on Belgium and England. In chapters 5 and 6 we make an overview of the Belgian and English postgraduate medical education market. We focus in particular on three aspects, that is the financing of the postgraduate medical education, its quality, and the planning of workforce supply.
In chapter 7 the overall conclusions are drawn.

Part I
1 Economic regulation – theory and application

1.1 The theory of economic regulation

Medical education, either general education or specialist education, has various models of regulatory design. From a social point of view it is important to train an optimal amount of doctors in all specialities to cover the real need for healthcare treatments. Too few physicians would have a negative impact on social welfare since, among others, scarcity usually increases prices and waiting lists give rise to high social costs. These costs can emerge in the form of a production loss because people are unable to work, or they can arise as worsening the healthcare status of a person due to the long waiting time for a treatment. Too many doctors, however, can also have negative welfare effects as when a physician does not find a job then the high costs of the training are wasted. Furthermore, if there are too many doctors, they might have incentives to extend treatment in order to increase their earnings (supply-induced demand) ending up in higher costs for the society.

The question rises what regulation model is most beneficial for social control of medical education. In the history of economic regulation, different approaches have been developed aiming to create maximal social welfare. The challenge of the different models is to balance market forces and regulation to create maximal benefits for the society. In the following, public interest theory, contract theory and capture theory will be described as standard theories of economic regulation. Afterwards, a modern approach of the enforcement theory by Shleifer, Glaeser, La Porta, Lopez-de-Silanes and Djankov (2005) will be outlined. Enforcement theory addresses the critiques of the other three theories and presents a different manner to cope with the need for economic regulation as it takes historical and cultural characteristics into account to define the need for regulation.

1.1.1 Welfare Economics - Public Interest Theory

The public interest theory of economic regulation assumes that governments must step in to regulate markets in the case that markets are unable to regulate themselves. Pigou (1920) described in his book 'The Economics of Welfare' that market failures occur when the price mechanism that regulates supply and demand breaks down (e.g. due to information asymmetries). The major market failures are natural monopolies and

externalities such as information asymmetries. Natural monopolies occur when the fixed costs of production are so great that it makes sense that only one firm supplies the good. Externalities occur when the costs or benefits of producing a good or service are not fully incorporated into the price, leading to over/underproduction of the good.

Public interest theory stresses that governments are fully able to regulate prices in order to avoid overcharged prices of natural monopolies, set (minimal) quality and safety standards to prevent accidents, guarantee quality standards, regulate the labour market, to counter the employer's monopsony power over the employee and so on. According to this theory the need for regulation is to protect society, the public from the negative impact of such market failures and other harmful business behaviour (Schleifer et al., 2005).

Over the years, there has been a lot of critique on Pigou's theory. Winston (1993) states that the weakness of this theory is its assumption that perfectly informed social welfare maximisers are either able to manage the regulation or run the regulated firms that cannot be left to the market. On the one hand, there is almost no perfect information and on the other hand, bureaucrats do not, by definition, run a firm efficiently. Shleifer et al. (2005) add : "markets and private orderings can take care of most market failures without any government intervention at all, let alone regulation" (Shleifer et al, 2005, p440). Where the market does not work, private litigation can address whatever conflicts market participants might have. These critiques cleared the way for other models of economic regulation such as contract theory and capture theory.

1.1.2 Contract Theory

According to the contract theory individuals are able to enter a contract without strict state regulation. The theory describes the relationship between two contractual partners; a principal and an agent. There are two preconditions: (1) both contracting parties respect property rights to avoid bribery and theft, (2) there are no contract failures.[1]

The contract between two parties is made ex-ante specifying the process

1 Contract theory is based on the notion of a complete contract, that is a contract that specifies the legal consequences of every possible state of the world. In reality contracts are incomplete and parties are unable to write complete contingent contracts. Because it would be impossibly complex and costly for the parties to an agreement to make their contract complete, the law provides default rules which fill in the gaps in the actual agreement of the parties.

through which the amount of trade and the transfer are determined ex-post (Tirole, 1989). This means that information asymmetry can bias the contract between principal and agent in advance. The specific question rises how to formulate a contract such that the principal has his interests advanced by the agent, despite the fact that the agent's interests may diverge from those of the principal. This leads us to two general side effects coming up from information asymmetry: moral hazard and adverse selection.

Moral hazard rises through strategic behaviour after a contract has been concluded. A patient has incentives to ask for treatments that are not strictly necessary (ex-post moral hazard). Deductibles can prevent from this kind of behaviour. Another form of moral hazard is that doctors have incentives to provide more or overpriced treatments than necessary. This because the patient does not have to bear the costs due to the insurance coverage. (Andreosso and Jacobson, 2005). Case payments or capitation fees can prevent from this undesirable behaviour.

Adverse selection emerges when the principal is not informed about certain characteristics of the agent. This problem is very common in the insurance industry. One example of this is the health insurance market, where the insurer is not (fully) informed about the health status of the applicant for insurance (Bolton and Dewatripont, 2005). The information advantage of the client can be used strategically by choosing the insurance policy depending on the own health status. For the insurer it means that he cannot adapt the insurance policy to the risk he is running (Akerlof, 1970).

Contract theory further assumes that there is unbounded rationality, which refers to the ability of those designing the contract to take all possible and relevant future events into consideration (Andreosso et al., 2005). Rationality is mainly associated with basic property rights. Property rights create the framework for rational negotiations without extra state intervention. Each capitalist economy has public and private institutions to choose political leaders, to secure property rights, to distribute wealth, to resolve disputes, to govern firms and so on. The rationality aspect can be found in the initial work on contract theory by Coase (1960), who argues that where competition and private ordering do not work due to asymmetry in information and power, impartial courts can create rationality by enforcing contracts and common law rules for torts. It is the courts that can create rationality making it possible to form contracts within rules given by an independent authority. However, Coase is also aware that the most efficient institutional structure retains residual levels of both dictatorship and disorder. We will introduce these two concepts in section 1.1.4: Enforcement Theory.

1.1.3 Capture Theory

In the time being, there has been critique on the public interest theory as it assumes that government regulation is able to create maximal social welfare. In contrast, the Chicago School of Law and Economics has argued that markets can take care of most market failures without any government intervention at all. Moreover, the Chicago School claims that private litigation can address conflicts of market participants. Besides, even if markets and courts cannot solve all problems, government regulators are incompetent, corrupt and captured, so that regulation would make society worse off.

The capture theory (Stigler, 1971) relies on the concept that governments have the legal coercive power to regulate the degree and effects of monopoly power. However, instead of reducing monopoly power, government regulation tends to protect the incumbents from rivalling price war with potential competitors, which cannot enter the market due to the regulation. Stigler claims that, in practice, regulated firms have a more comfortable and profitable existence than non-regulated firms. Therefore private companies compete for scarce supply of regulation.

The essence of Stigler's capture theory is that if firms are in the position to be regulated and protected from other market players, they try to influence the governmental agencies so that the agency issues regulations in favour of the regulated firms. Regulated firms expend resources in lobbying the regulators. Stigler claims that it is common that officials from a regulatory agency wind up in a high-paying job with a firm that previously fell under their regulatory review. Regulators do not want to antagonise the firms they regulate to keep the possibility of switching their job after a while. Next to this, regulators avoid conflicts because it can cost a lot of energy in the future. All in all, Stigler assumes that regulated firms have higher return rates than non-regulated firms.

The critique on the capture theory mainly concentrates on the inability to supply a theoretical explanation of the process by which the regulators get captured. In practice, there are even long list of regulations adopted by regulatory agencies but opposed by regulated firms.

1.1.4 Enforcement Theory

The enforcement theory tries to find its way between the extremes of total regulation or total market competition. The contract theory claims a good definition of property rights as an essential element for a functioning market. This is true, as investments and citizens must be secured (by the government) from expropriation. With this, governments are able to control private disorder of crime, bribery, investor expropriation and

so on. On the other hand, there is the possibility that the government itself becomes the violator. The state as superior can act as a dictator expropriating all securities for individual investment. Therefore, Shleifer et al. (2003) claim that the fundamental problem of institutional design is the conflict between the two extremes of disorder and dictatorship.
The enforcement theory of regulation tries to describe a trade-off between both extremes. Djankov, Glaeser, La Porta, Lopez-de-Selanes and Schleifer (2003) call the trade-off to be found between disorder and dictatorship the 'Institutional Possibility Frontier' (IPF), which is shown in Figure 1.
The IPF describes a range of possible alternatives within the two extremes of total disorder or dictatorship, and can be relevant for a whole society or for a sector within it. The *x* axis describes the increasing social losses from a higher level of dictatorship measured relative to a world with perfect property rights. The *y* axis describes the social losses from a higher level of disorder as a relative weight to perfect property rights. The theory provides four general strategies of regulation: market discipline, private litigation, public enforcement through regulation, and state ownership. Normally, it is not one single strategy that is chosen by welfare states. Competition and regulation can appear in the same market as private litigation and public regulation. In reality there are immediate strategies of social control (Shleifer, 2005). In the following these different alternatives will be outlined and adopted for the situation of postgraduate medical education.

Relying on Shleifer's theory (2005) as a social welfare society has an interest in a balanced amount of physicians covering all treatments needed, it can make four choices. First, the society can rely on the reputation incentives of teaching hospitals. In this scenario each single institution follows its own interests and therefore the whole system adjusts to the social optimal amount of doctors. If, in a second scenario, the institutions do not reach a social optimal amount of trained specialists, the society might rely on private suits by interest groups, who doubt that the amount of treatment complies with the future need for treatment. It is then up to the court to decide if teaching hospitals provide a comprehensive strategy of postgraduate medical education for future health needs. If this scenario does not fit, a third strategy might be put in place. The society might put a regulatory agency in place that creates a framework that teaching hospitals need to use in planning their training capacity. The agency monitors the behaviour of the actors and penalises the actors if they do not fulfil the framework. The last method of social control is that the state itself runs the teaching hospitals and decides on the number of specialists trained according to future expectations of health services needs.

The four strategies rank from total private ordering to total state intervention. The enforcement theory of regulation states that all four

distinct strategies are imperfect for social control. Optimal institutional design involves a choice among these imperfect alternatives. Both most extreme alternatives have dangers of disorder and dictatorship, which might have negative impact on social costs creating inefficiency.

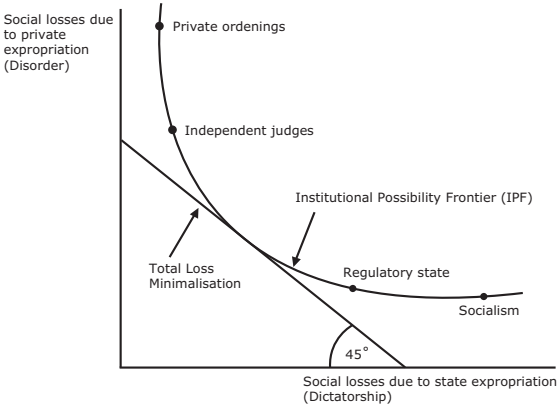

Figure 1. Institutional Possibilities Frontier
Source: Djankov et al., 2003

Private ordering has the advantage that it is independent from politicisation of rules of conduct, state corruption, costly and delayed enforcement of rules, or random or comprised choice of one competitor over another. People or industries resolve disputes among themselves without any government intervention, because they need to get along with each other over long stretches of time. Industries form associations that assure quality and penalise cheaters.
However, market discipline is necessary to control disorder. In a free market, participants can use economic, political or social power to damage rivals and create monopoly pricing and social exclusion. When market discipline works well, it is the most efficient instrument for society, since administrative costs are at the lowest level of all different strategies.
The market itself directly responds if the price and quality of the product are unbeneficial. However, in reality, discipline might not be sufficient. Teaching hospitals for example might underinvest in quality of training, which effects are invisible till students start working. This might be a reason for the state to intervene with e.g. quality regulations.

The less invasive method of intervention is to conduct good private litigation. Residents or patient organisations could sue for better training conditions. In theory private litigation is untouched by political influence

and judges are able to take a good decision. However, some private players may influence courts as they may hire talented lawyers. Problems of corruption of justice exist in some countries, which means that decisions are not totally independent from politics or might be susceptible under-the-table-payments.
To avoid these effects, countries can formalise clear legal procedures through codes. The formalities, however, might cause delays and can be expensive. In some countries judges are employees of the state and there exists specific guarantees to make the system of justice independent from private players.

The third strategy is to put in place governmental regulation. Here private litigation is framed by a set of governmental rules. Within the framework, it is still up to private litigation to set the right incentives. The reason for this strategy might be that it is much cheaper to leave it to litigation then to set specific contractual principles. In the postgraduate medical education for example, the state could provide minimum quality standards and leave the rest of the organisational matters to the market. Public regulation has a clear advantage to avoid disorder. Regulators act as experts and are motivated by social goals. A regulator monitors the market and intervenes when private players pass the given framework. In general,
it is more difficult to subvert regulators than judges. However, regulators can be politicised and over enforced as the checks and balances are not well introduced. A regulatory body also increases the social costs. In the postgraduate medical education it means, for example, that the state requires some demonstration of a minimum degree of competency to enter the market as a doctor, also called occupational licensing (Kleiner, 2003) (see section 4.4.2: Occupational licensing). Or the state can administer certificates that signal a standard level of quality to the market (Rottenberg, 1980). Regulation is, in general, a good method when the level of disorder is too high for private orderings and even courts to deal with it properly. Shleifer (2005) mentions that this is the case in situations where the problem of inequality of weapons between private parties involved into transaction is too severe.

At last, the most far going manner to avoid social losses due to private expropriation is state ownership. This might be the case if all sorts of other regulation fail to condemn monopolies and assure quality and public safety. A state can also choose for owning certain facilities to prevent any negative effects stemming from (public regulation of) private orderings (e.g. defence). Police and military services are good examples of preventive state ownership. However, state ownership has possible dangers of abuse by public authorities or of dictatorship. The state-owned entities can easily become a political instrument.

Djankov et al. (2003) assume that each country has specific determinants that need to be considered when putting (non-)regulation in place. At first, culture directly influences the quality of institutions. In countries where corruption is common, it is questionable if private litigation works as the judges might be easily bribed.[2] Second, endowments and the physical environment shape the institutional opportunities of a society. A third important factor is the technology of production. When the scale of production and the pace or interaction among individuals rise, the opportunities for private expropriation expand moving the IPF out as well as changing its slope. Technology has a positive impact on the society and indicates a well functioning state. A fourth factor is the efficiency of tax extraction, which also determines the location of the IPF because it points out how much dictatorship is needed to reduce disorder both on average and at the margin. At last, the level of human capital in the society also determines the location of the IPF because better educated and more informed people are likely to solve problems without violence.

In conclusion, there has to be a close look on prevalent cultural and historical conditions of a country before deciding on a (non-)regulation strategy. If a country wants to reform its system towards either a regulated or a deregulated system a transition period is needed (Shleifer, Glaeser, Porta, Lopes-de-Selanes and Djankov, 2003). In a state with corruption and strong regulation, it is dangerous to switch to a liberal system in one step, as corruption might not decrease. Therefore a transition phase would be desirable where a state tries to reduce negative effects of corruption.

1.2 Application of the enforcement theory to the postgraduate medical education

In this section we will apply the enforcement theory to the postgraduate medical education market. The starting point of our analysis is based on a theoretical situation, namely a free market economy (where no regulation is in place). This starting point coincides with that of the enforcement theory. Enforcement theory states that if there are no market failures (the market can thus achieve the socially optimal outcome), the market ordering is the best strategy, since it has the lowest social costs of

2 In Serbia for example, a candidate member state of the EU, cultural aspects as well as the long war in the 1990s made under table payments a common method to pay for healthcare treatment. Unlike EU countries, doctors take bribes because their income is too low to live from the official state funding and patients pay bribes to get treated quicker as health supply is very fragmented.

dictatorship. Subsequent strategies (private litigation, public regulation, state ownership) are justified in case of market failures. Here, we first look at potential market failures of the postgraduate medical education, and we then define the candidate fields for governmental intervention.

Taking the free market as a starting point also allows us to keep our analysis independent from present regulation practices of countries. We do not intend to find the best strategy for a specific country, but we examine under which circumstances governmental intervention might be desirable.

1.2.1 Potential disorders in the market of postgraduate medical education

The precondition for application to postgraduate medical education is a primary medical qualification. Potential disorders in the basic medical education may later affect the postgraduate level. At the same time, potential problems in the postgraduate medical education influence the medical workforce. From the society's point of view, the most important aspect is the availability of high qualified specialists. This requires an appropriate match among all the three levels: basic medical education, postgraduate medical education and medical workforce.

We focus on potential market failures in the postgraduate medical education, taking into consideration its interdependence with the other two levels. We will mention the most relevant concerns regarding the effects emerging from the basic education and the consequences on the medical workforce.

1.2.1.1 Influence of the basic medical education market

The basic medical education provides the base for the postgraduate medical education, and so most regulations in this market have an effect on the latter. If the number of students at medical universities, for example, is restricted, there are only limited applicants to become specialists, even if free market features the postgraduate level. Regulations seep through the market boundaries. The quality of basic education also has an effect on the higher levels of education and on the final abilities of specialists. The organisation of the basic training segment may affect the student's later choice if information about existing postgraduate possibilities is easily available (e.g. students have to follow internship in hospitals where there is the chance for specialists' training).

When we think in terms of potential residents, we cannot neglect the fact that they have already finished a medical education. They have accumulated experiences and information about the work of physicians. The fact that they are not laymen any more affects their behaviour in the postgraduate education market.

1.2.1.2 Potential market failures in postgraduate medical education

In the assumed free market situation, we consider teaching hospitals as suppliers of postgraduate medical education, and prospective residents as consumers who demand education. We take a conventional market situation where suppliers maximize their profit[3] and compete in different dimensions (e.g. price, quality) to attract consumers. The prospective residents (consumers) make their choice according to their preferences and the available information on alternatives.

Potential financial problems

It may occur that it is not profitable to be engaged in postgraduate medical education in a free market environment. Organising specialists' training in a hospital may increase the costs (e.g. professors spend time in education besides treatment and research), and if the benefits (e.g. value of the work of residents) do not weigh it out, the teaching activity is not profitable. If postgraduate medical education is financially not rewarding, or residents cannot afford the training, state interventions may be necessary to promote the education of medical workforce.

First, we assume that the resident has to bear the costs of his or her own training. In a free market environment this would be the expected situation, as the direct benefits of the education (obtaining knowledge) enrich the resident. Looking at the relative high costs of specialists' education, there may be problems with effective demand to become specialist.[4] Even if later the higher income weighs out the costs of the training (in a final evaluation of profitability of medical career), the risk of that future income (the uncertainty about finding a well-paid job after completing the training) and the need for a large initial investment may cause financial difficulty. The gravity of the problem may differ by country since it is presumably in relation to the overall financial situation. Even if a certain social class is disposed to pay the tuition fee, the number of applicants (and so the number of specialists in the future) may be too low compared to social necessities.

We could also approach the question of the existence of the market from the supply side: Are there enough institutions in a free market environment

3 In this analysis we use a pure economic approach. In practice, hospitals may have several other objectives than profit maximisation (e.g. provide excellence in a specialty) in contrast to our assumptions.

4 In The Netherlands for example general hospitals receive € 154.400 for a training place (the first 50 places, for further places gradually decreasing amount) (VWS, 2008). Assuming that the financing cover the costs, we may use this sum as estimation of the costs of education.

offering postgraduate medical education? Provision of trainings for specialists has both set-up and current costs. The level of set-up costs (among others) determines the willingness of institutions to enter the market, while the current costs heavily influence the amount of residents' tuition fee[5]. Obviously if current costs (and so tuition fees) are so high that there is no or just minimal demand, it is not rewarding for institutions to start courses. Set-up costs may be an obstacle to education in less developed countries where the lack of investment capital is a general problem.

Competitive behaviour of suppliers

Even if there are providers of postgraduate medical education, it is possible that they do not or not enough intensively compete among each other. Reasons for weak competition can be, for example, the low number of providers or entry barriers to the market.

The intensity of competition can be understood only regarding to a given market. As a first step of an analysis, we have to determine the relevant geographical market that is the region in which teaching hospitals are alternatives. Are the residents ready to move to another region in order to get better training? Does a teaching hospital attract residents from the neighbouring cities, from the whole country or even from a larger area? It is also important to take into account the specialties present in the hospital. In the following, we will refer always to the relevant market, when we use the word market.

Low number of providers can be the result of high entry barriers or relatively high fixed costs. If institutions need large and expensive infrastructure, it may occur that only one or two suppliers can act profitably in the market (the demand is relatively low to guarantee return of investments).

5 If every hospital should engage in teaching, they could commonly adjust the prices to their higher costs, and there would not be losses. In contrast, if teaching is an optional service the costs are disproportionally distributed, and prices may not reflect the differences (due to price competition). Institutions which do not participate in education could free-ride enjoying the benefits (highly qualified professionals) free of costs. The consequence of the possibility of free-riding can be a total market failure, when there is no supply of the service.

In such case, the monopoly or oligopoly is the best solution from the social point of view as long as we can prevent the abuse of market power. The competition policy generally offers solution to this problem.

Low entry barriers are important for competition because they ensure that providers of lower cost and presumably better quality can supersede less successful organisations. Low entry barriers mean that teaching hospitals can begin at any time with courses or trainings. There are different kind of barriers to entry, namely administrative barriers, economic barriers, and strategic barriers.

Administrative barriers may serve public interests, for example through guaranteeing a minimum quality standard (refer to the section 3.4: Regulation enforceable by law). Entry to the market may be bound to accreditation and the number of suppliers may be controlled by the severity of requirements. Besides the positive effects on quality, there are some undesirable consequences of administrative barriers. The restricted number of suppliers decreases the positive effects of competition, and this may increase the prices in the market.

Economic barriers to entry can be for example the necessity of a significant initial investment, difficult access to inputs or distribution channels. In the case of the postgraduate medical education market, economic barriers can stem from the difficulty to organise the educational activity, such as to hire (find and attract to the institution) professors, to develop the study material, special appliances or possibly demonstration models. These preparation steps may cost a lot of energy and money, reducing the number of applicants for market entry.

Strategic barriers may be set up by incumbent suppliers who try to use certain strategies to threaten potential entrants. They can signal e.g. by pricing or by overinvestment that they can engage in fierce competition if new suppliers appear on the market (see theory of market deterrence, e.g. Milgrom and Roberts, 1982). Sometimes these signals are enough to convince potential entrants that entering the market would not grant any profit. Considering the medical profession, we may also think about the different associations of physicians or consortia among teaching hospitals. The mission of these associations is to stand up for the interests of their members. This may implicitly mean that they aim to defend their market position and prevent entry of new competitors if it lowers their profits. In case of sufficiently high demand and possibility of price differences in the market (e.g. by product differentiation), entry deterrence is less likely.

Potential informational problems

Another key element of the effective working of market forces is if prospective residents are able to make well-informed decisions. This requires, among others, accessibility of complete, clear and comparable information on education possibilities. Information problems may also arise when the provider misses relevant knowledge, for example, about the applicants' capabilities. Teaching hospitals may want to choose among residents and therefore need accessible and comparable information (e.g. through the set-up of national eligibility criteria). If market parties cannot attain all the necessary information for their decision, competition may not lead to social welfare maximising outcomes.

Accessibility of information

Residents can choose among the teaching hospitals where they want to apply. Teaching hospitals intend to convince residents to choose them and so they are interested in offering as much information about themselves as possible (e.g. open days at universities). We cannot exclude that the competing institutions distort the information (in positive direction) in order to attract more applicants.

Teaching hospitals, at the same time, ask for reports on previous education or may organise entrance exams in order to know more about applicants.

Comparability of information

The comparability of information concerning the offered services may be difficult. A resident may be unable to judge the usability of the knowledge transmitted during the training. Teaching hospitals may also offer very different sets of study materials in the way to achieve the license.
The heterogeneity of the courses is first of all a problem if the obtained knowledge is unclear (like in the United States, where the exams to obtain license are of different difficulty by state). In that case, neither residents can foresee the future value of their training, nor do future employers know what to expect from applicants. This situation is not straightaway a market failure (we can consider it as a product differentiation), but it causes confusion and lack of transparency in subsequent markets.

When evaluating the applications and choosing among the candidates, teaching hospitals also need to pay attention to collect the same set of data about all applicants, if it is possible in an easily comparable format (e.g. grades from graduate school, years of experience).

1.2.1.3 Effects on the healthcare workforce supply

Medical specialists, finishing their education, enter the medical workforce market. In an ideal situation, both the number and the specialty mix of starters level out the amount of physicians stopping their profession and adjust to the society's need (e.g. if one year no neurosurgeon stops, but the need for neurosurgery increases, there are starters in this specialty). Good balance in the workforce market is important, because temporary over- and undersupply of physicians can cause problems and costs, although in some specific cases a slight oversupply of doctors may increase the performance of the whole healthcare system.

The undersupply of doctors makes availability of medical services more difficult what is manifested in waiting lists. A delayed medical treatment hinders the recovery of the patient, and so may lower his/ her quality of life. The low number of specialists results in a higher workload per physician which also may worsen the quality of healthcare delivery. Oversupply of physicians may lead to supplier induced demand, meaning that physicians try to increase their turnover by prescribing more than necessary visits or examinations. Furthermore, oversupply of specialist may result in higher unemployment rates in the given specialty and so disappointment among young professionals. Oversupply has less negative consequences, however, if there are outside options for specialists. An internist can for example choose to engage in scientific research, or work for an health insurer as an advisor in case of temporary oversupply. It may also occur that the competition among specialists (due to oversupply) force them to excel, improving the performance of the whole healthcare delivery system. This can be a positive effect of oversupply. Furthermore, there can be hidden needs present in the healthcare delivery system, which do not appear as demand. An increase in the number of specialist can contribute to meet these additional needs.

1.2.1.4 Supplier induced demand (SID)

In the patient – doctor relationship, doctors not only provide healthcare services, but they have a central role in the information flow. Patients need the help of a professional to understand the different treatment possibilities for their disease and to choose the most appropriate one.
The physician is the agent of the patient in this case. In an ideal situation, what is also targeted by the professional ethic, the relationship is "perfect agency" when the doctor's decision coincides with the alternative that a perfectly informed patient would have chosen. However, if physicians have their own interest (for example financial interests due to the nature of the reimbursement system and competition), it may influence their decision[6].

In Hurley's (2000) phrasing "supplier inducement refers to a phenomenon whereby a provider shifts the demand curve for healthcare by patients. More commonly in the literature, inducement refers to a situation in which a provider violates the agency relationship out of financial self-interest by recommending services of questionable benefit to a patient" (Hurley, 2000, p78). There are two theoretical models describing the mechanism of demand inducement: (1) Target income model and (2) Profit-maximising model.

The underlying idea of the *target income theory* is that in areas where the healthcare supply is relatively high compared to demand, physicians' incomes are depressed. In such a situation doctors may intend to regain some of their earnings by inducing demand. Proponents of the target income model assume the physician to be a utility maximiser. The utility of the physician depends on the level of his income and on practicing good medical care. Demand inducement increases the earnings, but causes "psychic costs" of non-optimal treatment (Feldstein, 2005, p. 235). This psychic disutility delimits the possibility of infinite demand inducement. The empirical study of Fuchs (1978) in the United States between 1963 and 1970 demonstrates that a 10% increase in the surgeon/population ratio raised the per capita utilisation of services with 3%. Although there were less operations per surgeon (7% decrease), the income of the

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6 It is interesting to mention that McGuire (2000) identifies two other ways, besides demand inducement, about how physicians can influence the quantity of provided medical services. He points out that even in a complete and symmetric information situation, it is possible that more healthcare services are given than the patient would need and demand. It stems from the unretradable feature of physician services and the fact that doctors usually offer a treatment plan, i.e. a quantity – price pair rather than price per unit. The second way to increase the volume of provided services is through a non-contractible input (quality) that influences patients' demand.

specialists diminished with lower amount. There were several similar studies (Cromwell and Mitchell, 1986; Birch, 1988; Grytten et al, 1990) of which results were consistent with Fuchs' analysis.

Dranove and Wehner (1994) tested the common methodology to identify demand inducement for feasibility. They estimated the effects of obstetrician/population ratio on the volume of birth, where inducement should not exist. Higher number of birth was indeed demonstrated in case of more obstetricians per capita, which gives rise to suspect on the credibility of the results of previous studies. Explication for the failure of the methodology can be the omission of variables and border-crossing of patients (in consequence of higher supply, patients from neighbouring regions come to use services in the research area) (McGuire, 2000).
There are other studies that investigate the relevance of inducement. McCarthy (1985), for example, studied primary care physician visits in metropolitan areas and found that the (squared) physician/population ratio had a negative effect on utilisation. The demand for services was elastic both for (waiting) time and prices, which had negative relationships to office visits. However, the fact that there is no inducement in the margin, does not exclude the possibility of inducement in the past (Feldstein, 2005).

The *profit maximising model* of SID draws a parallel between modelling of advertising and demand inducement. It assumes profit maximising behaviour of physicians, and costs (like loss of reputation and time) of manipulating demand. The optimal amount of inducement (from the doctor's perspective) is reached when the marginal costs equal the marginal revenues (Folland et al., 2004).
In the combination of the two theories (target income and profit maximising theory), it is possible to distinguish the income effect and the substitution effect. If the margin gained by the physician decreases for a service, there is an incentive (substitution effect) to decrease the inducement of that service and increase the volume of some alternatives. At the same time, the income effect (just like in the target income theory) would give a rise to the inducement in order to regain the lost earnings (which are due to the decreasing fees). The two effects have contradictory incentives, and therefore the final outcome (more or less inducement) is ambiguous. However, in the case of alternative services, the effects (cross-price and income effect) point to the same direction, i.e. more inducement (McGuire, 2000).

Besides the studies that examine the effects of physician/population ratio on utilisation of healthcare services, another group of studies take the advantage of price (reimbursement) changes to analyse inducement.

Rice (1983) dealt with the effects of changes in Medicare payments in 1976-77. He found evidence of inducement, namely in case of lower reimbursement rate, the intensity of provided service was higher. Another study analysed the effects of the introduction of a new (Medicare) physician payment system in 1990. Thoracic surgeons were expected to be the mostly affected doctor group (it was anticipated that they would lose 26% of their income). Yip (1998) found that thoracic surgeons indeed induced demand increasing the volumes of their services, and they were able to recover up to 70% of their lost earnings. Not every study found evidence of inducement, however. Hurley, Labelle and Rice (1990) and Hurley and Labelle (1995) for example analysed provincial billing in Ontario, Canada, and did not discerned negative or positive utilisation changes as response to fee changes (Feldstein, 2005).

There are some circumstances that favour supplier induced demand, and without which inducement is less likely. For example SID is more likely in a regulated environment, where the wages (or fee of services) do not decrease as a consequence of higher demand. In a free market situation, the adjustment (lowering) of wages would take away the incentive to induce demand. The theory of SID also has an implicit assumption on the financing system of healthcare delivery. If specialists are employees of a healthcare centre and they receive monthly salary, it is not in their interest to increase demand. General practitioners cannot gain from more frequent visits either, if they get capitation fee as compensation. On the contrary, a fee-for-service reimbursement system provides incentives for demand inducement, since more services increase the physician's earnings. Results of empirical studies also underpin this argumentation. The rate of hospitalised surgical procedures was higher if the reimbursement was based on fee-for-service than in the case of capitation basis (Feldstein, 2005).

Critics of SID state that in practice supply follows demand and not the other way around, as SID assumes. Opponents point out that there could be omitted demand factors in the analyses, which give rise to the healthcare service utilisation regardless of inducement. For example, if there are more physicians in a region, the quality of service may increase (e.g. physicians spend more time on the patient per visit). Consumers may be willing to pay higher prices for better services. As a consequence of higher physician/population ratio, the travelling time to the consultation room is also likely to decrease. Patients experience less difficulty to see the doctor, and therefore they tend to utilise more frequently the services (Feldstein, 2005).

Supplier inducement is a highly discussed issue in the economic literature, and as we have seen above, empirical studies have no conclusive results about its occurrence. From a policy perspective, it is an interesting issue, because it undermines the traditional economic analysis of healthcare. Since it violates a basic assumption on market mechanism, namely that demand and supply are independent, it has also implications on normative policy recommendations. In case of increasing physician/population ratio, the traditional analysis (assuming limited or no possibility of inducement) predicts, for example, lower rate of increase in both physician fees and incomes than in the past. SID theory would anticipate faster increase in fees and utilisation. Policy implication following the logic of SID would be that the rate of unnecessary surgery can be decreased through training lower number of surgeons (McGuire, 2000 referring to Schroeder, 1992).

1.2.1.5 Cobweb theorem

Surpluses and shortages in medical workforce may occur even if the postgraduate education market works properly. The main reason of these cycles in the education and later in the number of professionals, can be the relatively long time lag in becoming a specialist. Only the postgraduate medical education (residency) takes on average 3 to 5 years, which means that a specialist finishing his education now has made his decision 3 to 5 years ago, based on the situation of those days. The free market reacts to surpluses and shortages, but with a certain lag. To better understand the economic background of the problem, we make a short theoretical by-pass.

Fluctuation in quantity and price is characteristic of markets, where the volume of supply can be changed only in given periods (e.g. agricultural products where harvesting is once a year). The economics of these markets was first described in the 1930s. Mordecai Ezekiel was the first to dedicate a whole article to this phenomenon (Ezekiel, 1938), and since then a number of extensions and applications of the topic came along (e.g. Freeman, 1976; Rosen, Murphy and Scheinkman, 1994; Goeree and Hommes, 2000; Branch, 2002).

In the neoclassical theory, it is assumed that markets are in equilibrium (if equilibrium exists). If the market deviates due to an external shock, the new market clearing prices are reached quickly through continuous adjustments of price and quantity. The cobweb theorem analyses the problem when such adjustments are not possible because, for example, of periodical production process. The supply in one period cannot change according to the market price, but reacts only in the next period.
In Ezekiel's model (1938), suppliers have naïve expectations, i.e. they assume that the price of next year will equal that of the current year. Further contributions to the cobweb theorem relax this condition, and

examine the process assuming for example adaptive expectations (Nerlove, 1958), or rational expectations (Pashigian, 1970).[7]

We can distinguish three scenarios that can take place in a market of delayed adjustments if it once deviates from equilibrium: a) continuous fluctuation of price and quantity, b) convergent fluctuation, c) divergent fluctuation. Figure 2 illustrates these three possibilities. The two axes of each coordinate system are price and quantity and the lines draw the supply and demand functions. In order to be able to deal with the lag in production decisions, the demand and supply curves in the figure refer to subsequent periods. Looking at the supply function, we can read what the quantity will be in the next period as reaction to a given price. The demand function, however, defines the price corresponding to the actual quantity.

Part a) of Figure 2 illustrates the case of continuous fluctuation. In the first period, the price is P_1. Suppliers have to decide on the quantity of the next period now, because the production takes time. They choose quantity Q_2, which however yields prices P_2 in the second period (and a shortage of Q_1-Q_2). Reacting to this new price, production rises and the quantity in the third period is Q_3. This volume of product, however, only can be sold for price P_3, which now coincides with the initial price P_1. The process starts again, and fluctuation in the market does never cease.

Part b) of Figure 2 illustrates the case of divergent fluctuation. Like in the previous case, the reaction to the first period's price P_1 is quantity Q_2 in the second period. The corresponding price to Q_2 is P_2, which induces quantity Q_3 in the third period. Price P_3 now, however, does not coincide with P1, as in the case of continuous fluctuation, but it is lower. The cycle starts again, but with higher amplitude. Prices and quantities get further from the equilibrium with each cycle; the fluctuation diverges.

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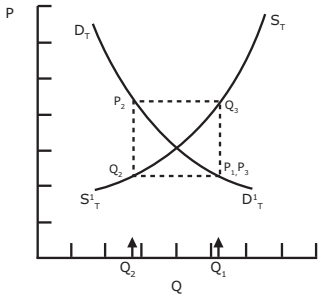
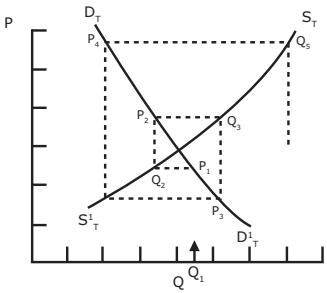
7 Suppliers' expectations about prices are assumed to be based on observations of previous prices. *Adaptive expectations* refer to the situation where suppliers look back at the most recent prices in order to forecast future prices. This backward-looking forecasting turns out to be crucial for the model's fluctuations. When suppliers expect high prices to continue, they produce too much and therefore end up with low prices, and vice versa. In the convergent fluctuation this may be a believable outcome, since the suppliers' prediction errors (the difference between the price they expect and the price that actually occurs) become smaller each period. In the continuous and divergent fluctuation cases suppliers' errors get larger every period. The fact that agents with adaptive expectations may make ever-increasing errors over time has led many economists to conclude that it is better to assume *rational expectations*, that is, expectations consistent with the actual structure of the economy. However, the rational expectations assumption is controversial since it may exaggerate agents' understanding of the economy.

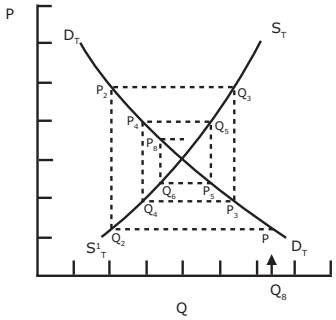
In case of convergent fluctuation, illustrated in Part c) of Figure 2, the process is again very similar, but now with cycles of decreasing amplitude. Prices and quantities converge to the equilibrium point, and finally the fluctuation ceases.



a) Continuous fluctuation



b) Divergent fluctuation



c) Convergent fluctuation

Figure 2. Three cases of fluctuation in the cobweb theorem
Source: Ezekiel, 1938, pp 262-264

The distinguishing feature of the three cases is the relative elasticity of the demand and supply functions. If the elasticity of the two equals, we get the case of continuous fluctuation. Divergent fluctuation is expected in markets where the elasticity of supply is greater than that of the demand, while the convergent fluctuation is just the reverse case, so when demand elasticity is greater than the supply elasticity.

Ezekiel (1938) points out that the cobweb theory is not the only possible explanation to economic cycles. He mentions as examples the replacement cycles of durable goods and the derived character of producers' goods that can also result in fluctuation. Ezekiel sets forth three conditions for the application of the cobweb theorem: "(1) where production is completely determined by the producers' response to price, under conditions of pure competition [...]; (2) where the time needed for production requires at least one full period before production can be changed, once the plans are made; and (3) where the price is set by the supply available." (Ezekiel, 1938, p 272).

We can apply the cobweb theorem to the postgraduate medical education. Our assumption in this analysis is a completely free market, and so the condition of pure competition applies to the supply of specialists (in cobweb terminology they are the producers). The training takes several years, which means that the number of recently qualified specialists reacts with a lag to salary changes. Furthermore, if we consider the whole supply of specialists, it reacts even slower to price changes due to the relatively low proportion of new entrants to the workforce market to the whole supply. In a free market scenario, we can assume that the third condition is fulfilled. As an illustration of fluctuations in the number of healthcare personnel and their salary, we demonstrate the process in the nurse labour market in Australia in Figure 3. The lines represent the yearly increase in number of graduating nurses (pink line) and in the salary of hospital nurses (blue line) respectively. We can see that there are significant fluctuations in both.

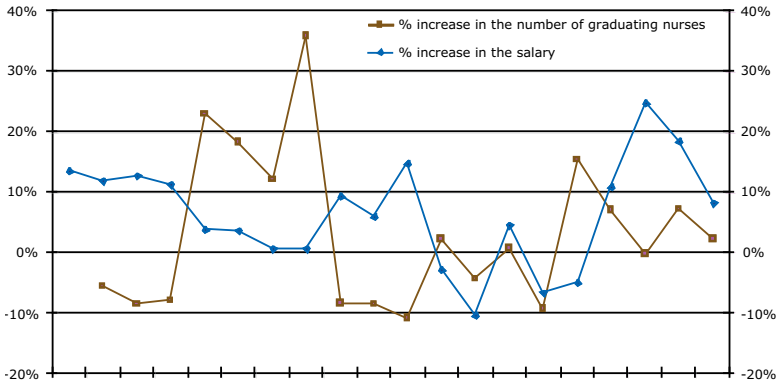


Figure 3. Increase in the number of graduating nurses and the salaries in percentages in Australia
Source: OECD Health Data, 2008

1.2.2 Possible strategies in response to the market failures

In this section, we analyse the above discussed market failures in the light of enforcement theory. Following the recommended path, we consider the strategies (market discipline, private litigation, public regulation and state ownership) as subsequent stages from free market to state intervention. As we mentioned in section 1.1.4: Enforcement Theory, the best solution to a market failure closely depends on the traits of the given country. At the same time, it is possible to conclude with a minimal necessary state intervention. For example, free market or private litigation cannot offer solution to the fluctuation in the medical workforce market (see cobweb theorem). Public regulation and state ownership, are both appropriate answers to the problem, and the precise socio-economical situation of the given country determines which one is better.

Financing problem

There are two possible market solutions to solve the financial problems of residents with low income: (1) to take a loan to cover their tuition fee, or (2) to sign a contract with a human capital fund[8]. A loan, however, would be just a partial solution, because the number of students would still not achieve the optimal number needed from the society (an explanation is given in section 2.2.2: Possibilities of self-financing, and Nerlove, 1972). Human capital funds are rarely used instruments, probably because of not appropriate juridical conditions. Before funds can work in a market, the government has to create favourable and supporting environment (e.g. guarantee the enforceability of such agreements, beneficial taxation rules). However, human capital contracts cannot correct for positive externalities related to the education. If the social benefits are significantly higher, than the private benefits, the market would not be able to assure the due volume of medical workforce and so governmental intervention may be necessary.

Approaching from the institution side, financial credit could cover the initial set-up costs related to the teaching activity (of the hospital) if the education plans seem to be profitable. When a teaching hospital does not have the sufficient capital to start up training, but profit can be expected from the activity, banks are likely to offer financial credit. The situation changes if the current costs of the education activity of the hospital (and therefore the tuition fee) are higher than students can afford. Without

8 Human capital contracts are equity-like instruments. If a student signs a contract with a human capital fund, he receives financial resources immediately and he agrees to pay a certain percentage of his salary to the fund during a given period of time after completing his education (for further explanation refer to section 2.2.1)

financial subsidy the education would be a loss-making activity[9], because either tuition fee is so high that residents cannot pay it, or the tuition fee does not cover the costs. In this situation, financial markets will not be disposed to offer a credit. Shortly, the market is able to solve the potential problem of high initial costs, but unable to deal with too high current costs. In the latter case state intervention may be necessary.

Subsidies to teaching hospitals or to residents lower the perceived cost of the training, and consequently increase the demand. If residents have to pay only a part of the tuition fee, more of them can afford to study, and the number of specialist can increase to the social optimum (or even above the optimum). Other way around, if institutions receive the subsidy, they have to cover their costs only partially from the tuition fee, and therefore it is possible to lower the fees. As a consequence, more residents apply, and the number of specialists can increase.

Public regulation (like creating favourable regulation environment to promote market solutions, or state subsidies) can be an appropriate strategy to solve the financial problems in postgraduate medical education (we will analyse the financial problem and the different forms of subsidies in more details in the Chapter 2: Financing).
The system of subsidies may not work in some countries, for example, in case of incomplete enforcement of rules bound to the utilisation of subsidies. If institutions, for example, spend the financial support on something else than education (anticompetitive cross-subsidisation), the regulation does not achieve its goal. The next step in the strategies (state ownership) may be necessary in this situation.

Informational problems
Looking for solutions to the *distortion of information* about the quality of offered education, we can use the framework of market discipline. We may argue that the desire for good reputation sets a limit to mystification of facts. Even if extreme distortion occurs, and some resident feels that they are misguided, there is a possibility to start a private litigation. We may expect that the market can solve the failure alone, and direct government intervention is not necessary (of course, in case of a specific country, we have to analyse the other influential factors).

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9 Benefits from specialists' training for the teaching hospital are not only financial gains (e.g. revenue from the tuition fee), but also such as better reputation, success in scientific research, easier recruitment. When evaluating the profitability of education, all these factors should be considered.

Besides the information provided by the teaching institutions, wages and salaries on the labour market are also important signals. They transmit information, among others, about the ease to find a job (in specialties where an insufficient number of doctors work, earnings are higher), or the quality of the education in the given institution (residents from a better teaching hospital may obtain better jobs and higher salaries)[10]. This mechanism, however, works only if the market for medical workforce is also a free market without failures. Distortions in the level of earnings due to imperfections or regulation may hinder the efficient transmission of information.

An example of distorting regulation of the workforce market is when the salary of physicians is determined centrally (i.e. by the government), thus does not react to changes in demand or supply. Another distorting factor is the high bargaining power of medical associations. If physicians bargain collectively on wages, it would result into higher level of wages than the competitive equilibrium. (Feldman and Schleffer, 1982).

There are a number of possibilities to cope with the problem of *hardly comparable information,* and therefore *not transparent market*. First, it is possible to mandate teaching hospitals to make their teaching material and education plan accredited before they start a course. This insures that standard basis knowledge is transmitted by all institutions. Alternatively, teaching hospitals can acquire voluntarily a certification, which works as a signal to the residents. There would be hospitals with and without certification on the market, and everyone could choose from the providers by his own preferences (for a more detailed analysis of the different alternatives refer to section 3.4.1: Accreditation).

The last solution (certification) is a market solution, because independent institutions can set up standards and issue certifications. It can function as a signal of quality only if the standards used and the process of acquisition of certification is commonly acknowledged in the market.

Mandatory approval of teaching plans pertain to public regulation. If a commonly used certification does not emerge in the market, or it does not ensure a sufficient safety of medical services for the patients, state intervention may be necessary. State ownership, of course, offers solution. Because of its high social costs of dictatorship, however, other strategies (market discipline, regulation) are preferred as long as they are effective.

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10 However, wages signal the actual situation of the workforce market, which may be not indicative for the future.

Competition among suppliers
If the number of suppliers in the market is low because of entry barriers, it may be worthwhile to lower or cancel these obstacles. Administrative barriers are set generally by the government, and so they are "easily" removable. At the same time, administrative rules often have a positive goal (e.g. guarantee the quality), which justifies their existence. When deciding about keeping or removing the barrier, positive and negative effects have to be pondered. Economic barriers (high investment costs) cannot be weakened; furthermore if the start-up costs of the teaching activity are high, more competitors in the market would not increase social welfare. Good regulation of the incumbents or competition for the market (auction) can be an appropriate solution. Strategic barriers are created by individual providers or by their associations. Public regulation (prohibition of certain behaviour) can be an effective solution to prevent anticompetitive strategies of market agents.

Market power of one or more suppliers cannot be solved by market discipline because this is the expression of the absence of the competition regulatory force. The next strategy, following the enforcement theory, is to rely on private litigations. The aggrieved party in an oligopolistic market is the consumer; in this case the prospective resident. According to the strategy, prospective residents should go to the court and claim lower prices or broader range of assortment. Beyond the fact that these claims are not present in the law as rights of the consumer (so they are not enforceable) the initiative of a private litigation seems to be very unlikely since for one student the time costs and efforts would be too high compared with the individual gains.

A better solution is if the state (or an independent governmental institution) defines general rules of competition (competition law), which take into account the consumers' interest. The market failure of concentrated markets can thus be solved by public regulation.

Fluctuation in number of specialists
Fluctuation in the number of specialists may emerge even in a well-functioning education market (section 1.2.1.5: Cobweb theorem). Cycles in the number of active specialists do not cause market failure in the education market but they have disadvantageous consequences for the society. With social welfare in view, we have to look for solutions to the problem of fluctuation in medical workforce.

Neither market forces nor private litigation can solve the problem of cycles. Central planning of the number of specialists active in the market, or the number of residents studying to become specialist may be necessary.

There are several countries (e.g. Canada and France) that try to keep the balance and to avoid in this manner both problems with the availability of medical services and the negative effects of oversupply of doctors. We will write more in detail about the question of workforce planning in chapter 4: Workforce Supply.

1.2.3 Conclusions

Table 1 summarises the potential market failures of the postgraduate medical education and the effective strategies to cope with these problems. Financial difficulties in the market, lack of competition and fluctuation in the number of specialists likely require public regulation, while information problems may be solved by the market itself.

	Market discipline	Private litigation	Public regulation	State ownership
Financial problems				
Information about quality				
Concentrated markets				
Fluctuation in the number of specialists				

Table 1. Summary of market failures and potential solutions
Coloured cell: the given strategy (in column) is suitable to solve the market failure (in row).

Several of these market failures are not specific to the postgraduate medical education. Fluctuation in the number of workforce supply is always expected when the education takes several years. Information problems are also present in markets of experience and credence goods, and non-perfect competition is neither the peculiarity of medical education. Financial problems are rather a severer difficulty in postgraduate medical education than in other fields of education due to the long training period and the high unit costs. However, expensive training would still not make postgraduate medical education unique.

The co-existence of these problems and other regulations in the healthcare, however, makes the question especially complex. Due to health insurance and therefore the low price sensitivity of patients, supplier induced demand is more relevant in healthcare than in other sectors. Governments may therefore regulate the number of specialists in order to set a limit to

healthcare expenditures. The higher the share of public money spent in the sector (either in education or healthcare delivery), the more the justification for cost control methods.
At the same time, regulations hinder the working of market forces, and so impede effective market solutions in related areas. For example the regulation of doctors' wages prevents to use income information as a signal of shortages/surpluses. In this example the intervention in the workforce market infers the regulation of education market.

2 Financing

There are several actors participating in or affected by the activity of postgraduate medical education. Residents and teaching hospitals are directly involved, since the main process (transmission of knowledge and development of abilities) takes place between them. Patients, insurers and the whole society are indirectly affected due to additional features of education (e.g. generally teaching hospitals are equipped with appliances of latest technology that favours patients, but likely costs more to insurers). Thus, all actors have costs and benefits related to the education, and therefore have an interest in a well-functioning system.

Teaching hospitals fulfil different roles. They train doctors, provide medical services and do medical research. The determination of the specific expenditure related to the postgraduate medical education may be difficult because of the interrelation of all three roles. Another problematic factor is that in the time of postgraduate medical education, the training costs money for the hospital, but residents produce value as well since they work. Even if the quality and efficiency of the work of a resident does not reach that of an experienced doctor, they provide services and therefore cover parts of the training costs (in case of some specialties potentially the total training costs). In the case of the nurses, however, the input during the placement represents a benefit to the service provider offering the placement. (PSSRU, Personal Social Services Research Unit, 2007, p. 113)

The main question of this chapter is how to finance the postgraduate medical education. In order to get a clear view on the problem, we first take a closer look at costs and benefits of all affected actors. In the second section we sketch the economic theory on the financing questions of education, and we mention some concerns that may influence the decision (e.g. appropriateness of business approach in the healthcare sector). Considerations lead to the findings that state subsidy is likely necessary to the postgraduate medical education.
We describe different possibilities of subsidizing in the third section. Potential non-desirable effects of the financing and a criteria system to decide among the alternatives are also discussed in this section.

2.1 Cost and benefits of the specialists' education

In the following sections we will discuss the costs and benefits of postgraduate medical programmes to teaching hospitals, residents, patients and insurers, and the general public.
The discussion is mostly based on the paper of Wynn Guarino, Morse and Cho (2006).

2.1.1 Costs and benefits to teaching hospitals

Several studies (e.g. Linna, Häkkinnen and Linnakko, 1998, Mechanic, Coleman and Dobson, 1998, Sloan and Valvona, 1986) examine the cost difference between teaching and non-teaching hospitals, after correcting for the patients' case-mix, and find significantly higher (approximately 11%) expenditures at hospitals offering postgraduate medical training besides healthcare services. Linna et al. (1998) also found economics of scale for teaching and research activities. University hospitals have lower marginal and average incremental costs of these services than other teaching hospitals. Mechanic et al. (1998) similarly found that there is also cost difference among different types of teaching hospitals according the intensity of the teaching activity.
In the following sections, we discuss what factors contribute to the cost increase of teaching hospitals (compared to general hospitals).

Direct costs
The costs of the teaching hospitals are usually classified as direct and indirect costs. Direct costs are strictly related to the teaching activity and so one can identify them through the accounting system. Resident stipends, teaching physician compensation, administrative costs and overhead pertain to direct costs. These costs are relatively easily quantifiable by aggregation.

Indirect costs
Indirect costs associated with education cannot be identified through the accounting system. Indirect costs are, for example, the opportunity costs of teaching (the same money could have been spent on other, perhaps more profitable, purposes) and unavoidable inefficiencies due to the teaching activity. Time spent on explaining to residents or the costs of additional non-necessary examinations that residents prescribe by lack of experience are ambiguous to identify and quantify.

Often teaching hospitals have newer and more expensive technology than non-teaching hospitals. In many discussions these costs are lumped together with the indirect costs of education.

Benefits
Benefits of the education to the hospital stem from three sources: (1) value of the work of residents, (2) better circumstances for scientific research (better than in a non-teaching hospital), and (3) better reputation and increased attractiveness in the workforce market (e.g. specialists may work more willingly in a teaching hospital, and there is also the possibility to keep the residents after their training).

Productivity during the education period depends on the specific specialisation and on the experience level of the given resident. Residents may successfully fulfil the work of a physician assistant or of an advanced practice nurse; moreover they can substitute attending physicians enabling them to see more patients. A method to determine the benefits stemming from the work of residents, is to calculate how much it would cost to the hospital if those tasks were done by physician assistants, nurses etc. (see e.g. Green and Johnson, 1995).

Net cost
The net cost of the education activity for the teaching institution is the difference of the total costs (direct and indirect costs together) and the benefits. The result might be negative, which would mean that education is a profitable activity of the hospital (without any subsidy).

Some economists argue (Newhouse and Wilensky, 2001) that the direct costs of the training should fully be born by the residents themselves. The stipend of residents is lower than the earnings of a qualified specialist, reflecting the difference in productivity and the need of costly education. According to Newhouse and Wilensky (2001) the hospital will not offer higher salary to a resident than the difference of the value of his work and the costs directly related to his training. Following this reasoning, one might conclude that the net cost of the training from the hospital point of view is only the indirect costs.

However, the reality may be more complex, especially if there is no free market. For example if the salary of the resident is not subject to individual negotiations between resident and hospital, direct costs might be left at the hospital. Furthermore, we face in every case the difficulty of identifying and calculating the indirect costs.

2.1.2 Costs and benefits to residents

Costs
We may distinguish the direct and the opportunity costs of the training. The direct costs are the possible tuition fee paid to the institution and the potential additional expenditures for example for course books. As postgraduate medical education is partially a practical training, the effort invested in the work during that period is also one type of direct costs.

Opportunity cost is the value of the other, not-chosen alternative. Instead of the training, the resident could have started to work as an assistant or become a resident in another speciality or chose another profession. We may count the opportunity cost even broader, and calculate the present value of every future income that it would be realised had the resident chosen another specialty or a whole different line of work. In this way, outside options (e.g. working as medical advisor or being engaged in medical education) also play a role, when calculating the expected future incomes.

Benefits
The gain of the resident from the training is the knowledge itself. The conversion of this knowledge to monetary benefits has two different aspects. The first is that the license obtained with the training enables the doctor to work as a specialist, and the present value of all future earnings can be counted as monetary benefit of the training. The OECD study "Remuneration of General Practitioners and Specialist in 14 OECD Countries" (Fujisawa and Lafortune, 2008) finds evidence that there is a negative relationship between the number of specialist per capita in a country and the remuneration level. This association is the most expressive in The Netherlands where the density of specialists is the lowest, while the remuneration level is the highest among the studied 14 OECD countries. Self-employed specialist earned seven times more than the average wage in The Netherlands in 2004 (Fujisawa and Lafortune, 2008).
The second aspect is the quality of the training. Competent knowledge ensures higher demand for the services of the specialist or better career possibilities, both yielding higher future earnings. The discounted value of these additional monetary gains is also the benefit of the training.

2.1.3 Costs and benefits to patients and insurers
Patients benefit from the high technology infrastructure and innovative environment of teaching hospitals. Since academic hospitals are engaged in significant scientific research, and the high quality level of infrastructure is also important for teaching, these hospitals possess unique (and very expensive) appliances in some specialties. Generally, the quality and

reputation of these institutions attract the best professionals, so that patients can benefit from these very best conditions. However, there might be some drawbacks of teaching hospitals, namely that physicians have to focus on teaching as well. Attending physicians have less time to devote to patients who cannot rely on residents as a substitute for their involvement, and practicing residents might lack the skills of an average physician (Wynn Guarino, Morse and Cho, 2006). This might lead to greater probability of medical errors, however, double checks may also increase the certainty.

The costs and benefits of the insurers depend on the insurance system of the given country. Insurance companies make no additional costs or benefits when contracting with a teaching hospital, but they can take over a part of the hospital's costs by paying higher price for the services (higher than to a non-teaching hospital). The cost allocation between the insurer and hospital has first of all motivational effects. The cost bearing party is usually incited to look for efficiency enhancing methods to lower costs.

2.1.4 Costs and benefits to the general public

The extent of benefits of postgraduate medical education greatly depends on its match with the actual medical workforce necessities of the society. Assuming that the education yields the right number of specialists in an adequate breakdown to specialties, the benefit is that the medical help is available for the population. If prevention is offered and timely diagnosis of diseases is ensured, monetary benefits stem from the fact that people are healthier, can be longer present in the workforce market, and their productivity is higher. Furthermore, welfare increases in the country, which involves the acquisition of several non-monetary benefits.

The costs of postgraduate medical education to the general public depend on the financing system. If the state does not contribute directly to the costs, there are no direct expenses of the specialists' training.

2.2 Who should bear the costs?

2.2.1 Theory of human capital[11]

The theory of human capital examines the effects of education and training on the present and future earnings, and the incentives to invest in human capital both at the employer and the (prospective) employee side. It analyses for example which benefits stem from the training for the

11 This whole section is based on Becker, 1964.

employer and employee and how the wage of an employee consequently changes during the time he is on the training and afterwards. The theory of human capital also considers who optimally bears the costs of the training and how we can compress the costs and benefits in one measure such as the rate of return.

The first and pioneering book on this topic was written by G.S. Becker in 1964. He was the first researcher dealing with knowledge development in the same way as with business investments. In Becker's view, similar rules apply for physical capital investments and accumulation of knowledge, and so the concept of depreciation and rate of return is also applicable in education. The most significant difference is that the obtained knowledge cannot be separated from the person, while physical capital may be sold anytime.

Becker dedicates special attention to on-the-job trainings. He deals with the financial consequences of attending the training, the increased knowledge or improved skills and the calculation of the rate of return. We can use this analysis for the postgraduate medical education since this is mainly learning-by-doing just like on-the-job trainings. In both cases the employees, now residents, produce value for the company (hospital), while there are also direct and indirect costs related to their education. The question, how much should be the salary of residents during the training and who should bear the costs of the education, can be analysed by means of the human capital theory.

General versus specific training

Becker identifies differences between general and specific training based on the distinction that the knowledge obtained on the training is specific to the company or might be used in another job as well. Training increases the employee's productivity by improving skills and/or knowledge. If the improvement is strictly bound to that company, Becker defines it as specific training. For example team building programmes can be categorised as specific training.

In contrast, if training supplies knowledge or skills that are useful for more organisations, Becker classifies it as general training. For example, communication training allows people to communicate more successfully everywhere and not only at the given organisation. It ensures higher productivity, and so probably higher wages, even in case of change of the workplace.

The most on-the-job trainings are neither completely general nor completely specific. We can classify those trainings according to their main

effect. If it mostly increases the productivity in the company rather than anywhere else, it is a specific training. If the productivity rises at least as much in other organisations as in the company providing it, it is a general training. We may also divide these partially specific and partially general training into two components, and look at the whole training as the sum of the specific and general part.

The education of specialists gives mainly general knowledge, so it may be classified as general training. A surgeon can work at any hospital after obtaining the license in one institution. This also means that not only the teaching hospital will benefit from the improved professional knowledge of the resident but other institutions as well (positive externalities).
It might well occur that the resident starts working as a specialist at another hospital.

Level of wage during and after the training
The wage of an employee depends on the value of his performed work[12].
If he can work more effectively *after* the training, and he produces more value for the employer, his wage rises. However, if the training is a general training, the productivity of the employee rises irrespective of the specific employer. The outside option for the employee, i.e. the wage he could get somewhere else, is exactly the value of his (increased) work. The actual company cannot offer lower wage, because the employee would then quit. This leads to the finding that the actual employer has no advantage from the training. The employer has to pay all the surplus of the higher productivity in form of wage to the employee.
If the employer should pay the costs of the general training, it would be a disadvantage for him compared with competitors. Employers who do not offer training to their employees could free-ride, because they would enjoy the benefits of qualified labour force without bearing the costs of education. This would lead to underinvestment in education.

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12 The neoclassical economic theory states that the wage equals to the value of the marginal product. The *neoclassical economics* is "The approach in economics of analysing how individuals and firms should behave to maximize their own objective functions, assuming that activities are coordinated by the price mechanism and that markets clear so that the economy is in equilibrium at all times." (Dictionary of Economics, Second Edition, John Black, Oxford University Press, Oxford, New York, 2002). *Marginal product* is the quantity of product that the last infinite small unit of input (e.g. labour, capital) can produce. We can speak about the marginal product of labour, capital etc. In words of mathematics: the marginal product of labour is the derivative of the production function with respect to labour.

The employee, at the same time, can profit from the training, since he gets higher wages working for any employer. If the value of money and time invested in the training is less than the present value of increased earnings, the employee is ready to pay for his own education. These considerations result in the idea, that in case of *general training* it is not the employer who should bear the costs of the education but the employee. Since we classified the postgraduate medical education as general training, we can say that the resident should bear the costs of the education according to the human capital theory.

The situation is different in case of *specific training*, because the benefits can be collected only at the employer that provided the training. If the employee quits, the potential higher productivity is wasted. There are as many reasons for self-finance of the training as against. The employee bears the risk of getting fired, while the employer bears the risk that the employee quits. If this risk can be lowered, the willingness of both parties to pay for the training is higher.

After finishing the training, the outside option of the employee (i.e. the case when he works for any other employer) is to receive the wage that equals the marginal product *before* the training. The actual employer, thus, may offer this same wage after completion of the training and keep the difference to the increased productivity. This margin ensures the return on the investment in training. However, if the employer offers some higher wage, the likelihood of quitting is less and so the risk of non-return of the investment is also less. In other words, the employer offers a share of the return of the training to bind the trained employee to the company. If the higher wage attracts too many applicants, and the organisation wants to keep the demand and supply for training more in line, it can share also the costs of the training with the employee. As a result, the employer and employee share both the benefits and costs of the education in case of specific training. The most common solution is that employees receive a wage lower than corresponding to their productivity during the training, and a wage little higher after the training.

2.2.2 Possibilities of self-financing

Market solutions

The self-financing system of postgraduate medical education might yield new problems in the market. As mentioned in the section on market failures, it could be difficult for residents to cover all the costs of their training from current incomes. An obvious solution would be to take a loan for the years of studying and pay it back during the years of work as a specialist. Nerlove (1972) describes, referring to Friedman (1962),

why the capital markets work imperfectly in the case of human capital investments resulting in societal too low number of highly qualified people (without any state support). Starting from the supply side, the key point is that there is no physical capital to secure the loan of residents (in contrast to a mortgage, for example, where the value of a house stands against the owed money). The loan is invested in human capital, which is not transferable, i.e. if the debtor fails to pay back the loan, the lender (bank) cannot take the cover away and sell it on the market (as it would be the situation in the case of a mortgage). The loans spent on education are riskier from the bank's point of view, and because of this they charge higher risk premiums than standard loans. From a social perspective, however, the fact that the cover of the loan is not transferable does not decrease the value of the investment (the social discount rate is not affected). If we look at the social optimum of investment in postgraduate medical education, we have to calculate it with the social discount rate. Since this is lower than the rate banks offer, we would get a higher level of investment than the students' calculation yields. There would be underinvestment in medical education in a free market scenario.

We may consider the career choice of students as an investment decision. First, they have to choose among professions; they have to decide if they want to become physician or something else. They make this decision, among others, comparing the rate of return of the alternatives (for a decription of factors that influence residents' career choice, refer section 4.3.1: Factors of demand for and supply of medical workforce). They also face higher risk if they invest in human capital than for example in the case of buying a house. Nerlove (1972) distinguish two types of risks: (1) individual risk, which is the possibility that the resident finally cannot finish the education due to lack of requisite skills, (2) social risk, which is the likeliness that the market conditions change and the obtained qualification has less value than expected. The individual risk of each resident is independent of each other and in this way it is possible to lower it by pooling. Insurance could exist to avoid the individual risk. Social risk, however, is not "poolable", because the chance to find a job is similar for everybody in the given profession. Still, we could assume that residents are more risk averse than other agents in the capital market, and therefore the risk could be shifted. The problem is that insurance (shifting the risk) gives rise to moral hazard in the behaviour of the insured. After finishing the training residents could decide to choose a less profitable job, since they are secured for lower rate of return than one was expected when taking the loan. Nerlove (1972) points out: "The existence of a severe moral hazard and the discrepancy between the information possessed by an individual student and that which could be known to an insurance company are presumably reasons why the market economy has not

provided institutions for shifting the risks involved, but this does not mean that the same moral hazard would exist for society as a whole, or that at least partial insurance would not be desirable from a social point of view." (Nerlove, 1972, p. S188)

Besides thinking of an insurance to deal with the risks of investing in human capital, we can also think of an equity-like instrument. Friedman (1955, reprinted 1962) mentioned first this idea in 1955; human capital contract is still just an exceptionally used instrument[13]. The scheme of contracts can be compared, as Palacios (2002) describes, to the situation when a company sells equities, which entitle the shareholder to a share from the company's future profit. In the case of education, human capital contracts can assure financial resources to students in return for a certain percentage of their future income during a given period of time. For example, a human capital fund offers $10,000 to a student, if he agrees to pay the 4% of his income to the fund in the first 10 years after completing his studies. If this given student manages to obtain a well-paid job, the money he pays back to the fund may be more than $10,000. However, if his expectations are not met, and he has a low salary, the repayments may not reach the $10,000. The fund literally invested in improving the human capital of the student, and it shares its success or its failure (example from Palacios, 2002, p.4).
From the students' perspective human capital contracts have an advantage compared with fixed loan payments, namely that the monthly terms are adjusted to the actual income. In this way the payments do not entail too high burden on the student even in low-income periods. From the funds perspective, the scheme lowers the probability of default, and it makes even possible to profit from some contracts. Palacios (2002) argues that the scheme also increases the efficiency of the education market. The fund will price the contracts according to the expectations of the student's future income in the repayment period, and so this price signals the economic value of that diploma. The funds evaluate all contracts individually in order to avoid adverse selection, and use all information available (e.g. field of studies, reputation of the teaching institution, grades of the student, etc). Human capital funds will rate not only the amount of required money (tuition fee), but also the income expectations, that is they weigh the cost against quality. This also means that a university where the tuition fees are high, but after completion the expected income is also high, will not be less attractive for the students (signing a contract with a human capital fund) than a cheap university that offers lower quality. However, when two

13 There was only one human capital fund (MyRichUncle) in the USA in 2002 (Palacios, 2002, p.8).

universities are of the same quality, students have the incentive to choose the cheaper one.
A disadvantage of human capital contracts is that they cannot deal with externalities. When calculating the price of the contract, only the private economic benefits of the student are taken into account, and the potential social benefits are disregarded. If there are significant externalities, the scheme of human capital contracts does not offer sufficient solution to the financing problems of education. Another, ethical concern about the scheme is that it may offer less advantageous contracts to certain groups (e.g. women and racial minorities) because their income expectations are lower than average. However, the scheme is not the cause of the inequity in the society, but it reproduces it.
Finally, Palacios (2002) claims that certain conditions have to be fulfilled in order to insure the well-functioning (or even the existence) of the scheme: (1) contracts have to be enforceable by law, (2) bankruptcy law has to offer the same protection than traditional student loan lenders enjoy, (3) contracts should be acknowledged as securities so that investment funds are allowed to hold them, (4) taxation of the contracts should be similar to the treatment given other student financing (Palacios, 2002, pp.8-9).

Non-economic arguments against self-financing
Gbadebo and Reinhardt (2001) discuss how the arguments for self-financing in postgraduate medical education match with the real situation in the USA. They show the difference in the way of thinking between economists and academic medicine/doctors. The authors argue that the strict economic approach lacks some social aspects of the practice of medicine and therefore a reform in the financing way based on those principles might have unintended consequences.

First, self-financing of the training would lead to a debt for the residents. Residents would be forced to keep an eye on financial matters, perhaps they would more frequently engage in for-profit activities, and this might spoil the "ethos" of altruism of physicians. They argue that even the actual partial financing places this traditional ethos in peril. Gbadebo and Reinhardt do not continue this thought stream, but the consequence could be a decrease in the social appreciation of the profession, which might negatively affect the number of applicants to medical universities (the profession becomes less attractive). This remark of commercialisation of medicine and its consequences apply in every country.

Second, teaching (public) hospitals in the USA also provide charity care (for uninsured) assuring a safety net. Since hospitals do not receive separate budgets or subsidies for this social role, they finance it by cross-subsidisation. According to Gbadebo and Reinhardt, "leaders of academic

medicine are convinced that their GME [Graduate Medical Education] programs have been expended not to procure cheap labour for revenue-yielding patient care, but primary to support non-revenue-yielding charity-care" (Gbadebo and Reinhardt, 2001, p149). This citation reflects the difference in the way of thinking between economists and doctors, and the importance of having a comprehensive view on the financing of hospitals when designing a new system. Even if the reform of financing of postgraduate medical education is budget neutral (hospitals could spend the same amount on education as before), there might be non-intended negative effects in the charity care and so related to the safety net of the society.

This second argument cannot be applied in a straightforward way to those countries where health insurance is mandatory and therefore the problem of uninsured is less significant. However, similar situations could occur if hospitals provide different services and the financing has to be changed from general budgets to a more targeted system. The problem is usually how to separate the costs and how to find coverage for all the different parts.

2.3 Subsidising possibilities and their "side effects"

Wynn, Guarino, Morse and Cho (2006, p.28) summarise the requirements for the medical education financing system as follows: "An ideally structured system of GME financing would link responsibility for financial support to those who benefit from the activities in equitable proportions, ensure that funding is adequate to support the quality of training that benefits current and future patients and the general public, and does so with maximum efficiency and accountability in an administratively feasible manner."

Here we describe some financing possibilities on how subsidy can be given to residents (demand side) or to teaching hospitals (supply side). We also analyse the effects on the quantity and quality of offered training. The public subsidies allow for intervention in the volume and structure of medical specialist workforce by weaker or stronger tools. Possible alternatives are (1) no intervention in the supply side of the market, but increasing the demand for education, (2) influencing the supply side by financial incentives, and (3) determine explicitly the volume and structure of medical specialists.

Demand side interventions have the advantage of not influencing the behaviour of suppliers. If there are no (or just minor) market failures

besides the financing question, it is better not to distort the supply side with subsidies. Any financial allowance to teaching hospitals would bring a number of incentives. For example, the financing system influences the efficiency of the organisation, the number of residents and the quality of education at the same time. The complex effects make it difficult to design the proper incentive system, which results exactly in the desirable number of residents. However, if there are other purposes than subsidising the education (for example promote quality or efficiency), financial incentives may be a good solution.

The explicit determination of the number of residents is free of additional incentives, but raises the question of who may decide on the numbers. This decision making procedure might be just as much complex and confusing as the financial incentives. As the enforcement theory also accentuates, every country has to choose the measure that the best fits to its economic, legal, cultural and social context.

Increasing the demand

There are several ways to make the medical profession more attractive, thereby increasing the demand for education. The final effect of these measures is the increase of the rate of return of the medical profession, which positively influences the students' career choice. We can principally distinguish between ways that raise the (future) earnings of residents and ways that lower the costs of the education.

The expected future earnings of specialists rise if the (future) demand for medical services increases. The government may take measures to incite the demand for medical services, for example by offering tax reductions on healthcare expenditures or giving direct subsidies to the needy. This method may be advantageous in countries where the health insurance coverage is not complete. By giving subsidies to the indigent, the general health status of the population improves. The better health status has several monetary and non-monetary advantages for the country (e.g. less sick-leaves, longer working period, higher productivity, higher living standard and more satisfied people) and furthermore the higher demand for medical services favours the postgraduate medical education market as well. However, in a country where the insurance coverage is complete, and the necessary medical attendance is available for everybody, further extension of demand for healthcare would result in possibly superfluous expenditures.

The costs of education of residents may be reduced by offering them, for example, discounted interests on the study loans. In this case, the lender (bank) receives public subsidies in order to offer favourable interest rates

to residents; therefore the support of residents is indirect. If the loan is offered by the state, it is possible to use income-contingent repayments. The idea is that the monthly instalment is a percentage of the current salary. In case of unfavourable career possibilities and therefore low wages, the loan taker may never pay back the whole amount borrowed. In this way, the loan also serves as an insurance against the unforeseeable changes in the labour force market (see section 2.2.2: Possibilities of self-financing). Both low interest rates and the shifting of risk likely increase the number of applicants to medical career (Barr, 2004).
The direct way to give subsidies would be to provide scholarships. This last measure allows for intervening in the total number of residents without distorting the competition among suppliers. If the government or other central organisation offers a certain number of scholarships directly to the residents, it does not influence the competition of the teaching hospitals since students are free to choose among them. It also does not mean the explicit determination of the total number of specialists in training. Residents without scholarship can be allowed to follow the specialists' education on their own costs.

Financial incentives on the supply side
Subsidies to promote postgraduate medical education given to teaching hospitals influence not only the number of residents, but also the behaviour of the suppliers. Here we discuss four common financing practices (cost plus financing, budgeting, capitation fee, higher prices reflecting the cost of education) and their likely effects on the number of residents, the cost efficiency of the education, and the quality of the education.

Cost plus financing
In the case of cost plus financing, the organisation receives the subsidy after it has borne its production costs. Whatever the education activity costs can theoretically be reimbursed to the institution. Therefore, this is a neutral financing formula, it does not incite to enrol more residents, but neither it motivates cost efficiency or good quality of education.

The practical problem with the cost plus financing formula is the difficulty to distinguish the costs of training and the general costs of patient care. Furthermore, the residents also produce value for the hospital (they work together with the specialist), which should be subtracted from the amount of subsidy. The jointly production of patient care, education and research makes it almost impossible to determine the exact costs of each. Given this problem, the cost plus financing might not be incentive neutral in the practice, because through accounting tricks extra benefits might be available.

Budgeting
Budgeting is in many aspects just the opposite of cost plus financing. The subsidy given to the teaching hospital does not depend on the actual costs, but it is determined beforehand. It is usually based on historical costs, but does not change with the number of residents or the quality of provided education. Without any controlling measures, budgeting incites to spare money on reducing (not developing) quality, and to enrol only a few residents. Theoretically it stimulates cost-efficiency, because hospitals can keep the difference between the budget and their actual costs. Practically, however, we would expect that organisations first reduce the costs by giving up those quality standards that are not easily observable, rather than make an effort to achieve better efficiency results.

Because of the adverse motivations of budgeting, this financing system usually goes hand in hand with additional regulations. For example, quality standards (see section 3.4.1: Accreditation) may be set or the number of residents (see section 4.3: Planning the number of professionals) determined so that the organisation can save money first of all by improving its efficiency. The difficulty of this solution is to find the right indicators of quality. For example, the outcome (knowledge and abilities of the resident) depends not only on the quality of the education but also on the efforts made by the resident himself. If the several influential factors cannot be distinguished, the quality indicator and the incentives based on it may not be effective.

Capitation
In this case the institutions receive the subsidy per resident. The amount of the capitation fee is determined in advance, but the number of residents is not influenced centrally (i.e. the government). Capitation induces to enrol the highest number of residents possible since each resident means extra financing. Teaching hospitals are also motivated to work efficiently because of the same reasons as in the case of budgeting. The incentives work in this way, if capitation fee is correctly set, i.e. it covers the costs of the education.

Concerns over quality may be less, if we consider that teaching hospitals want to attract residents because it brings extra subsidies. They cannot afford to provide low quality education because it would corrode their reputation. In the competition for residents, quality can be an important factor. Here we assume that capitation introduces competition among teaching hospitals.

Higher prices
The previous methods all require an estimation of the costs of education separately from the general costs of the hospital. However, we may consider education as a factor that increases the cost of the hospital (compared with the costs of a non-teaching hospital). For example teaching physicians have to explain their decisions to the residents, they have to supervise their work, and residents may order more lab checks due to their inexperience. Considering that these cost increasing factors are unavoidable during the education, and so they are useful (it is due to a socially desirable activity), the higher costs of the hospital could be reflected in higher prices for its services. In an environment of price competition, higher prices have to be guaranteed by regulation, because otherwise insurers/consumers might not accept the teaching activity as costs increasing factor[14].

The incentives of higher prices are ambiguous to the number of residents, advantageous to the efficiency of all activities and neutral to the quality. The institution is incited to increase the number of residents, if the higher prices more than cover the opportunity costs of teaching, and may decrease the resident places in the opposite case. Efficiency is induced because teaching hospitals are interested in lowering their costs (their cost increase is less than the difference between prices for general hospitals and prices for teaching hospitals). The level of quality is not directly related to this financing system, but mainly determined by other factors.

Determining the number and mix of medical specialists
The measures above can solve the market failures of financing of education. The state offers subsidies to the residents or to the institutions, guaranteeing an effective demand for postgraduate medical education. The number of residents is not explicitly determined by the state, but at the most it is influenced by financial incentives. The cobweb theorem, fluctuations in the medical workforce supply, may be relevant here because of the large lag between the decision moment about one's career and the real enter into the workforce market. The state may try to avoid it by planning and explicitly determining the number of residents (see section 4.3: Planning the number of professionals).

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14 In price competition, cross-subsidising would be a solution. Hospitals can obtain higher prices for their monopoly services, and spend that extra revenue on education and research. According to Anderson and Lave (1987), however, that margin would not be sufficient to cover the total costs. Another, possible solution could be that hospitals differentiate their products, i.e. patients would not consider that treatment in a teaching hospital equals to the treatment in a non teaching hospital.

Once the desirable number of residents is known, we still face the problem of allocation of residency positions among teaching hospitals.[15] There are several different ways to organise the allocation and financing (see e.g. Young and Coffman, 1998). The decision may be left to the association of specialists, which is the central actor of self-regulation of the profession (in this case the association would act as a multi plant monopolist). The allocation also may be determined centrally based on market-like measures (e.g. benchmarking, auctions), or on transparent criteria.

2.4 Conclusion

The main questions of this chapter were twofold: (1) who should bear the costs of the postgraduate medical education, and (2) if subsidy is desirable, in which form is the best to offer it. We have seen that the education of specialists entails costs for the teaching hospitals, which could results in significant drawback in case of competition, if they are not reimbursed. In contrary, if residents are charged the entire costs of their training, it likely yields from a societal perspective too low application rates. The high initial investments in time and financial resources may impede a number of students to opt for medical career even with opportunity of top salaries later. Another element increasing the gap between the optimal and effective number of residents is the risk of failure in both completing the studies and meeting the expectations when looking for a job. Capital and insurance markets fail to completely solve these problems, and therefore governmental intervention is desirable in the financing of postgraduate medical education.

The most market conform solution is to offer subsidised loans to residents or to promote the formation of human capital funds. Taking away the obstacles from effective demand, market forces can remain the main coordinating mechanism in the market of postgraduate medical education. When providing the subsidy to teaching hospitals, every form of reimbursement gives additional incentives to the institutions. Regulation of tuition fees and central planning are complex tasks if many specialties and the activity of different teaching hospitals have to be coordinated. The success of regulation greatly depends on the consistency of the whole system, and therefore it assumes scrutiny of the given financial, social and cultural situation in the country.

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15 Since the state does not define the number of residents in case of the previous measures, we have not mentioned this problem yet.

3 Assuring Quality of the Education

Quality is defined as doing the right thing, at the right time, in the right way, for the right person, and having the best possible results (IOM, 2001). This definition implies that a teaching hospital has 'a responsibility to the public that its residents are competent and that the education they receive helps minimize errors in patient care' (Shumway, p. 397, 2004). In Figure 4 this definition has been translated into a model.

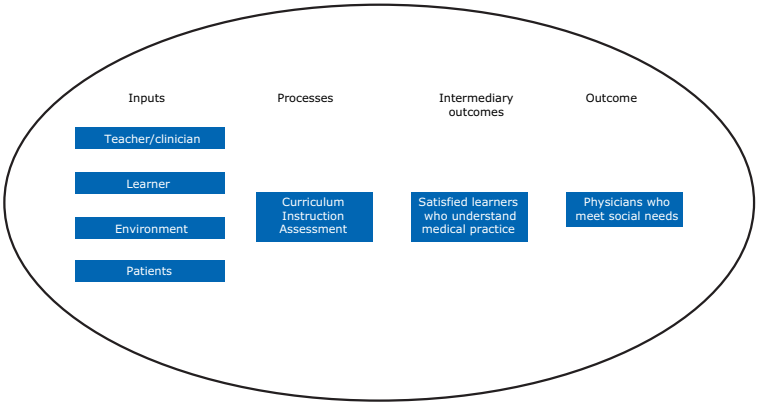

Figure 4. A model for medical education quality
Source: Shipengrover and James, 1999[16]

In the model we see that the part of the educational processes is a so-called black box that is difficult to measure. There are, however, a few aspects that can help the measuring and assuring of quality, such as transparency of the education itself. With high transparency it is easier to see who (teacher as well as student) achieves the better results and makes fewer mistakes.

When there is perfect competition within the educational system, the level of quality will be high without intervention of the government in the form

16 In total quality management (TQM) the key words that are often used are structure, process and outcome. When using an educational terminology the matching keywords are resources/curriculum, teaching/learning and competence/performance (Eitel, Steiner and Tesche, 1998)

of regulation. This is true because in a market of perfect competition the institution with the highest quality or best offer considering education has the first pick of residents. This is because residents know that the better they are educated the better chance they have of succeeding in their medical careers. The teaching hospital can thus choose the most promising residents who will increase the quality of their products (medical care). The incentive for providing good quality of education can also be found in the following rationale; when the quality of medical specialist education has measurable outcomes (e.g. the success of the specialists) clear incentives are present to provide an education of good quality because the most talented residents will try to get in at the hospitals with the best quality, which leaves the less talented residents at teaching hospitals of lower quality. Hospitals have an incentive to provide good quality of education, because this increases the value of the residents, who are employees of the hospital for the coming three to five years.

High quality education leads to high quality residents, which leads to higher quality of care. This in turn will result into more patients and therefore higher profits. In a market of perfect competition the high quality of education is also guaranteed because hospitals are eager to show their patients that their care is better than the one of the other competitors. Obviously, one way to reach this is to ensure that residents are highly qualified.
The educational system however is not one of perfect competition as can be seen in section 1.2.1.2: Potential market failures in postgraduate medical education. Regulation of quality is therefore a necessity. In this chapter we look at the possibilities and theories of regulation of quality within the educational system.

To find out whether regulations reach the expected effect, namely, sustaining and/or improving the quality of (the education of) medical specialists, various theories on regulation of quality will be addressed. Enforced self-regulation will be discussed, followed by the use of incentives. This chapter ends with regulations that are enforceable by law. We begin with an explanation on how quality of education can be measured.

3.1 Measuring quality of education

Transparency of the education is important for distinguishing good quality from bad quality. In chapter 2 we concluded that one of the issues of the medical specialist market is to have clear information on the quality of education. For this to work not only the curriculum of the education has to be transparent but also the instructional effectiveness. What we thus really

want to measure is how effective the teaching physician is in transferring his instruction to the residents, which then results in a desired outcome. Three factors that enforce this effectiveness are enthusiasm of the teacher, good organisation skills and skills in interacting with the students and patients. The instructional moment contains the relationship between teacher and learner as well as the patient and the setting. A good teacher, therefore, has to be able to structure the surgery schedule in such a way that the residents will face clinical situations that are within their capacity to understand. The teacher has to make sure that there are ample learning opportunities and that the patients are comfortable with the idea that a resident is examining and treating them (Shipengrover and James, 1999).

The teaching physician is in control of the education. One way to measure the quality of education is by determining indicators that will show how much the education is appreciated by the students; in other words, the student satisfaction. According to Shipengrover and James (1999) students found that the important parts of the learning process were the learning opportunities given by patients and the quality of the surrounding resources such as the nursing staff, reference materials and the level of participation in patient care.
A possible method to measure quality in education containing these aspects is the Medical Instructional Quality questionnaire[17] (MedIQ) (Shipengrover and James, 1999). This instrument was constructed after finding the strategies used by award-winning General Practice teachers, clarifying the environmental clues that present barriers to instruction, and through listening to students to find out what they find important activities that are under the teachers' control. The MedIQ questionnaire contains 25 items which are used to measure four themes of the education; the role of the teaching physician in facilitating the learning process; the role of the site (hospital) as an effective environment for learning; the availability of opportunities to learn; and an active involvement by the resident (James and Osborne, 1999). A positive outcome on these four aspects would then indicate an education of good quality. This can be then compared with other teaching hospitals (but with the same specialty as different specialties need different circumstances) to see improvements and the relative quality of the education of teaching hospitals.

As was said above and as confirmed in various studies (Roff, 2005; Mulrooney 2005, Hoff, 2004) a supportive, learning-oriented environment is of great significance in the training and education of potential competent

17 This instrument was originally made for on the instructional effectiveness of General Practitioners education.

physicians. Roff (2005) refers to the Postgraduate Hospital Educational Environment Measure (PHEEM) to measure the environment of the teaching hospital. The method of PHEEM is often used for various specialties in various countries (e.g. England, the Netherlands) and measures the environment of education. Mulrooney (2005) used questionnaires filled in by the residents to measure the environment. The issues that were discussed considered (i) items relating to the practice job; (ii) items relating to the trainer; (iii) items relating to teaching and learning; and (iv) items relating to the interaction with other health professionals.
The questionnaires contained agree/disagree questions.

Another instrument to measure the quality of the education climate is the Learning Climate Questionaire (LCQ) from Bartram, Foster, Lindley, Brown and Nixon (1993) as described in Mikkelsen, Saksvik, Eriksen and Ursin (1999), This instrument measures autonomy and responsibility which refers to "perceptions of control over how one organizes one's work, opportunities for making decisions and initiating action, encouragement to take responsibility for learning, and freedom to experiment and take risks" (Mikkelsen et al., p.23, 1999), and opportunities to develop, which refers to "perceptions of the workplace as providing opportunities to learn new jobs, to vary type of job, and to have room for creativity and learning beyond the present work task. It also includes awareness of what learning materials and options exist and the possibility for participating in discussion of plans and policies for change".(Mikkelsen et al, p.23, 1999).

It seems that measuring quality of education is best done via questionnaires filled in by the residents and that the content of the questionnaire is about the environment of the education and especially the learning opportunities it presents.
This means that when making the quality of the education more transparent the outcomes of these questionnaires has to become known to the public and especially to the future residents. When a government needs to regulate the degree of quality it has to implement measures that improve the abovementioned themes that make up the learning environment, which comes down to the role of the teacher, the role of the resident, the role of the hospital and the role of the patient (in random order).

Now that we have an idea what quality is and how you can measure it, we have to explore whether regulation can have the right effect on the sustaining and guaranteeing of a certain level of quality.

3.2 Enforced self-regulation

Regulation is defined by Brennan and Berwick (1996, p. 4) as: 'any set of influences or rules exterior to the practice or administration of medical care that imposes rules of behaviour'. They believe that regulation can be a very effective tool to enhance quality in any situation. Their line of reasoning can therefore be applied to quality of postgraduate medical education.

The enforced self-regulation model is about negotiation occurring between the state and an individual organisation to establish regulations that are specific to each organisation. Each organisation in an industry is required to propose its own regulatory standards if it is to avoid harsher and less tailored standards imposed by the state. The self-regulation is enforced in two ways: the organisation is required by the state to do the self-regulation; and the privately written rules can be publicly enforced. Ayres and Braithwaite (1992) follow the Coasian theory, which says that when internal production is cheaper than external market transaction, teaching hospitals will be organised to do the production themselves. This reasoning could be used for public goods (regulatory duties) as well. When external contracting (letting the teaching facilities do it) of these goods/duties is cheaper then internal public production (through the government) it should be outsourced. Of course not all regulatory functions can be subcontracted to every industry. There is a dependence of the internal structure and the historic performance.

Self-regulation (without being enforced) has several advantages. It can expand the coverage of the inspected activities (e.g. more specialties within the hospital), achieve greater inspectorial depth (e.g. hospitals have greater knowledge about innovative procedures), and better trained inspectors will perform the monitoring. These inspectors can be more effective and raise less suspicion than the government inspectors who are forced to be generalists (no firm-specific knowledge). Another advantage is that with internal inspection/regulation employees are less reluctant to answer questions and be of assistance. This is due to the fact that the inspectors work for the same organisation as the employees they inspect and want the same goals for the company/industry. They are not seen as outsiders as the governments' inspectors are.

Furthermore, when performing self-regulation there is more leeway to monitor, less restrictions and there will be less panic when the investigation starts. A disadvantage is that results and recommendations that are beneficial for the long term but hurt the short term performance can be easily ignored. This is where *enforced* self-regulation can help. When using the model sketched by Ayres and Braithwaite (1992) the disadvantages of

self-regulation and detailed governmental regulations are dealt with while the advantages of both are kept. When using enforced self-regulation, each organisation is obliged to write a set of rules tailored to the unique set of contingencies facing that firm. These self-made rules will be then either approved or send back for revision if they were insufficiently stringent. This is handled by a regulatory agency. The appointment in the USA of a Residency Program Coordinator (RPC) (Norwood, 2006) can be seen as an enforced self-regulation. Ensuring a certain standard of the residency program to keep the educational environment of a certain quality is the obligatory part and the hiring of a RPC would than be the realisation of it. The idea of an RPC is that he or she helps to ensure that the program is in line with the requirements of the accreditation boards, that the residents fulfil the requirements of the education and that the proper forms are processed accurately.
The enforcement of these rules and the accompanying costs will have to be internalised by the organisation and will be required to establish its own independent inspectorial (or compliance) group. Inspectors from the government are still necessary. It will be their duty to warrant the independence of the inspectorial group of the company and to audit its competence. The director of the inspectorial group will be held criminally liable for not reporting any management overruling of advice given by the independent inspectorial group to the relevant regulatory agency. Violation of the privately set standards will be punishable by law. This kind of regulation is, however, not feasible for organisations that are too small to afford their own inspectorial group (Ayres and Braithwaite, 1992). Teaching hospitals are, however, usually large enough to facilitate a so-called compliance group. An important boundary condition is that the compliance group does not consist of doctors who actually teach because then the prevailing conflict of interest will result in a lesser amount of independency.

3.2.1 Five approaches from enforced self-regulation

As enforced self-regulation is in demand Brennan and Berwick (1996) argue that there are at least five different approaches to improve quality via enforced self-regulation. The approaches are self-regulated in the sense that it is not the government that puts in place the regulation but joint-trade organisations. They are enforced because anyone who does not comply with the regulations is liable for prosecution or banishment from the profession.

The first is via *repair*. This means that the teaching hospital has to identify quality deficiencies and has to take quick and sufficient actions to correct these deficiencies. This can be done with the aid of guarantees offered to the patients. This system is sometimes used in the relation between insurers and care providers. For this to work quality indicators

are necessary. One can think of report cards, publicizing mortality rates or even malpractice lawsuits. The government could then enforce the publication of this kind of information. This is discussed in more detail in the section on Market Based Instruments. Another method would be the supply of continuing medical education[18] for the teaching physician to refrain him from making quality deficiencies.

A second approach is that of *culling*. This approach entails the removal of defects from a system. The organisations or people that do not possess the right quality or act in an incorrect manner are culled from the profession. In countries as the USA, the Netherlands, and Germany this is done via occupational licensing and accreditation of teaching hospitals. A softer variation of culling is the use of certificates. With certificates, hospitals can signal that they offer a certain quality of education by showing that their teaching physicians have the right certificates. It is, however, not yet proven that this method indeed increases the total level of quality (see section 3.3.2: Market-based instruments).

Another approach to achieve (higher) quality is to encourage *copying*. Hospitals should share their successful methods with others without reducing their profits and continuity. One way to accomplish this is by treating 'improvement information' (Brennan & Berwick, 1996, p. 364) as a public good. One can think of sharing a certain teaching method with other hospitals instead of using it to get a comparative advantage (encouraging *best practices)*.

The fourth approach is *creativity*. The belief is that quality improvement emerges through creativity. The teaching hospitals could then experiment with different teaching methods and have the freedom to do this. Through experimenting better teaching methods can appear/be arranged. Also, creativity of teaching physicians can create greater quality because more learning opportunities can be discovered when a teacher is creative (Lippell, 2002) and inspires his students to be creative as well.

The last of the five approaches is *continuous quality improvement*. This approach can be implemented with the help of a 'plan-do-check-act' (PDCA) cycle[19] as is drawn in Figure 5.

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18 Continuing medical education helps physicians to maintain competences and to learn about new and developing areas of the medical field.

19 The PDAC-cycle is also known as the Demingcycle, named after the promoter of the cycle; W. Edwards Deming.

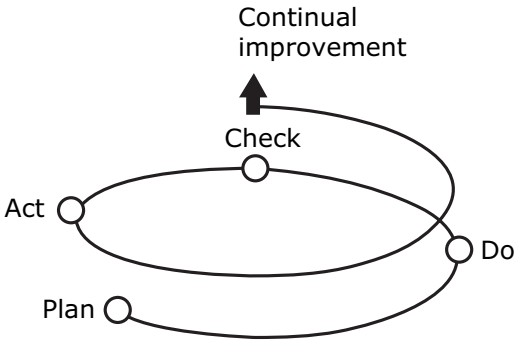

Figure 5. The PDCA-cycle
Source: de Wolff, 2004

This cycle was first invented by Walter Shewart (1930) and has to be seen as a vicious cycle to achieve continual improvement. The four phases of the cycle contain seven steps to follow.
The planning phase contains the first three steps. First the problem has to be defined. An example in the postgraduate medical education could be the mistakes that residents make during their education. Step 2 and 3 contain a sketch of the current situation and a cause and effect-analysis (why do they make which mistakes? Is it lack of knowledge, sleep deprivation, or bad instructional effectiveness?). To prevent the company from challenging symptoms of the problem instead of the problem itself, it is important not to go from problem definition to solutions right away.
In the Do-phase the possible solutions can be given and tested (step 4). An example would be then to reduce the amount of hours on call. After the testing period an action plan for the best solution may be drafted.
In the Check-phase the results of the Do-phase have to be evaluated (step 5) to see whether it was indeed the right solution and the problem was resolved or reduced.
In the Act-phase the solution can be standardised (step 6) and evaluated (step 7). On the basis of this evaluation other solutions have to be given attention to find out whether these would work as well or even better (Ter Hurne, 2005). When this last step of the last phase has been completed, the whole cycle can be repeated. This will be needed due to the discovery of another problem or to the need for an improvement of a former solution. This leads to continual improvement.

For regulation to be really effective it is necessary to use a combination of these 5 approaches. Often just culling is used, which leads to little development and therefore frustrates continuous quality improvement.

3.2.2 Strengths of enforced self-regulation

The model of enforced self-regulation has several strong points and of course some weaknesses as well. The strengths of the model are the following (Aires and Braithwaite, 1992):

1. Teaching hospitals can differ from one another in structure, culture and other organisational aspects. Having rules based on the situation of the specific hospital in lieu of a general hospital makes sure that physicians and students do not have to rearrange their methods of operating to be able to follow the rules. This can improve efficiency
2. Rules can adjust more quickly to changing business environments. Due to the possibility to change rules frequently there exists the possibility for regulatory innovation. Teaching hospitals can experiment more with rules and have more managerial knowledge to generate improvement in the quality of healthcare and education.
3. Large hospitals could write rules that cover a larger proportion of the most serious harms or wrongs that could occur than governments do. A reason for this can be that the teaching hospitals have more insider knowledge about the hazards.
4. Teaching hospitals would be more committed to rules they wrote themselves and acknowledges a greater responsibility.
5. There will be less confusion resulting from having two rulebooks, that of the government and that of the teaching hospital.
6. Hospitals would bear more of the costs of its own regulation, which improves economic efficiency.
7. When the hospitals write their own rules, which are monitored by their own people, physicians that do not teach according to these rules are more easily caught (the offender is more easily recognised than in the situation where the government installs universalistic rules). The disciplining of these offenders will occur in a larger proportion of cases than under traditional government regulation, because the system of enforced self-regulation would reward teaching hospitals that show a certain toughness with offenders.
8. It would be easier for prosecutors to obtain convictions. This is due to precise and particular rules that take away the unpredictability of the formulation that is often used as a defence with universal rules.
9. The last advantage is that compliance would become the path of least resistance within the teaching hospital.

3.2.3 Weaknesses of enforced self-regulation

There are (possible) weaknesses of enforced self-regulation:

1. Regulatory agencies would bear costs of approving a vastly increased number of rules each year. Compared to the costs of making universalistic rules the above mentioned costs are higher.
2. State monitoring would sometimes be more efficient than private monitoring. This is true when we think of the spreading of ideas on the most effective and efficient methods of teaching medical specialists under certain rules. When the state is the monitor, it can share the effective methods with other teaching hospitals so to enhance the social revenue;
3. Due to the fact that the particularistic rules have to be approved by a regulatory agent there is bound to be some delay and a lot of paperwork that would otherwise be less. The costs resulting from this can however be balanced with the increased efficiency of teaching that comes with following hospital specific rules (see the strengths listed above);
4. The legal feasibility of the model could cause problems. Western jurisprudence might not be able to accommodate privately written rules being accorded the status of publicly enforceable laws;
5. Moral hazard could occur. Teaching hospitals could sneak provisions into their rules of which the regulatory agency does not understand the full consequences. Hospitals could also evade liability by 'forgetting' to write certain required rules. This kind of moral hazard, a hospitals resourcefulness at law evasion, is however a possibility in any model;
6. Teaching hospitals cannot command compliance as effectively as government. According to Shelling (1974, as cited in Aires and Braithwaite, 1992) compliance works best when management can say that the government insists on it. But since this is about *enforced* self-regulation this is still the case.
7. The independency of the compliance group could never be fully guaranteed. The group could have a sense of loyalty to the hospital and commit itself to attaining the productivity goals. Therefore the members of the group have to be chosen based on certain characteristics. Another possibility is that management decides that the recommendations of the group are not in the best interest of the organisation. The group is than pressured to do something that defies the regulations. This weakness can be reduced by making the hierarchy in such a way that the group answers to the chief-director or a board audit committee.
8. Particularistic rules hurt the comparability of teaching hospitals. All the teaching hospitals teach in a way that complies to their own rules. This can lead to various teaching methods throughout

the world. It is more difficult for students, teachers and patients to see which hospital offers the best quality.

When putting all the strengths and weaknesses together most of the possible weaknesses can be handled in such a way that they are sufficiently reduced. Other weaknesses are dissolved by the strengths. This analysis indicates that enforced self-regulation can have the desired outcome of a higher quality in organisations and in the education of medical specialists.

3.3 Incentives

Giving incentives to teaching hospitals is often seen as a solution to guarantee a high quality of the education. In this part of the paper financial and market-based incentives are considered.

An incentive is defined in the following manner: "a financial compensation, public recognition or other benefits used to reward higher levels of performance and/or new ideas or contributions"[20]. This paragraph will start with the possibilities and downsides of several financial incentives. The second part is dedicated on incentives that work via public recognition also known as Market-Based Instruments (MBI).

3.3.1 Financial incentives

Whenever there is a case of asymmetric information the threat of a principal-agent situation is present (see section 1.1.2: Contract theory). In the case of medical specialists' education there is asymmetric information in several relations. Especially in the relation between the teaching physician and the hospital board/government there is a high threat of a principal-agent problem. The board/government cannot observe the effort the teaching physician is putting into his teaching activity. Therefore they are unable to see how good the quality of education is. The teaching method adopted might not result in the targeted level of quality by the hospital board/government which wants a combination of efficiency and quality. To align the goals of teachers and board/government, financial incentives can be used.

Pay-for-performance

There is the possibility to offer a financial reward for certain results, which is known as a pay-for-performance system. There has to be set minima and maxima to frame the results in order for everyone to know when the

20 See www.bridgefieldgroup.com/bridgefieldgroup/glos4.htm.

result is good enough to deserve the reward or when the result is so bad it deserves a penalty.

For a factory this could be seen as piece-work payment, for a salesman a reward when a certain quantum is reached, or in a teaching hospital the amount of patients a resident can treat. The downside of this typology of incentives is that too much attention is often paid to quantity and not to quality, or on short term gains instead of long term gains (Baker, Jensen and Murphy, 1988). There is a problem of misallocation of resources (Casalino, 1999).

The incentive must consist of several criteria; most simply quantity and quality. Quality however is not as easy to define. In fact it is for every product different (Baker et al., 1988). Quality indicators are therefore a necessity. But when just one aspect of the quality is measured, there is a risk that all attention goes to that part and other parts are neglected (misallocation of resources); total quality is not necessarily high then. Quality indicators need to be set up in a way that when trying to get the reward, total quality rises (Dudley, Miller, Korenbrot and Luft, 1998).

Another problem is that the measured quality may not fully reflect the efforts of the agent. The performance of the medical specialist in training is also influenced, for example, by his or her abilities or the quality of the previous education. Rewarding the teaching physician for the good performance of the resident does thus not always result in rewarding the real efforts. A possibility to avoid this problem is to observe the effort directly. The best way to make sure care and attention is given to the production (teaching medical specialists in training) is to monitor the teaching physicians 24/7. This is very time-consuming and degrading for the physicians. Distrust and unhappy employees are the consequences. A possible solution to this problem is the use of random samples. In the case of postgraduate medical education this can be seen as a (surprise) visit of an examiner that looks and evaluates an operation. These visits will have to take place in various stages of the training/education to have a good overall view of the education. The financial incentive can be in the form of a bonus for the teaching doctor when the average of the samples or the relative progress is of a certain value.

Critiques on the use of pay-for performance consist of the belief that it lowers the intrinsic motivation (Deci, 1972). Slater (1980) reports that when money is used as a motivator, the quality of production degrades progressively. Kohn (1988) believes it to be counterproductive because when the focus is on quantity and speed, few risks are taken, and "people come to see themselves as being controlled by a reward" (Kohn, 1988).

This leads to an environment in which people do not feel at ease, are less proud to work in and in which too much attention is paid to that part of the process that is evaluated *(*Baker et al., 1988).

Giving teachers financial incentives is in general very difficult. On the one hand they are motivated to achieve better results (Lavy, 2003) but there is always the chance that when the incentives are based on the outcomes of exams, they will adjust the grades themselves even when the performance of the residents has not changed. A condition then is that the one who teaches is not the one who grades. In reality this is often the same person. To prevent this kind of fraud, national tests can be given to residents (as is done in Australia) to detect the ones that have the relative higher score (relative because otherwise the teacher who has the most intelligent students wins, progress is therefore a much better indicator of the teachers ability to teach) (Holanda, Gondim Nogueira and Petterini, 2008). Another disadvantage can be that teachers focus on good results of the tests, and not on broad and useful knowledge. When tests are optimally designed, meaning that they measure all abilities and require broad knowledge, there will be no problem.

Another possibility is to give financial incentives to the principal/managers and let them handle the motivation of the teachers. The principal will then be motivated by money, the teacher is motivated by the principal (listening to ideas, change in curriculum, etc.) and the residents receive motivation through their teachers and the learning opportunities they will present them.

Capitation fee

A capitation fee is also a possibility to increase the quality of the education. In this system the benefit goes to the teaching hospital instead of the individual teachers. The hospital receives fees for every resident. The rationale behind this system is that when the amount of residents is high enough (to cover the costs) there will be more spaces available in high quality teaching hospitals[21], and the teaching hospitals with a lower quality (and thus lower costs) can use the extra money to improve the quality (Holanda et al., 2008) (see also section 2.3: Subsidising possibilities and their "side effects"). A condition for this incentive to work is that the quality of the education is, in a certain level, transparent for the potential residents.

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21 The implementation of another place for a resident will not cost the teaching hospital anything extra but will induce the benefits of having the resident at their disposal.

Teaching hospitals have, however, additional income next to the capitation fees and the possibility then exist that they are not motivated enough by the fees.

Ownership profits
Dudley et al. (1998) discuss various methods to increase quality. One methodology with the most potential is through increasing ownership profits. When an organisation offers certain ownership profits, employers are incited to work on achieving higher quality. Increased quality attracts more clients and so return on equity rises and in this way bonuses/extra's are also higher.

When an organisation tries to increase quality through an increase of ownership profits (or vice versa) there are several possibilities to follow. The first method is to create a higher price relative to cost. Due to the higher mark-up there are higher returns on equity (ROE) to be made. To create such a higher mark-up the quality of the delivered service has to be higher. A higher quality can reduce costs because of the fewer mistakes that have to be corrected. When this is the case the price does not have to be altered. When the costs cannot be lowered the higher quality puts the hospital in the position to ask a higher price and increase in this way the mark-up.

Another method is via an increased patient volume. A higher quality than that of the competitor results in a better/larger market share and more clients. When there is an average profit margin on each unit ROE is then increased. Higher patient volume gives room for more practice and learning opportunities for the residents and therefore increases the quality of education. A larger patient volume often leads to a larger heterogeneity of patients, which also benefits the education.

Negative effects
Unfortunately there are also situations in which having a stake in the company can lead to a reduction of quality. When quality is hard to measure ROE can be easily increased by reducing quality of the education and so quality of given care. When the price is inelastic and consumers (patients in this case) cannot distinguish good quality from bad quality, there exist the danger of a supply-induced market. This entails that the physician can sell more services than the patient actually needs (see section 1.2.1.2: Potential market failures) in order to increase his return on equity.

According to several studies equity ownership of medical equipment, and the potential to profit from its use, can lead to over-utilisation (Hillman

Joseph, Mabry, Sunshine, Kennedy and Noether, 1990; Mitchell and Sunshine 1992). Another negative situation is when consumers are more sensitive to price than to quality. An underinvestment in quality could arise.

Financial incentives can also be used to influence the use of physicians resources. Misallocation of resources can occur due to certain measurements of quality. This effect can also be a goal in itself which gives rise to concerns regarding conflicts of interest for physicians and adverse effects on the quality of patient care. This indicates that financial incentives can reduce quality (Armour, Pitts, Maclean, Cangialose, Kishel, Imai and Etchason, 2009).

Another drawback of financial incentives concerns the un(der)insured population. Because of the dependency on some rewards/incentives the un(der)insured is not treated as well as the insured population. Hospitals expect to lose money on un(der)insured patients and therefore have an incentive not to spend too many resources on these patients. Several studies show proof for this reasoning (Burstin, Lipsitz, and Brennan 1998; Yergan, Flood, Diehr and LoGerfo, 1988; Young and Cohen 1991).

Subsidisation of medical education

Via trust and delegation large areas of information asymmetries should vanish. This can be done by guaranteeing a certain level of quality. Guaranteeing this level can be achieved by various methods of regulating. Kenneth Arrow (1963) names three aspects that would enhance the quality of medical institutions. These aspects contain licensure; rationing of entry into medical schools; and financial subsidisation of medical education. Licensure and rationing of entry are discussed in the following section (Market-Based Instruments).

Without subsidisation there could be a shortage of qualified applicants to postgraduate medical education. The reason for this is that the tuition will be much higher and not everyone can afford this. A second problem is that the quality of the people who do take part in the education is linked to their wealth (Cooper and Aiken, 2001) (see Chapter 2: Financing).

Conclusion of financial incentives

Incentives that can work appropriately are the use of tenure, partnership, profit-sharing plans and up-or-out systems. Ehrenberg and Milkovich (1987) show that merit pays and bonuses based on individual performance are less effective than profit-sharing, stock ownership, and team-based bonuses. But these incentives do not work the same in all sorts of organisations. Up-or-out systems for example work generally better in organisations where the required human capital is general and where

turnover is important because that provides in the needs for new ideas, energy, enthusiasm and change. The benefit of these systems is that the sample from which the best employees can be chosen increases, which can lead to an increase in quality of the employees that went 'up'. These promotion systems, together with tenure and partnership, are usually found in relatively small organisations with few hierarchical levels.

For the teaching hospitals the need is for an incentive that works in a large, highly hierarchical organisation, where tenure is possible.
Financial incentives can have as an effect increased quality and efficiency. There are, however, a multitude of possibilities in which the use of financial incentives can backfire. This is especially true when a large variety of people is involved.

The difficulty of linking financial gains with an increasing quality finds its root in the uncertainty of the definition/indication of quality. Too little empirical research has been done to exclude one or the other from quality increasing financial incentives.
From the information above it seems that negative financial incentives to hospitals may reduce the quality of education, and thus care. Regulating the quality of education through financial incentives is therefore not desirable.

3.3.2 Market-Based Instruments

Market-based Instruments (MBI) are often used for restraining pollution and other environmental activities. In other words, they are used to improve the environmental quality. With MBI's, the market puts pressure on the industry to fulfil certain standards. This can be adjusted for the medical situation as well, since negative externalities occur in the healthcare sector when medical specialists do not receive the proper education.
An example of a market-based instrument that can create an incentive for improving quality is the provision of information. When information about the quality of education is freely accessible by the public there is a triggered incentive to make sure the quality is high enough (Khanna and Anton, 2002). Patients may not care about the quality of education directly, but they care about the quality of the care. As it was shown in the introduction of this chapter, the quality of the healthcare will be higher with a high level of quality in the education of medical specialists.
Under the provision of information one can classify mortality rates or other statistics concerning performance that imply a certain degree of quality, certifications for teaching hospitals or even awards.

What is becoming a more common provision is the publication of report cards. When this kind of information is published more attention will be given to the upkeep of quality by the participating teaching hospitals to assure the outgoing information will be positive for the relevant teaching hospital. In the following paragraph the effect of the publication of report cards and other outcome indicators, and the use of certifications will be reviewed.

Report cards

The system of publishing report cards entails information and the assignment of value to the performances of doctors and their residents. These report cards have to be able to be compared with different hospitals. The success rate of certain ailments is a transparent method to indicate the quality of performance of the teaching hospitals. One can also give a value to the amount of returning patients, which can indicate that the treatment was not sufficient. Since insurers and patients want assumingly the best quality of care these report cards can be used to choose the right provider.

To use this method to improve the quality of postgraduate medical education, report cards can entail figures about successful operations by residents or mortality rate of patients under the care of residents. Another possibility is to report the figures of the medical specialists who train and educate the residents. The residents can compare the different teaching hospitals and choose the one with the highest score. This can encourage competition and, in doing so, increase the quality of the education.

There are however some negative results that can come from publishing report cards. One of these disadvantages is that the quality on the 'easy' operations will rise but the quality of those relatively difficult procedures with high mortality rates are passed on (Armour et al., 2001), meaning that residents will not be able to practise on these cases but that they can only watch. Common knowledge tells us that you cannot sufficiently learn from only watching. To correct for this downside, an additional report mark can be given for the amount of, and which procedures residents are allowed to do for different ailments.

Another undesired outcome is that teaching hospitals will take on less residents. If the report cards show bad results due to the mistakes residents make, a logical response could be to take on less residents. The higher degree of report cards will then attract a high amount of patients but this kind of actions could lead to an undersupply of medical specialists.

A possible problem for the filling in of report cards is that the surgeons responsible for the collection of data on which the report marks are based

on are often the subjects of the investigation. This implies a conflict of interests. To make sure the report cards are not biased and show informative comparisons, the used data and methods should be subject to independent evaluation on a regular basis (Mukabel, Mushlin, Weimer, Zwanziger, Parker and Indridason, 2000).

Outcome indicators

When using a certain outcome indicator as an indication of quality, e.g. mortality rates, the information has to be comparable. Distinction has to be made between mortality in-hospital and out-hospital. Information concerning the time period between surgery and patient discharge from hospital needs to be taken into consideration to avoid biased and misrepresented figures.

A risk-adjustment model should be set up to account for differences in severity of illness (Armour et al., 2001). Risk-adjustment is a method used to account for the impact of individual risk factors ó such as age, severity of illness(es), and other medical problems ó that can put some patients at greater risk for death than others. To calculate the risk-adjusted expected mortality rate (the mortality rate we would expect given the risk factors of the admitted patients) statisticians use data from a large pool of patients with similar diagnoses and risk factors to calculate what the expected mortality would be for that group of patients (Green and Wintfeld, 1995). What has to be corrected for are the other actors that play a role during the care of a patient (e.g. the hospital population, the used material, the OR-nurses, other doctors than the teaching doctor and resident).

There has been data on reduced mortality rates after the implementation of outcome indicators (Armour et al., 2001 and Epstein, 2006). This can however be a result of choosing not to operate on the difficult cases but forwarding them to other hospitals. Surgeons are then not worried that their ranking on the list will decline.

Certification

One manner to acquire a certain level of quality in medical education is (re) certification.

When a doctor has completed a recognised training programme and has been assessed as competent to practise as a specialist in his or her field a certificate can be given to acknowledge this. Certified specialists will begin their professional career with a common knowledge base and with similar skills. They will, however, develop themselves into specialists in their area of expertise. The result of this development is that the knowledge and skills of different doctors will vary (Bashook and Parhoosingh, 1998). Because of this inequality between doctors' skills and knowledge and because of the

demand for a minimum level of quality of doctors or standards of expertise there is a need for certain recertification.

Certification is per definition voluntarily but some rules can be appointed to it. In the USA a doctor has to be recertified every seven years to be called 'board certified'. In the Netherlands this is every five years. The underlying principle for putting a time limit on certifications is dual. On the one hand it is constructed to distinguish those specialists who continue to meet the standards from those who do not; on the other hand it is a method to encourage doctors to learn and be up-to-date. Physicians have an ethical obligation to undertake further education (oath of Hippocrates) but a moral responsibility is most likely not enough.

Certificates can be used to assure a certain quality of teaching physicians and medical specialists. It can be used as a quality mark and is an opportunity to compete and show potential patients/clients that they are competent and up-to-date. A certificate gives the medical specialist an assumption of knowledge and competence and therefore decreases uncertainty about quality. Certification can be done by non-governmental organisations. It is not obligatory to have a certificate but when an institution does have one, it signals to the public that they possess a certain level of quality. Without certificates physicians could deliver education of care below the desired level of quality, which could result in a large spread of quality.
Specialty boards and societies would like to carry out ongoing assessments of physicians' outcomes and competencies (very labour intensive and a possibility to decrease quality (Casalino, 1999).

Because of the intransparency of quality of medical care and education, patients and residents choose their care suppliers based on trust. This trust is gained through reputation. When product quality is unobservable the reputation of the hospital plays a big part in attracting residents and patients. Being recertified every period is a method to obtain and/or sustain a certain reputation. Teaching hospitals could receive certain certificates based on their success rates, which attracts the best residents. It is, however, not true that with a certificate a teaching hospital has by definition a good reputation or vice versa. The certificate is just one manner to obtain a certain reputation. Especially when a teaching hospital starts up it could be helpful to have teaching physicians with certificates.

There can also be cost accompanied with a certification. To qualify for recertification doctors need to take a written examination (for testing the knowledge) and often an on-site visit by the board of certification is needed to check the competences and performances of the doctor and the hospital.

The one who wants to be recertified has to pay a fee just to be considered and to take the exam. Being ready to pay for a certificate can also signal to consumers that the quality is high. Otherwise the investment in the examination will not be wise because the admission fee is paid but the certificate will not be granted. The downside of this kind of measure is that the incentives to engage in charity work (see 2.2.2: Possibilities of self-financing) would decrease.

There are certain perceived side-effects to recertification. One effect is the existence of self-designated certifying boards. When such a board adapts its name to look like an official board, doctors can just pay an annual fee to be certified. Patients cannot differentiate between these 'fake' certificates and the official ones.
Another disadvantage is that when anyone can set up a certifying board the whole idea of a general standard of quality disappears because the qualification can differ widely between the boards.
Another possibility to disable the aimed effect of certification is the existence of organisations that teach physicians to prepare and pass the certification examinations. This could lead to doctors receiving a recertification while not possessing the real needed knowledge to practice but only the knowledge to qualify for the exam. It can also occur that certifications are based on documented partaking in formal didactic activities and not on actual performance. The education is then more formalised and didactic instead of an experiential higher training (Talbot, 2004).

Based on these negative side-effects we can conclude that recertification cannot be left to market forces alone. An intervention of the government, thus regulation, is needed.

Consequence of MBI
In the introduction to this chapter it became clear that teaching hospitals have strong incentives to communicate to future residents the quality of their education programme, even without the use of MBI's. By making the publishing of the above three informative figures obligatory for teaching hospitals MBI's can result in an extra incentive to improve the quality of their education programme. The hospitals will implement their own norms and criteria to assure a certain level of quality and therefore receiving a good ranking when compared with other teaching hospitals. In this way market-based incentives trigger a certain amount of self-regulation within the teaching hospitals.

3.4 Regulation enforceable by law

Next to incentives and enforced self-regulation there is also the possibility to use the judicial terrain to achieve high quality in the postgraduate medical education. Three methods are discussed in this paragraph. We will start with the accreditation of teaching hospitals. After this entry rationing will be discussed and we will end up with measures concerning the amount of hours residents make.

3.4.1 Accreditation

Accreditation is a method used in many countries to ensure a certain degree of quality of the education programme within hospitals. When a teaching hospital is accredited it means that the educational facility is officially declared to be of an approved standard.
To receive the accreditation the teaching hospital must meet a certain amount of set standards, which are measured with quantifiable indicators such as the presence of appropriate administrative structures, adequate faculty, patients, training facilities, didactic teaching etc. (Davis and Ringsted, 2006). These indicators are, however, process indicators and not overall quality indicators. This could lead to teaching hospitals that are accredited and thus follow the right processes, but do not have a guaranteed high quality or the best outcomes to go with it.

When teaching hospitals take part into the accreditation procedure a lot of energy and time is invested in meeting the standards and preparing the appropriate paperwork. This can be seen as an investment because of two reasons; first, when being accredited the transparency of quality is higher, which could attract more qualified residents; and second, because of the high standards the outcome of given care will be better. Both reasons lead to a more successful hospital that validates the investment made (Davis and Ringsted, 2006).

In various researches the effect of accreditation on outcome has been investigated. The research of Spike and Hays (1999) shows that specialists from formal training routes have more success in receiving (re)certification than for those of a practice-eligible route. Sharp et al., (2002) show that half of the studies that compare the teaching hospitals show a positive relation on certification and clinical outcomes, which can be interpreted as a positive effect of accreditation on clinical outcomes. The other half, however, shows that there exists a negative relationship between the two. When considering all these studies the general outcome is that there is no evidence that accredited hospitals have better outcomes than those that have no accreditation.

A danger that is present when using accreditation is the lack of interest for further innovation in teaching methods. When a hospital is meeting all the standards of the accreditation board there is no incentive left to invest in the quality. Innovative methods will not be easily used because of the danger that they will not be considered by the accreditation board. Teaching hospitals will therefore be of precisely the quality set by the board, and not higher.

3.4.2 Entry rationing

Rationing the entry of residents is also a method to guarantee a certain quality of doctors and of the education. When there are (too) many residents in one hospital there are two possible dangers for the quality. The first is that a large amount of residents can give the education a lower quality due to less personal attention and crowded rooms. The residents will have less possibilities to practice their specialty. The second danger to quality is that the admitted residents could be of lower quality than when entry rationing is in place (Arrow, 1963). This, however, does depend on the manner of rationing.
The above can be explained by the following rationale; suppose that when there is entry rationing based on ranking, 300 medical specialist spaces are available. 1000 students fight for these places through attaining high marks and test scores and the 300 with the best results win. The quality of the residents is thus relatively high. When there is no rationing there is no competition for the education and everybody can get in. The best 300 might even work less hard because the training position is no longer a scarcity. The lesser 700 can get in as well, and the average quality will therefore be reduced. A possible problem for this kind of rationing is that when many residents try out for a certain specialty with limited spaces, the ones who are not chosen will have a lower intrinsic motivation when they start to work in a specialty, which is their second or third choice. The above rationing without loss of motivation will work best when there is a high demand for spaces in all specialties and the ones who are not chosen will choose an outside option if they can't get into their specialty of choice.

There is also the possibility of self-selection after the admission by imposing minimum results and grades. The residents will then have a larger motivation to belong to the best and will demand the best education as well. When the entry rationing is implemented through a lottery (and therefore being random) tough, it is not certain that the ones with the highest motivation and aptitude are selected for the education.

3.4.3 Resident hours

In the USA there was a great debate about the working hours of residents and the quality of their work. In 1984 Libby Zion died on the operating

table and her relatives sued the hospital for negligence. The main point of view was that residents make mistakes due to fatigue. It was argued that residents should have a maximum amount of hours a week that they are on call (Imperato, 1988). This regulation is not only implemented in the United States (since 2003), but in the European Union as well.

The measure has its positive effects but also a certain negative impact on quality of the education. On the one hand, residents are very happy that they can have a social life outside the hospital and are well-rested when they commence their shifts. This increases the quality of life. It is also possible that residents can be more involved with the patients since they have more energy and better quality time to care about them (Gaufberg, 2006).

On the other hand, it is argued that residents learn much less because they cannot be present for the whole duration of the treatment. A discontinuity comes into existing through the departure of one resident and the arrival of the other. They learn much less when they cannot see how an illness evolves, they do not get to know their patients. The quality of the education declines due to this measure. It is also not proven that the long work hours of residents are the reason for medical mishaps. In the high profile case of Libby Zion it was shown that it was more a lack of knowledge and failure of supervision that caused the malpractice (Charap, 2004) than long working hours.

A large number of doctors agree that reducing the working hours of residents is not improving the quality of education or the care patients receive. It is also said that the reduction of the working hours has not even reduced the mistakes caused by residents (Kohn, Corrigan and Donaldson, 2000). The problem is no longer fatigue but a lack of understanding patients. When a resident begins its shift and consults on a patient they do not have a history yet. All the necessary information has to be gained from paper filled in by the former resident and the information on reports is not always complete. This could lead to more errors than tiredness would. The reduction in working hours leads to a limitation on diversity, intensity and continuity of the interactions with patients. This limitation leads to a lack of clinical skills. These skills are, however, hard to test on certification examinations and therefore go undetected.

Because hospitals will be penalised when breaking the rule of the prescribed amount of working hours, residents will have to leave sick patients during emergency when their time is up. This could send a message to the residents that the professional responsibility does not need to be high (Gilsdorf, 2006). Charap (2004) goes deeper into this argument.

The author believes that this measure rewards those who are showing non-professional behaviour and punishes or criticises those who wish to help their patients in their hour of need and in doing so sacrificing free time. With this measure Charap believes that residents are giving the incentives to limit their involvement with patients. In the years of training people develop their habits. When these habits are based on a dependence of the clock instead on of giving the best care to patients, the quality of medical specialists will most likely be reduced. (Charap, 2004).

What we can conclude from the opinion of residents and doctors is that it is important to see the whole duration of a patient's sickness to really understand the diagnosis and the appropriate treatment. In this way, long working hours increase the quality of education. A well rested resident is, however, important too. For patients it is important to have trust in their physicians and residents. When a resident looks exhausted the patient (and/or his family) will not have the same peace of mind as when the resident looks alert and energetic.
The solution seems to lie in the improvement of information handover. If residents can quickly see what the status of a patient is, the decisions made and the rationale for those decisions, then a lot of problems can be avoided and working hours are not needed to be more than twice as much as for regular professions.

3.5 Conclusion

In this chapter we have shown that quality of postgraduate medical education can be regulated via a variety of methods. To regulate the quality of education it is best to use a combination of the named possibilities.
Enforced self-regulation can result in very high quality as long as the compliance group is really independent and the (market-based) incentives are present to make a difference compared to the other hospitals.
The use of financial incentives has to be considered with delicacy. When this is applied in a situation where the result is a misallocation of resources it is possible it will do more bad than good. The MBI's will only play a complementary role as hospitals have the incentive to let future residents (and patients) know that they have the best education programme. Entry rationing can lead to a higher quality of education but it can also backfire when the incentives for the hospitals are not right.
Regulating the working hours of residents also has its pros and cons. The disadvantages can, however, be limited with a good organisation within the teaching hospital.

When a government needs regulation to assure the quality of education each method has to be assessed and evaluated in order to see whether the combination of factors complements each other instead of getting a situation where one regulation negatively effects the outcome of the other.

4 Workforce Supply

The planning of workforce supply is a very important component of the healthcare industry. Today's health workforce is a result of decisions taken by different institutions and persons in the last sixty years. According to Hall (1998) countries have started with the implementation of human resource planning right after the end of Word War II. The assumption underlying these planning efforts was that since a high proportion of health workers are trained and eventually employed at public expenses, it was then in the *public interest* to train the number of individuals considered necessary.

Planning the amount of medical specialists is a serious undertaking present in all countries. It influences not only the total number of specialists but also the quality of the education (poorly trained personnel reduces the quality and productivity of the whole system).
Several policies have been put in place in order to affect the number of practicing physicians in OECD countries. These policies entail education, recruitment, and retention plans to increase the flow of doctors into the workforce and reduce the outflows. A good and well-performing planning of human resources tackles the problem of static and dynamic imbalances in the medical workforce. Such imbalances can take the form of shortages or oversupply of doctors in the market (Simoens, S. and J. Hurst, 2006).

4.1 Why plan human resources in health

The planning of health human resources (e.g. the number of nurses, GPs, specialists in the healthcare system) has been high on the political agenda of developed countries since the end of World War II. Healthcare is viewed as a merit good by society as a whole and therefore most governments train and employ health professionals at public expenses. In this manner the planning of the number of specialists has not been left to market forces alone but has strongly been influenced by public policies.

Hall (1998) suggests that simulation models should become in use also in the healthcare sector. The author affirms that simulation programs and/ or models have been largely used in other industries but that the health sector has been very slow to use scenario construction, games, and other methods to help with decision-making. This delay in the use of simulation models in healthcare has been due to several factors, including lack of competitive pressures and lack of management training for senior decision

makers, who for the most part are physicians.
Indeed, the intrinsic nature of medical training and practice lead many medical administrators to apply the same approach to institutional decision-making as to making decisions about patient care, that is, with strong prescriptive views and minimal consultation with others (Hall, 1998).

The *economic and human costs* of poor human resources policies are particularly high in the health sector. The quality of care that is given, the efficacy and efficiency of services, and the accessibility to healthcare primarily depend on the performance of those who deliver them, like specialists and nurses (Bennet and Franco, 2000). The importance of good planning of human resources in healthcare allows a reduction of costs because of the avoidance of overstaffing, better distribution of personnel by categories, and promotion of staff mobility and greater flexibility in personnel deployment.

According to Bloor and Maynard (2003) the planning of supply and demand of medical workforce is subject to two major weaknesses: first, *substitution possibilities* are rarely taken into consideration; and second, the planning is often "*mechanistic and supply-side driven*". The stock of specialists in any country is estimated from extrapolations of earlier time series data. These estimations do not take into account several factors such as behavioural shifts due to e.g. increased emigration/immigration of physicians. This supply side approach tends to be complemented with imperfect demand estimation using parameters, such as the ratio of doctors to the population, which are not correctly linked to the real resource constraints.

Medical supply is a crucial element: both oversupply and undersupply may alter the quality of health care delivered. An oversupply might inflate the health care costs through a possible supplier induce demand, whereas an undersupply might result in unmet health needs. Potential costs of workforce imbalance are summarized in Table 2.

Costs of undersupply	Costs of oversupply
– Poor access, unmet needs, potentially poorer outcomes – Overworked and stressed workforce – Increased costs of alternative provision	– Unnecessary costs incurred in education sector in training workforce – Unnecessary services provided (in case of supplier induced demand) – Potentially lower quality of healthcare because of insufficient consultation rate

Table 2. Costs of workforce imbalance
Source: KCE, 2008

4.2 Coordination in medical education

The regulation of the public sector is present in all healthcare markets: entry to the labour market is highly determined and constrained by licensing and professional regulation, and wages are often negotiated nationally for groups of health professionals, making price insensitive to changes in demand and/or supply. The great involvement of governments in the planning of the medical workforce is due to the absent equilibrium effect of the price mechanism.

In several countries the central government decides on the planning of medical school intake over time (e.g. Australia, Sweden). In other countries medical schools decide the number of places available for specialists (e.g. Germany, Japan).
A few countries, such as Austria and the US, do not impose any limitations on the number of medical school enrolments.
It is thus interesting to confront the situation of human resource planning to the situation of market forces guiding the training policy.

4.2.1 Planning

One of the underlying assumptions of actual workforce planning policies is the tendency to assume that *existing healthcare delivery systems are efficient* (Bloor and Maynard, 2003). Most decisions relating to, for example, the amount of medical specialists needed for each specialty, are purely made on the basis of *healthcare expenditure*. This means that plans are driven by medical outlays and therefore financial resources dictate the volume of provision. This can possibly lead to under-treatment as well.

Moreover most planning strategies have a *short-term impact*; cyclical shortages or occasional surpluses in medical specialists tend to provoke short-term changes in student intake[22], rather than a search for strategic solutions that work out in the long-run, or at improving methods of forecasting demand and supply, e.g. by modelling supply elasticities. Most decision-making is concerned with a one- to five-year timeframe, with particular emphasis on next year's budget. Recognition of the importance of long-term strategic planning is thus needed.

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22 For example, a decision to change medical student intakes by 10% will only change the doctor supply by about 2% in the first 10 years. Thus doubling of medical student intakes would increase the doctor supply by only 20% in 10 years, but during the subsequent decade the effect could be far greater. Even with shorter health worker careers such as nursing, it takes a long time to implement major quantitative or qualitative changes, and an equally long time to undo major mistakes (Hall, 1998).

Further problems may emerge, if there are several agents who have an influence on the developments in the market, and so mismatches among their actions may occur. In a country of decentralised governance, for example, country and national level may have different goals, or they may set conflicting measures. The same may emerge a level lower, between the authorities and programme managers in teaching hospitals. A good harmonisation of all decisions influencing the demand for and supply of medical workforce is essential in such a complex framework.

Workforce planning suffers of a number of limitations that are clearly described by Simoens and Hurst (2006).
First, forecasts of future demand and supply of physicians suffers of uncertainty relating to the effect of technological change on demand, and uncertainty on the rate of growth of publicly-funded health expenditure, because this latter is subject to changing political priorities.
Moreover, incertitude may exist on the supply side too due to migration flows, career changes or retirement.

Second, workforce planning has generally been conducted in the context of uncertainty surrounding healthcare system design issues. For instance, planners had to project the required number of primary care physicians in the absence of a consensus on the optimal model of organising primary care delivery (e.g. to what extent can nurse practitioners substitute for primary care physicians in the provision of primary care services?).

Third, tensions may arise from the different levels at which workforce planning takes place. This situation is very characteristic in those countries where healthcare policies are strongly decentralized. In Australia for example, the Australian Medical Workforce Advisory Committee provides advice on physician supply policies at national level, but implementation is the prerogative of State/Territory governments. This may lead to planning recommendations that do not take into account the budgetary implications and health service delivery decisions of State/Territory Government.
Canada also showed differing and non-coordinated approaches to workforce planning by provinces and territorial jurisdictions resulting into inter-provincial tensions.
In Belgium since 1996 the Federal Ministry of Public Health limits the number of physicians that may practice under the national health insurance system. However, the Community Ministers of Education bear the responsibility to adapt students' intake and this is done differently in the two Communities (the Flemish Community and the French Community). The Flemish Community introduced for example an entrance examination, while the French Community opted for a selection procedure after three years of study.

Fourth, workforce planning is subject to political interference (Hall, 1998). Changing priorities in the political environment have negative externalities on strategic planning. Many workforce decisions, however, require longer-term planning given that, for instance, decisions to change medical school intake take time to have an effect on the actual physician workforce. Workforce planning does not always take into account the viewpoints of the various stakeholders, undermining its accessibility and hindering its implementation.

4.2.2 Market forces

Given these limitations the question of whether market forces would be a better instrument to training medical policies than planning arises.
The market provides feedback on two aspects, namely training and employment. In some cases a workforce surplus or shortage quickly leads to changes in training programme intakes. Other times, as in the case of many Latin American medical schools, a doctor surplus may have little effect on school intakes (Hall, 1998).
The main advantages of using market forces instead of planning are the low cost of monitoring and the fact that no one has to assume responsibility for any unpopular "message" it produces. This latter aspect is obviously different when for instance a politician needs to take a decision. In general market forces have been the main determinants of the numbers of persons working in most occupations outside the health sector (manufacturing, sales, social services, transportation, etc). Training programme intakes for these fields are, in turn, guided by the market.
Market forces are used to train lower level of health workers, in particular technicians or auxiliaries. A shortage of this kind of workers can easily be adjusted by increasing the training capacity.
Training programmes for these cadres are relatively short and inexpensive, and surplus personnel can usually find alternative employment.

Some countries have chosen for a market forces approach (e.g. USA) to be the dominant guide for training outputs (Simeon and Hurst, 2006) even for university-level health professionals. Sometimes this was a matter of explicit policy but most of the time it was either failure to do human resource for health planning or because such planning was ineffectual (Hall, 1998).

Hall (1998) reports that the use of market forces in the planning of healthcare workforce has not been very successful so far.
This has been most evident among higher level personnel. On the one hand, there are the pressures from politicians, universities and students to expand the health professions. On the other hand, it is almost impossible to reduce enrolments when a surplus becomes evident, since this would

involve ending education trainings and/or reducing the number of training places for residents.

An example of a large failure of the market is supplied by Mexico and the United states. What happened in Mexico in the 1960's was such a quick enlargement of medical school enrolments that the doubling time of the medical workforce dropped from 31.5 years in 1969 to 10.2 years in 1979. The supply of doctors was increasing at 7% a year while at the same time the population growth rate was declining to almost 2% what eventually led to a rise in medical un- and underemployment. By the 1980's measures where taken to correct for this imbalance of demand and supply (Frenk, 1994). The damage was however done. The newly educated doctors could not find a matching job, leading to a waste of money, time and other resources.
In the USA an oversupply of physicians has been detected since the 1980's. Agreed upon is that the disequilibrium deforms the delivery of care and the healthcare costs. In spite of this acknowledgement the oversupply is still present and no solution has been put forward to solve the problem. Noren (1997) affirms: "A rational national physician workforce policy is a half century overdue. While some have argued that market forces will correct workforce flaws, 50 years of experience have demonstrated the error in that reasoning. Furthermore, the hope that managed care market forces will lead to effective workforce corrections reflects wishful thinking....".

4.2.3 Market forces or planning?

The question we aim to answer is whether we should use market forces or planning to define the workforce supply in medical care. Hall (1998) documents quite a few criteria. Some of them are relevant, many are interrelated, and no criterion is likely to be decisive.

Firstly, when the state is the main employer in the healthcare sector (as it is the case in many countries, think of e.g. public hospitals), it is closely affected by shortages and surpluses. Besides the social interest for planning, the state as employer also can benefit from a properly planned workforce supply. As we have seen in section 1.2.1.2: Potential market failures in postgraduate medical education, even a competitive market works insufficiently when there is long time lag between the start of education and the entry to the labour market. The planning of workforce is especially important in that group of professions exhibiting time lags (all specialties pertain here). The gains stemming from planning are more significant for the state as employer when the expenditures on the given profession are high (many employees and/or high salaries).

Even if the state is not the main employer, it is reasonable to plan the number of residents if the government bears the costs of the education in a large extent (or totally). The money spent on education would be wasted if qualified professionals could not work in their field. However, in the case when professionals are also required by other sectors than healthcare, the proper planning becomes very complex, sometimes even impossible. In those few cases (e.g. microbiologists, social worker) planning is unsuitable.

Secondly, some specialties (e.g. surgeon and anaesthetist) or professional groups (e.g. doctors and nurses) are highly interrelated; a good balance between their supplies is essential for the effective provision of healthcare services. Separate planning or the regulation of only one specialty irrespective of the developments in the supply of other specialties is inappropriate.
The maintenance of a good balance in the mix of specialties by planning is highly needed when one of the fields undergoes significant changes or external factors change the structure of demand. For example, when information technology becomes more important in the medical working process, technical personnel and/or better knowledge about IT is needed. The encouraging (e.g. by subsidy) and planning of the education of required technicians can be appropriate in such a situation.

Finally, there are reasons to restrict the entry of professionals to the labour market when quality concerns arise (Arrow, 1963). Moreover, entry rationing is needed to avoid an unnecessary and costly duplication of medical knowledge, and supplier induced demand. In order to still ensure the match between demand and supply (and prevent shortages), it is important to do at least a basic planning. In general, the role of the state is needed when quality of education and quality of care has to be guaranteed.

These are some considerations to decide if planning is necessary in the medical workforce supply or if market forces can ensure an acceptable outcome. The health labour market is constrained by licensing and professional regulation, restriction on training places, and wages are often negotiated on a state-wide or national basis for group of health professionals, making price inflexible to changes in demand and/or supply (KCE, 2008). Of course, a concrete decision always has to be based on prudent deliberations of the current situation. It is also important that there is a larger range of alternatives than the two extremities, i.e. market forces and planning. A good planning takes into account market forces; and even if the market is the primary determinant of the workforce supply, monitoring and recognition of potential signs of disturbances are crucial elements.

4.3 Planning the number of professionals

According to Adam Smith (1776) the best way to run a society is by leaving everything to the market. The various market forces will govern everything like an invisible hand into a situation that is best for society. In the case of planning the number of medical specialists it is also possible to use a 'laissez faire' method. This can be done in several levels. The most intensive one is of course that the government is not involved at all. No restrictions on available places but neither any subsidisation for the education. Governments can also decide not to intervene on certain aspects and to intervene on others. An example is subsidisation for teaching hospitals and further leaving the inflow to the market, meaning that the supply and demand forces will secure a certain number of enrolees that will fit the market.

4.3.1 Factors of demand for and supply of medical workforce

From an economic point of view, imbalances in the workforce market are the mismatches between demand and supply. However, there are several factors influencing both the number of specialists seeking a job and the number of vacancies. An adequate human resource planning policy considers the relevant characteristics of the whole system and determines accordingly the socially optimum number of specialists.

When we speak about the supply of medical specialists, we mean the qualified specialists who actively seek jobs in their profession. Shortage and oversupply of specialists is a relative concept. The internist per inhabitant ratio, which is adequate in a developing country for example, would be too low in a western society. Demand for health personnel is derived from the aggregate demand for healthcare services in a country. The way the healthcare delivery system is organised also affects the required number of specialists. High or total coverage by insurance takes away the price sensitivity of patients and induces more demand. The level of medical technology and the proportion of inpatient and outpatient care have an influence on the desired breakdown in specialties.

Due to the diversity in the socio-economic status of countries and the several different ways in organising their healthcare delivery system, the optimal number of specialists varies by country. There is not a single golden standard.

It is important to notice that even if a sufficient number of physicians is involved in the education and attain qualification, there could still exist a shortage if they finally choose for outside options and do not practice their profession. For example, physicians may be engaged in teaching

or scientific research to raise their job-satisfaction or income. Choice of specialists to work part-time also decreases the supply. For example, women may opt for spending more time with their children and work less. Policy decisions can also influence the decision on working hours. For example, provincial governments in Canada introduced a cost-containment measure, namely that fees paid for individual physicians were reduced as the billing exceeded an agreed threshold. As a consequence, doctors opted to work only until they reached the threshold, and took leaves afterwards (Zurn et al., 2002).

An important determinant of the workforce supply is the number of residents who decide to choose the given profession. The career choice depends as much on economical as on socio-psychological factors. The human capital theory deals with the first one when considering the education as an investment (see section 2.2.1: Theory of human capital). The reasoning of the theory is that when the average rate of return of a certain profession, say medical specialists, is high and rising, more interns will apply for the education of medical specialists. When there is, in turn, a lower and decreasing average rate of return potential interns will be discouraged to apply for the education of medical specialists and will choose another profession. For example, if a career in the world of business offers more opportunities and higher earnings than a prospective physician expects, applications to medical universities will likely decrease. At the same time, students may choose a career in healthcare because they expect the greatest job satisfaction there or because healthcare professions are highly valued by the society (Zurn et al., 2004).[23]
Thornton and Esposto (2003) examine how economic factors influence the specialty choice of residents. They include in their analyses the expected earnings as benefits in the investment in studying, hours worked, and the length of training as costs. Thornton and Esposto also deal with the uncertainty about the actual values of variables. According to their findings, medical students have lower tolerance for variations in leisure time than risk in the level of earnings. They conclude that a future work contract with regular weekly work schedules and generous vacation times are more attractive to residents than increased earnings. McKay (1990) also finds that career choice is inelastic in expected earnings. Although there is variation in responsiveness by specialties, in all cases one percent increase in the expected earnings raises the number of residents in the given specialty with less than 0,5% (radiology, anesthesiology, and obstetrics/

23 Of course the characteristics of students should also be taken into consideration. Students have different interests and capabilities, and there are different costs of doing activities associated to a specialty.

gynecology are the most responsive, while internal medicine, pediatrics, and general practitioners are the least elastic).
Buddeberg-Fischer, Klaghofer, Abel and Buddeberg (2006) analyse 522 Swiss postgraduate medical students' specialty choice. They find that female doctors are over-represented in specialities like gynaecology and obstetrics (G&O), paediatrics, and anaesthesiology, while male doctors tend to choose surgical specialities. In case of G&O and paediatrics gender schemas play a certain role, while the choice of anaesthesiology can be explained by its features appreciated by females: it is a professionally prestigious but not too competitive, it covers wide scope of medicine and both part-time work and promotion is possible. Regarding the influential factors of career choice, gender proved to be the most determinant followed by career motivation, personality traits, and life goals.

Lastly, immigration and emigration flows also play a role in the total number of specialist seeking a job in their profession. Several policies have been designed to increase the immigration of doctors in those countries where shortages were present. These include: launching international recruitment campaigns, easing immigration requirements, and setting up special arrangements fostering shared learning between different countries. Flows of physicians between OECD countries are not always uni-directional. This is referred to as "carousel movement" and, not surprisingly, it normally takes place between countries speaking the same language (Simoen and Hurst, 2006).

4.3.2 Imbalances in healthcare workforce

It is important to notice that even if the total number of vacancies for specialists and qualified specialists seeking a job level out in a country, there can still be significant deviations in the mix of specialties or in the geographical distribution of the workforce. A close analysis of the workforce market is indispensable in order to discover the nature of the imbalance and find the most appropriate measure to solve it.

Zurn et al. (2002) offer a typology of health workforce imbalances. They distinguish between:

- Profession/specialty imbalances: it refers both to shortages and surpluses in a given field (e.g. in a specialty like neurologist) and to non-proportionalities among healthcare professions (e.g. inadequate physician – nurse ratio).
- Geographical imbalances: differences of workforce supply in rural and metropolitan areas. Usually rural regions are less attractive for physicians because of less employment opportunities for the partner or limited secondary and tertiary education possibilities for children. Governments often try to prevent shortages in these areas by offering

incentives or introducing compulsory service.[24]
- Institutional and services imbalances: it can occur that some healthcare institutions attract more professionals than others. Shortages and surpluses may emerge at the institutional level because of prestige or differences in working conditions.
- Public/private imbalances: It is possible that in a country the national healthcare and insurance system is essentially public, while there are also private institutions offering (possibly not reimbursed) health services. If the budget of public hospitals is very constrained, the private sector may offer better career possibilities with higher earnings. Specialists are likely to leave the public sector in such a situation causing shortages in the national healthcare delivery system.
- Gender imbalances: Although women's proportion in the medical workforce significantly increased (e.g. in the USA, with 425% between 1970 and 1994[25]), women are underrepresented in higher-status occupations and among managers (Zurn et al. 2002, referring to Dussault, 1999).

Besides these categories, we can make a difference between quantitative and qualitative imbalances. There is shortage in the workforce market in the quantitative sense, when the supply for professionals exceeds the demand. It may occur that there is no shortage, but the market is very tight. Employers have few applicants to a position then, and may fill in the vacancy with a candidate of less fitting capabilities. Quantity is however not the problem, but the quality of the labour force may be an issue.

4.3.3 Approaches to forecast the necessary number of doctors

A crucial step in human workforce planning is the estimation of the society's future needs for healthcare personnel. Zurn et al. (2002) and O'Brien-Pallas, Baumann, Donner, Tomblin Murphy, Lochhaas-Gerlach and Luba (2001) mention several approaches that can be used. Adams (1992) also identifies four main approaches for physician resource planning. In the following we will present the characteristics of the four models.

Need-based planning (also called the *epidemiological approach*) intends to forecast the necessary number of specialists using demographic trends, current utilisation data and determining effects of market forces in the given healthcare delivery system. Needs refers to the number of workers

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24 In Belgium the government started up the project Impulseo I/II for GPs. One of the goals of this project is to stimulate GPs to locate themselves in rural areas, and to set up their practices in those areas where there is a shortage of GPs.

25 Zurn et al. 2002, p13.

or amount of services necessary to provide an optimum standard of service and to keep the population healthy. For example, it takes into account the society's aging, the shortening hospital stay due to technical achievements, and the financial incentives aiming at cost reductions. The information is essentially provided by professionals. This approach has been utilized in the USA in the early 80s, by the Graduate Medical Education National Advisory Committee (GMENAC). Their model used epidemiologic evidence for each specialty, modified by professional opinion on the need and appropriateness of care for various conditions to estimate physician need (Delphi technique). This approach relies on three assumptions: (1) all healthcare needs can and should be met; (2) cost effective methods of addressing needs can be identified and implemented, and (3) healthcare resources are utilized in accordance with relative levels of needs.
An important limiting factor of the needs-based approach is the availability of extensive epidemiological data. These calculations require highly detailed data, which may be unavailable in some segments of healthcare. This limitation has led some authors to use an alternative approach based on utilization data, by making the implicit assumption that, at least in universal healthcare systems, utilization of services could be a valid approximation of the need for services.[26]
The needs-based approach is also more useable when predicting numbers in a specific care speciality, because incidence of the diseases managed within that care speciality can be approximated with more accuracy. An example is the radiologists forecast in Australia. One radiation oncologist is expected to treat 250 new patients per year. The number of radiation oncologists required is thus determined by calculating the number of patients with newly diagnosed cancer during that year and dividing the assumed 50% treatment rate by 250 (Morgan, Wigg and Childs, 2000).

The utilisation-based approach (also called the *requirement model* or *the demand-based approach*) assumes that the current utilisation equals the demand for healthcare services. *Demand* refers to amounts of the various types of health services that the population of a given area will seek and has the means to purchase at the prevailing prices within a given time period. Physician requirements are estimated based on the number and type of projected services and on the physician-per-population ratio in the reference population. This information can be derived for example from billing data. Generally, the population characteristics considered are demographic information (age and gender), although other features can be incorporated too, such as existing market conditions, institutional

26 An example of this approach is given by Persaud (1999a, 1999b) for ophthalmologists in Ontario.

arrangements, and access barriers.
This model relies on three assumptions: (1) the current demand for healthcare is appropriate and appropriately met by current level, mix , and distribution of providers; (2) the age and gender specific resource requirements remain constant in the future, and (3) the size and demographic profile of the population changes over time in ways predicted by currently observed trends.
Demand can be estimated through 3 methods:

1. *Service utilisation method*: data on current service utilisation serve as a proxy of satisfied demand. Further, it is assumed that analysis of past trends in service utilisation allows estimation of the likely future changes in utilisation patterns. This approach is the most commonly used.
2. *Manpower/population ratio method*: a theoretical relationship (ratio) is established between the population (segmented into different age categories) and the requirement for health service professionals. Future predictions are based on estimated service need per unit of population and forecast population scenarios. An example of such an approach is given by Morgan et al. (2000) who assessed the adequacy of the oncologist workforce in Australia by using the reference ratio of 7 oncologists per million population. This reference ratio was derived from international benchmarking and expert evaluation.
3. *Economic demand method*: an assessment is made of the current and future social, political and economic circumstances, and how consumers of services, service providers and employers will behave as a result of those circumstances. This approach has been used by Cooper et al. (2003) in his paper, where he suggested that economic projections could serve as a gauge for projecting the future utilization of physician services.

Models can become quite complex given the level of precision and prediction flexibility targeted. Calculations are based on the extrapolation of actual utilisation ratios adjusted to expected demographical changes. In this way, it is necessary to estimate migration, mortality and fertility ratios when using this approach, and so the long-term estimations become increasingly unstable.

The *supply projection approach* (also called the *trend model* or *physician-per-population ratio* model) relies on physician-per-population ratios and takes into account healthcare services currently delivered by the total tool of practising physicians. The indexes used (e.g. number of paediatricians per 1,000 population) can be an indicator of under- or oversupply of specialists. Apart from detecting the imbalances in the market, we can use

personnel-to-population ratios as a target in human resource policy. The sensitive point is to set the norm, since there is not one golden standard applying to all countries.
Target values are often defined arbitrarily, for example copying from other countries or using international averages. This approach assumes that future requirements for physicians will need to match the quantity of services currently provided on a per-capita basis. This approach rests on 3 assumptions: (1) the current level, mix, and distribution of providers in the population are adequate; (2) the age and sex specific productivity of providers remain constant in the future, and (3) the size and demographic profile of the providers population changes over time in ways predicted by currently observed trends.
Possible changes in demographic features and the delivery system are sometimes factored into the projections. In such models, needs are defined as the necessary in-flow of human resources to keep or to reach, in some identified future point in time, an arbitrary pre-defined level of service offer. Thus, the computation of requirements is not computed on the basis of population health needs. The overview in Figure 6 shows how simple the conceptual model is.
However, such models can gain complexity. First, the supply-based model often integrates parameters of demand (see the utilisation-based approach). Second, the model is not necessarily based on simple headcount of providers but can also integrate parameters more or less refined of professional productivity. The model can also serve for scenario making, i.e. changes in the skill-mix. In such instance, the model is called by some authors *substitution model* (Persaud et al. 1999a; 1999b).

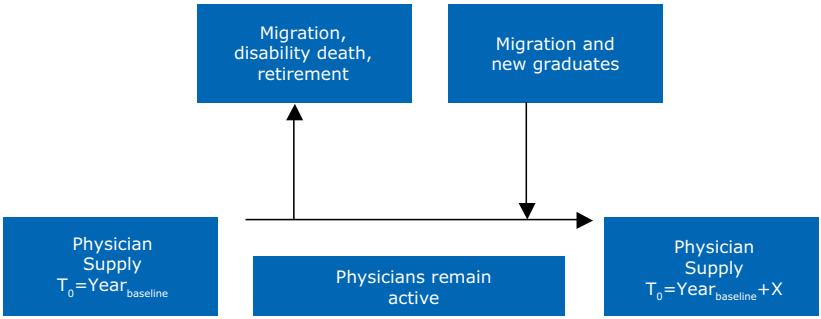

Figure 6. Overview of the supply projection approach
Source: KCE, 2008

Benchmarking is based on identifying regions or countries that are similar in their demographic and health profiles, including overall mortality, but are markedly different in their costs and deployment of health care resources. Municipalities and/or regions that achieve low levels of deployment of clinically active physicians without a measured loss of patient welfare due to a shortage of physicians are considered benchmarks.
Those benchmarks are then used as a current best estimate of a reasonable physician workforce active in patient care for planning (Goodman, Fisher, Bubolz, Mohr, Poage and Wennberg, 1996).
Benchmarking is thus based on real-life examples and expresses the question of the needed medical manpower in term of efficiency: could a similar level of health be attained with less human resources?
Most of the forecasting in the USA in the 80s and 90s was based on benchmarking.
The comparison reference was the staffing pattern of HMOs with adjustments to extrapolate to the general population (see e.g. Anderson, Han, Miller and Johns, 1997).
In benchmarking the extrapolation methodology is crucial. To draw relevant lessons from a reference model to a specific situation, adjustments are necessary for population demography, population health, patient's insurance, physician's productivity, and health system organisation. Obviously, these adjustments are feasible if appropriate information is available.

In the real world, supply projections of medical workforce are often based on mixed methodologies. In the Netherlands, for instance, epidemiological projections are considered along with demographic projections to estimate the evolution of health services demand (Westert, Schellevis and van der Zee, 2006).
The most common mix encountered in the literature associates supply-based and requirement-based parameters, which allows performing gap analysis for future years and taking action to make medical supply match the requirements.
Researchers have developed other methods, such as the effective demand-based approach and the effective infrastructure approach. For a detailed analysis of these models refer to Lomas, Stoddart and Barer (1985), O'Brien-Pallas et al. (2001), and Gavel (2004).

Issues relating to human resources are complex in essence, and such complexity is only partially captured in static models, based on a deterministic approach, such as the approaches we have reviewed so far. These models lack the capacity to examine the dynamic relationships among inputs and outcomes. There are alternatives to such bounded approach (the *econometric approach*), such as regression modelling,

deterministic sensitivity analysis, and stochastic simulation.
This approach estimates the workforce needed regarding the present and future resource constraints of the healthcare system. It is a macroeconomic model which is based on the determination of the price that patients would be willing to pay (directly or indirectly) for services.

Regression modelling could be a more appropriate approach. Such models allow to adjust for the effect of various parameters and to estimate the importance of each of those parameters on the supply and requirements for health care professionals. It would also be possible to compute confidence intervals around the required numbers.
However, such models have been seldom used so far. It was done in the USA by Angus, Kelley, Schmitz, White and Popovich Jr. (2000), and by Lipscomb, Kilpatrick, Lee and Pieper (1995), in Australia (Australian Medical Workforce Advisory, 2005), and in Ontario, Canada by Persaud et al. (1999a; 1999b) The difficulty to obtain accurate data on determinants of services utilization and provision is an obvious obstacle.

Uncertainty in health projections needs to be assessed. The two commonly used approaches are deterministic sensitivity analysis and stochastic simulation.
In sensitivity analysis, the input value of one variable is changed while the input values of other variables are held constant. A sensitive variable is detected if a change in its value results in a considerable change in the outcome. A range of projections can then be produced by varying the input value of the sensitive variables (see e.g. Westert et al., 2006). In stochastic simulation, the value of input variables is randomly assigned according to its probability distribution and the outcome of the projection will also be a random variable. This process is repeated until a large number of projections have been made.

4.4 Policies to meet the planning

In the following we will consider various policies for the regulation of the number of professionals. Two very often used methods, *numerus clausus* and occupational licensing, will be dealt with first. Other policies concerning the matching of available financial resources to the available amount of training positions, and offering subsidies as a lump-sum (and not per student) will be discussed as well.

4.4.1 Numerus clausus

Numerus clausus entails a certain, by the government predetermined, number of basic medical education places offered to students. Delimiting

the number of students studying medicine has an indirect effect on the postgraduate medical education market too. The *numerus clausus* is an annual ceiling on the number of students allowed to enter the basic education market (Dubois, McKee and Nolte, 2006). A *numerus clausus* for medical education (in basic medical education and/or for medical specialists education) is used for example in Australia, the Netherlands, Belgium, France, Greece, New Zealand and in Norway.
The motivation behind the set-up of a *numerus clausus* is often to avoid spending money on educating specialists who will be most likely unemployed as soon as the education programme is terminated. Moreover, an oversupply of specialists is usually perceived as a factor increasing supplier induced demand (SID). A *numerus clausus* is thus often combined with subsidisation of the medical education.

There are several degrees in how strict this clause can be and where or when it should be set up. Belgium, for example, does not restrict the number of students but the number of licences handed out[27] (Simeon and Hurst, 2006). France applies a *numerus clausus* in the second year of undergraduate school. The Netherlands apply it at the beginning of the education and use a lottery to decide which students can enrol (Simeon and Hurst, 2006).

Consequences of numerus clausus
The targeted effect of a *numerus clausus* is to align the demand for healthcare with the supply. The problem with this is that the future demand for healthcare needs to be estimated. For an estimation to be close to the truth an extensive analysis on current and past needs, and involvement of all stakeholders is required. Furthermore, the analyst has to have a highly creative mind because the need for not yet existing care has to be added as well (Dubois et al., 2006).

Because of the above mentioned matching and the variation in morbidity, mortality, health expenditure as a percentage of GDP, and in the design of health systems, there are very different levels of number of physicians across countries. It is often seen that countries that have tried to control entry into training have a lower supply of doctors than countries that did not try to control the market. In some countries this low supply even resulted in a shortage. This trend gives rise to concerns in OECD countries where the numerus clauses is used. There is a growing demand of healthcare and a tightening of the supply (Simeon and Hurst, 2006).

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27 This is however not the case for all specialties. Furthermore, this procedure is highly contested in Belgium.

To avoid or reduce the problem of undersupply, countries that use a *numerus clausus* to control the inflow should increase their annual ceiling (Simeon and Hurst, 2006). By raising the numerus clauses there is more diversity in the candidate pool and therefore in the workforce.
This can however only work when the different specialty groups complete their training at the same rate (Dubois et al, 2006). Because of the long training cycles, especially those of physicians, the impact of the *numerus clausus* restrictions or enlargements is often not felt until years later.

The use of a *numerus clausus* causes several reactions in the field. Especially when the change of admission places is large, the effect on teaching hospitals can be detrimental. The present amount of facilities and teachers can become too large or too small for the permitted amount of residents. The method of teaching or training may no longer be suitable for the new amount of residents and has to be adapted, which can take several years to be of certified quality. Another negative consequence can be the waiting times and unemployment among physicians. This occurs especially when there is a limited amount of places available for postgraduate levels.

Methods of selection
When a country uses the *numerus clausus* to plan the number of studens it still has to decide on how to choose the individuals who are able to follow the training.
In general, there is the possibility to select students before the start of or during their studies. When the selection takes place before the start of the studies there is the possibility of random selection (like a lottery) or selection based on prior academic achievement and aptitudes.

Random selection is used to give everyone who is eligible an equal chance to study. This method is cost-effective because students only need to show evidence that they are eligible. Random selection is used on all applicants, no matter how successful they finished their general medical education as long as they have finished their medical education. This method does not utilize any knowledge about the candidates suitability and is therefore not appropriate for the choice of specialty.

When the selection is based on prior academic achievement and aptitudes, however, only those who best fulfil the entry criteria are admitted. The control of teaching institutions is higher with this kind of selection.
It indicates that the candidates' suitability is used in the selection too but there is little guarantee that high-performing candidates also have the personalities and social qualities needed for success in the chosen specialties (Dubois et al., 2006).

When there is a restriction on medical specialty training positions and locations, selection is, in some countries, based on exam results.

By using selection criteria when the education has already started, e.g. in the second year of training (as France does) with the general education (Simeon and Hurst, 2006), then every eligible candidate has an equal chance to start training but only the best ones and those with the highest motivation may finish the training.
In this scenario the institution has maximum control and can pick out those students with the highest potential and the best personalities suitable for the chosen specialty. The downside is that the class sizes are very large in the beginning and there is a lot of wasted resources on the students that decide not go through with the study or who are not elected (Dubois et al., 2006). There is also the problem of capacity. Not every specialty has the capacity to offer training to everyone who is interested in that specialty.

4.4.2 Occupational Licensing

Occupational or professional licensing is an extensively used instrument to regulate workforce, especially in healthcare. Occupational licensing means that the entry into an occupation requires state or governmental permission. The license is bounded to some demonstration of a minimum degree of competency (Kleiner, 2000). This is in contrast to certification where people with or without certificate are permitted to perform specific tasks. In the following the effects of occupational licensing will be shown. The objectives will be worked out as well as the positive and negative impacts of occupational licensing.

Objective of occupational licensing

Licensing with medical specialists is common in most industrial countries either. Occupational licensing in healthcare focuses in the first place on a minimum average quality of aptitude of professionals in a specific occupation. Workers holding a specific license have proved to have a minimum standard of skills and knowledge. At the same time licensing can be used to regulate the total amount of workforce in healthcare. States, for example, can change the pass rates of exams to control the total amount of workers in an occupation or can change the difficulty level of the exam.

Pagliero (2005) views both goals of occupational licensing from the perspective of public interest and capture theory. While public interest theory views occupational licensing as an instrument to correct market failures and create maximal social welfare, capture theory assumes occupational licensing to be an instrument by the (healthcare) industry to realise maximal benefits (see chapter 1 for details of both theories). Referring to empirical data from the United States, Pagliero (2005)

concludes that exam difficulty increases in periods of low demand, which leads to an increase in quality of the candidates. This outcome is predicted by public interest theory as well as capture theory also when the reason to increase difficulty differs from both theories. The general literature is divided about the reasons and effects of occupational licensing. When looking at income effects and quality effects, it is hard to draw a clear conclusion if occupational licensing follows more the welfare economic theory or the capture theory (Kleiner, 2000; Law and Kim, 2005). Anderson, Halcoussis, Johnston and Lowenberg (2000) however, show that if an occupation - like physicians - is able to limit the number of competitors, they are able to increase their earnings. These findings have been supported by an international research (Kugler and Sauer, 2003).

Figure 7 shows the relationship between quality and price of health services. Kleiner (2000) concludes that regulation on accreditation by licensing impacts on the flow of practitioners. The flow will be limited because license requirements differ among states or countries. Due to licensing, the total amount of workforce will be limited, which leads to higher prices. At the same time the quality will increase because the exam to receive a license is difficult. Both factors affect the net quality of health services for the consumer. However, there are externalities that influence the perception of the consumer such as the accessibility to receive treatment.

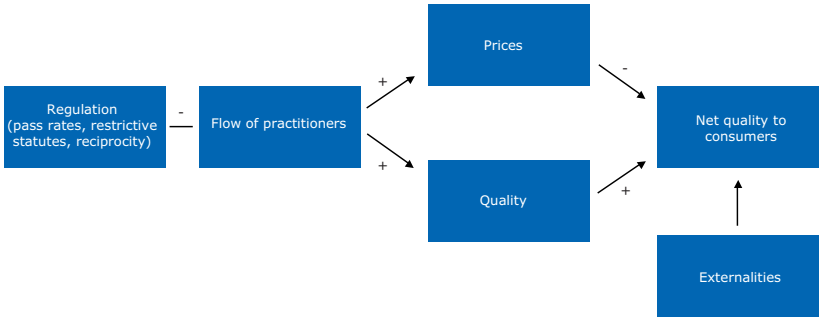

Figure 7. The impact of regulation on net quality
Source: Adapted from Kleiner, 2003

In conclusion, occupational licensing has an important role to guarantee a minimum quality of services provided by health professionals. At the same time it increases a monopoly position of several specialties. When deciding

on introducing (a certain level of) licensing in healthcare each country has to balance how far the restrictions benefit consumers by protecting service quality, given the current situation of a state.

4.4.3 Other policies

There are several other policies that can be used to plan the workforce of medical specialists.

There is the possibility to restrict the workforce by testing the motivation and aptitude of potential residents by implementing some sort of fee schedule (Dubois et al., 2006). This entails that there are costs involved by registering for a certain training programme. Only residents who are certain to be of high quality will enter (and residents who have money to spare), which results in a natural selection. It is even possible to let the potential specialists in training register for as many specialties as they want. The costs, time involved, and the expectation of success of these applications will restrict the number of applications (Jefferies, 2007). It is also possible to implement higher costs for the really popular specialties. When using this kind of schedule residents will be less focused into one specialisation. The motivation of the potential medical specialists can also be used to rank students, which Spain is experimenting with (Machado and Romero-Medina, 2008). The ones who score the highest on a motivational test will be the first to choose a specialty and a hospital where it is taught. The downside of this method is that the least motivated residents have nothing left to choose which could lead to even less motivation and a medical specialist of lesser quality.

Another policy to plan the workforce contains the use of minimum qualifications. Entrants will have to take a certain test or need to show that they have experience in the area of the specialty and those who pass may participate in the programme. The teaching hospitals can make their own tests and decide whether to take the best 10 or to welcome everyone with a score above a certain limit (this choice will be based on the capacity of the training positions).
A problem that governments should avoid is that an undersupply of medical specialists could occur when the control of the amount of medical specialists is in the hands of other medical specialists (Simeon and Hurst, 2006).

There are also policies to plan the workforce supply through recruitment and retention plans. Implementing incentives in labour contracts, for example to stop working early or to change professions (from outside option back to medical specialist or vice versa), can influence the decision of the medical professionals to work in a certain area.

4.5 Conclusion

Workforce supply is a central and important component of the healthcare system of each country. The goal of the planning of human resources is to guarantee the availability of a sufficient workforce to meet population health needs. Deciding what workforce is needed in the future, recruit it and train it should be in principle a relatively easy task. However, in practice the planning is difficult and complex. Technological and social changes imply that some skills are likely to become redundant.

The state has a strong interest and benefits in properly planning the medical workforce supply.
The gains stemming from good planning are significant for the state as employer when the expenditures on the given profession are high (many employees and/or high salaries). Even if the state is not the main employer, it is reasonable to plan the number of residents if the government bears the costs of the education in a large extent (or totally).

A good balance of the supply of human resources between specialties is essential for the effective provision of healthcare services. Separate planning or the regulation of only one specialty irrespective of the developments in the supply of other specialties is inappropriate.

We also find reasons to restrict the entry of professionals to the labour market when quality concerns arise. Moreover, entry rationing is needed to avoid an unnecessary and costly duplication of medical knowledge, and supplier induced demand.

Part II
5 Postgraduate medical education in Belgium

Belgium is an interesting country to analyse when thinking about planning postgraduate medical education. In the past Belgium was one of a very few countries with an oversupply in medical workforce. This is remarkable as education is very expensive and oversupply might be thus undesirable. On the other hand oversupply causes more competition among specialists and might beat down the price for treatment. In the last years the situation in Belgium changed from far going self-regulation to more public influence. According to the enforcement theory (Shleifer, 2005), Belgium made a shift towards more regulation.
This chapter tries to analyse the effects of that shift. Before that, this chapter gives an overview of the postgraduate medical education system, its financing and the way quality is assured.

5.1 Overview of the system

Medical training is a seven-year university course.[28] Medical studies are divided into two cycles: the first, lasting three years, covers basic scientific education (Bachelor's degree); the second cycle, lasting four years, is the Master's training and includes clinical studies and practical training in a hospital or a medical practice. After these seven years, students receive their physician's diplomas. For the last 15 years, the number of students receiving their physician's diplomas is approximately 1,100 each year (European Observatory, 2007). Belgium has currently seven medical schools with a complete training scheme for physicians.

In order to be able to practise, a physician needs a licence granted by the Federal Minister of Public Health. Further training is needed to obtain this accreditation. Students wishing to become specialists follow training from four to six years, depending on the specialty. Their choice can be constrained by the small number of training posts available at teaching hospitals. Specialisation is restricted to a limited number of candidates. To be eligible for specialisation, a student has to submit a training plan indicating the name of the supervisor with whom they wants to specialise

28 Pharmacists and dentists follow a five-year university course.

and the in-service department where they want to work, together with the agreement of the supervisor and the in-service department. The training plan has to be approved by the licensing commission for the specialty concerned. There are 30 recognised specialties. Those wishing to practise general medicine undergo two years of training.

The authenticity of diplomas is verified by provincial medical committees of the Federal Public Service Public Health, Food Chain Safety and Environment, which register all physicians, dentists, pharmacists, physiotherapists, nurses, midwives, etc. with an authentic diploma. Anyone who is not properly registered is not allowed to practise. The licence is given for an unlimited time, that is, once healthcare professionals have been given the right to practise, they do not have to apply again to keep that right. However, in cases of malpractice, licences can be withdrawn.

To be accredited for providing health services within the context of the compulsory health insurance, health care professionals need to notify the National Institute for Health and Disability Insurance (RIZIV/INAMI).

5.2 Financing

5.2.1 Cost and benefits of specialists' education

Antares Consulting studied the costs of medical research and education in 2002 at the request of the Council of University Hospitals of Belgium (Raad van Universitaire Ziekenhuizen van Belgi', RUZB). The aim of the enquiry was to identify and quantify the different type of costs of education and research in university hospitals. The results show that the expenditure on education amounted to €30,022,842 in an average institution in Belgium in 2002. The same sum for research was €46,314,650, and the two activities together added up to the 24.3% of the total costs of the hospital. University hospitals receive financial funds for their academic activities from different sources (see section 5.2.2), however, all supports together covered only €24,861,399 from the costs in 2002. This implicates that university hospitals faces a loss of €45.3 million related to their teaching and scientific functions.

In the research the following costs types were identified:

- direct costs: all instruments and expenditures directly related to research and education
- value: salary costs which are related to academic tasks of doctors, and are financed by some other organisation than the hospital. (When comparing the hospital's expenditures and the received funding, this amount is not considered. However, value has to be involved in the

calculations when identifying the total expenditure on research and education.)

- indirect costs: expenditures that are only indirectly related to research and education
  - pure indirect costs: costs of services provided by the university departments of the hospital that can be assigned to research or education
  - indirect costs of the structure: costs of the general services and overhead – a part of these cost can be assigned to the education and research
- induced costs: extra costs due to the "overuse" of some services (pharmacy, laboratory, radiology) like the parallel usage of traditional and new/ experimental medical practices or the "efficiency loss" in the work of doctors due to the time spent on education. Induced costs are not tangible, and therefore hardly definable.
- opportunity costs: incomes that would have been generated if the hospital uses their sources in a different way than teaching or research

Costs of education in academic hospitals (in € in average per institution)	
Direct costs	7.675.154
Value	2.437.318
Pure indirect costs	5.457.443
Indirect costs (general services and overhead)	4.333.252
Induced costs	6.871.561
Opportunity costs	3.248.113
IN TOTAL	30.022.842

Table 3. Costs of education in university hospitals (in 2002)
Source: Antares Consulting, 2003

5.2.2 Sources of financing

University hospitals receive funding for their academic activities from four different sources. The most significant is an additional budget (besides the general hospital budget) offered by the government (referred as part B7). The budget considers the direct and indirect costs of education and scientific research, and binds the support of hospitals to requirements (see section 5.2.3: Allocation of budget).
The National Fund for Scientific Research (Nationaal Fonds voor Wetenschappeloijk Onderzoek, NFWO) offer support to researchers (postgraduate and post doctorate) in all fields of science. The funds for physicians (before their postgraduate education) and specialists make it

possible that doctors devote a part of their time on scientific research. The fund covers a portion of their salary diminishing the financial burden on the university hospital.
Universities and private funds also contribute significantly to the education and research costs. Figure 8. shows the proportion of different sources in hospital resource for academic activities.

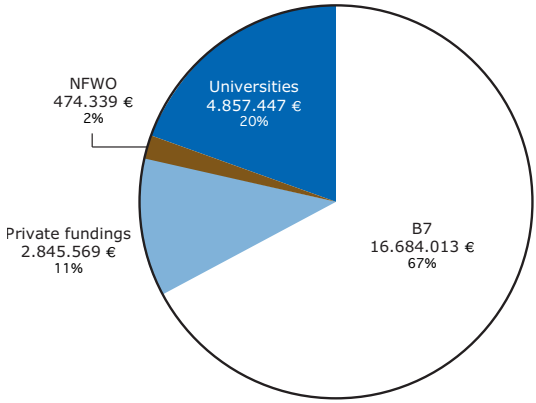

Figure 8. Sources for academic activities (2002)
Source: Antares Consulting, 2003

5.2.3 Allocation of budget[29]

The part of the budget that is available for scientific research and education is distributed across the academic activities as follows:

- 25% of the amount is devoted to support and encourage scientific publications. In order to be entitled to this fund, university hospitals have to realise minimum 3 publications per 10 beds in three years preceding the year of the support.
- 15% of the amount is spent to cover the costs of medical education. Teaching hospitals receive a capitation fee based on the number of teaching physicians and residents.
- 60% of the amount covers the indirect costs of the academic activities. The sum allocated to each hospital is proportional to the budget intended to cover the costs of hospital services.

Further conditions to receive the funding are:

- The hospital has to be approved for complete education programmes in de most important specialties.

29 Based on; Koninglijk besluit, 2002.

- There has to be minimum one resident (with an approved curriculum) per ten approved beds and the hospital itself has to pay the compensation for residents.
- The hospital has to employ minimum one physician (in fte) per three approved beds.
- It has to be proved that the 70% of the medical activities is performed by full-time working physicians.
- More than 70% of the physicians (in fte) have to receive a salary rather than a fee for service reimbursement.
- Quality assurance of medical education in Belgium

5.3 Quality assurance of medical education in Belgium

In this chapter we will discuss the measures Belgium has taken to assure a certain degree of quality in the education of medical specialists. The measures differ from self-regulation to accreditation/certification to entry-rationing.

In Belgium there are several associations that stand for the rights and duties of the medical profession such as the National Council for Quality Promotion and the Federation of Belgian Associations of Medical Specialists (*Verbond van Belgische Beroepsverenigingen van Geneesheren-Specialisten*) (VBS). The VBS and other organisations, such as the sickness funds, have proposed several possibilities[30] to assure quality within healthcare (medical faculties and scientific organisations did not come up with any proposals).

The chapter is organised as follows: we will first consider self-regulation methods such as the Local Peer Review Groups, then the governmental regulations are discussed and we will end with a European regulation.

5.3.1 Local Peer Review Groups (LOK)

Self-regulation is a method that would work in Belgium because physicians are said to be 'highly suspicious of rules established by non-medical persons' (Schepers p.589, 1997). To overcome this suspicion Local Peer Review groups (LOK) were proposed and accepted. Since 1996

30 One example is that due to pressure of the *Consilium Chirurgicum Belgicum*, the Surgical Specialty Boards in May 1993 organized examinations for surgeons in training "in order to improve the control on their progress in education before issuing a specialist license" (Hubens en van Hee, 1994).

continuing medical education in Belgium has taken the form of LOK's. Through continuing medical education, teaching physicians stay up to date concerning new and developing area's in the medical field which keeps the education from becoming outdated.

A LOK is set up as follows; in one group there should be 8 to 25 physicians from the same geographical area who attend the evaluations for a minimum of two times a year. Each group deals with one specialty. Medical faculties, the physicians and the scientific organisations are supposed to facilitate the evaluation process of the LOK. The activities of the LOK contains reflection on the data concerning the performance of individual medical practitioners, achieving a general agreement on which subjects will be evaluated on medical strategies, evaluating the prescribing profiles and the development of an annual evaluation report (Corens, 2007). The process of the peer review by LOK's starts with the checking of the relevance of data on behaviour (e.g. the amount of time spent on learning/ teaching ethics) and on recommendations on good medical practice. This is done by several LOK's together. Based on this evaluation all participating physicians receive feedback. Then, per LOK, physicians test their own individual behaviour against that of the others and so try to improve quality with the help of this frame of reference, like it is done in benchmarking.

In Belgium the possibility exists to receive a quality accreditation. The National Institute for Health and Disability Insurance (RIZIV-INAMI) oversees the system of ongoing training of physicians by means of the accreditation system and peer review. This quality-accreditation can be seen as a form of certification and must not be confused with the accreditation a hospital needs to be able to teach.

To apply for quality-accreditation membership of a LOK is obligatory. The accreditation itself is however not obligatory. There is however also a financial incentive attached to having this accreditation. Quality-accredited physicians receive a fee supplement which results in a 4% bonus based on salary (Peck, 2000; RIZIV, 2005), and patients are encouraged to obtain services from accredited physicians by means of lower out-of-pocket payments (Corens, 2007). In 2003 this procedure has been evaluated (Heyrman et al. 2003). The results show that the quality and the participation in training has improved.

5.3.2 Entry rationing

Another proposal that came from the organisations was the limitation of medical specialists, by means of the *numerus clausus,* that became effective in 1996. Most of the different actors in the Belgian healthcare

field felt that quality is negatively affected by an oversupply[31] of medical specialists (Schepers, 1997). It is thought that when (young/training) doctors have less patients to care because of oversupply of physicians, a lack of medical experience occurs and so the quality of care could become lower. Too little learning opportunities is also a possibility when there are many students and when the teacher/student ratio becomes too small the quality and efficiency of teaching will become lower as well. This formulated an extra motive to install a *numerus clausus* in Belgium.

Aside from the proposals of the LOK and entry rationing, the medical society in Belgium believes that the freedom of choice for the patients and the physicians is the best method to ensure quality of care (Schepers, 1997) and education. The rationale is that when patients can choose a hospital they will choose the one with the best physicians. Hospitals will thus invest in attracting these physicians and when the physicians are better there is a higher chance the education of medical specialists will be better as well. This liberal medical ideology together with the strong preoccupation with costs by the government lead, according to Scheper, to perverted incentives to put a limit on the number of medical acts and activities.

5.3.3 Governmental regulations

The government has set up several bodies to influence the quality of education of the medical training. These tasks are performed by the Management Council and the Authorisation Commission.

5.3.3.1 Management Council (De Hoge Raad van geneesheren-specialisten en van huisartsen)

In 1999 a law was passed to determine general criteria for the acknowledgement of medical specialists. This law is assisted by the Management Council.
The Management Council consists of a Dutch and French speaking department of each 52 members. The chairman of the council is a physician chosen by the ministry of Public Health. The duties of the council concerning the medical specialists consist advising the minister about the criteria one must comply to, to be acknowledged as medical specialist and about the guidelines and recommendations concerning the authorisation commissions. The two departments have the responsibility to reach a verdict concerning the appeals against the advice of the authorisation

31 In 1995, one physician cared for 264 Belgians. In 1994, there were 15.1 GPs for 10,000 inhabitants in Belgium and 4.6 in the Netherlands. The global figures for medical specialists are respectively 15.87 and 9.19 per 10,000 inhabitants (Schepers, 1997)

commission. Another responsibility is to decide over the advice of the authorisation commissions concerning education and recognition of medical specialists (portal.health.fgov.be).

5.3.3.2 Authorisation commission (Erkenningscommisie)
The Royal Decree of November 25, 1991 established the foundation of an authorisation commission for each medical specialty (portal.health.fgov.be). The commissions consist of 6-16 members of which 3-8 are acknowledged specialists of the concerned specialty and who have an academic background and are nominated by their faculty. The other 3 to 8 members are medical specialists who are nominated by their professional organisation. The duties of the commissions consist - among others - of giving motivated advice to the minister concerning the applications for acknowledgement of medical specialists and related matters.

5.3.3.3 Report cards
The Belgian government created a score card that is balanced by using medical and non-medical indicators. With these indicators, benchmarking will tried to be reached to stimulate hospitals to increase their performance and improve the quality of provided healthcare (Corens, 2007) and education.
As was explained in section 3.3.2: Market-based instruments can stimulate a better quality of education because it will make the education more transparent and potential medical specialists will choose a teaching hospital accordingly. The best medical specialists will thus seek out the best teaching hospital. This can increase the overall quality because every teaching hospital will want the best residents just as a company want to hire the best applicant.

The Belgian sickness funds also try to stimulate record-keeping by handing out financial incentives for record-keeping by physicians. Their motive is to exert pressure with the information on the behaviour of doctors (Schepers, 1997).

5.3.4 Rationing working hours

According to the European Working Time Directive (EWTD), which was installed in November 1993, residents will not be allowed to be on call for more than 48 hours a week. The complete directive is named Dir. 2000 / 34 E.C; the containments are that residents need a daily rest time of 11 hours (this comes down to 1 rest day in 7 days), have a maximum weekly working time of 48 hours and are allowed the possibility of working with reference-periods, and also about the point of view of the European Court of Justice that "time during which the employee is obliged to be present at the workplace" is to be considered as working time*" (EIRO, 2004).*

The intention of this directive is to keep residents fresh and alert to make sure they absorb all the relevant information that is supplied during the training and education, and that they and their patients are safe from sleep-deprived accidents.

5.4 Regulation of workforce supply

The current number of almost all healthcare personnel per 1,000 population has increased in the last 30 years (OECD Health Data, 2008). One of the reasons of such growth is the absence of control on the supply side of the market. According to the European Observatory (2007), an oversupply of physicians, dentists and physiotherapists has generally been accepted in Belgium. The overall number of registered physicians almost doubled in the last 25 years, going from 22,763 in 1980 to 42,176 in 2005, including 21,804 GPs and 20,372 specialists (KCE, 2008).

Registered physician numbers are commonly used by international organisations, such as OECD or WHO, to compute the physician-to-population ratio. On the basis of these figures, in 2005, OECD ranked Belgium third in terms of physician/population ratio (4,0 physicians per 1,000 inhabitants). Compared to its neighbouring countries (France 3,4, Germany 3,4, Luxembourg 2,5 and the Netherlands 3,7), Belgium had more physicians per 1,000 inhabitants in each year between 1970 and 2004. Also compared to all EU Member States, Belgium has a high ratio of physicians per 1,000 population.

KCE (2008) makes, however, an important distinction between registered physicians and active physicians.[32] Not all registered physicians are professionally active, and only a proportion of active physicians provide curative health care, other fields of activity being scientific research, administrative service, employment in pharmaceutical companies and insurances.

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32 Active physicians are physicians currently working in the country (alive, not dropped out and not retired) and they include GPs and specialists. Practising physicians are GPs or specialists performing at least one contact a year to at least 50 individual patients. Accredited physicians are practising GPs reaching at least 1,250 contacts a year. To obtain and keep the accreditation, the practitioner has to complete a Continuing Medical Education program, keep medical records for each patient, respect specific guidelines in practice and engage in a minimum level of activity. For specialists, the minimal level of activity is determined by specialty, and takes into account visits, consultations and technical acts. This accreditation, a quality label which is financed, is voluntarily requested by physicians who would like to be recognized for their activity levels as well as for their continuous training.

The overall number of active physicians was 36,770 in 2002 (18,205 GPs and 18,565 specialists respectively) and equal to 38,204 in 2005 (18,332 GPs and 19,872 specialists respectively). Between 2002 and 2005 the number of active specialists increased by 7%, while the number of GPs stayed roughly the same.
There exist differences between specialties in the number of active and accredited specialists (according to the RIZIV[33] definition). However, the number of active and accredited specialists per specialty might be overstated since specialists are labelled as "active" when they have not been declared dead, retired, dropped out, or permanently living in a foreign country. Therefore, a proportion of "active" specialists provide very low level of activity or no medical activity at all.
All in all there are differences in the number of practising specialists between the different data sets. The KCE definition of practising specialist underestimates numbers for mainly hospital-based specialities (KCE, 2008). These elements of discussion underlie the need to develop and harmonise the management of data on human resources for health (KCE, 2008).

The activity levels of specialists vary among specialties. Nine of them totalise 76% of all ambulatory consultations (gynaecology, ophthalmology, orthopaedics, dermatology, paediatrics, internal medicine, surgery, neuropsychiatry, and ENT). The density of specialists also vary geographically. In the Flemish community there are on average 8.9 specialists per 10,000 population, while in the French community the average is about 22.9 specialists per 10,000 population.

European regulation allows foreign physicians to practise in Belgium. Most inflow of physicians originates from neighbouring countries such as the Netherlands, Germany, and France, and to a lesser extent from Italy and Spain. Since 1980 there has been a rapid evolution of foreign doctors asking for a visa to practise in Belgium. The increase in immigration of physicians in Belgium can partly be explained by the demand for doctors in some specific sectors, most notably the hospitals (KCE, 2008).
KCE (2008) finds limited information on emigration of Belgian doctors. Figures do not indicate whether the migrating physicians are Belgian or foreigners getting back to their native country. A growing emigration towards the Netherlands is recently observed but not really computed.
Of course, such a migration of doctors makes any forecasting and planning exercise a difficult task for the Committee of Medical Supply Planning, which duty is to predict the "right numbers" of doctors to respond to

33 Rijksinstituut voor Ziekte- en Invaliditeitsverzekering.

future health needs. It is nevertheless an important factor to take into consideration when planning and programming the future medical supply.

5.4.1 Medical Supply Planning

For many health professionals the excess supply has had serious consequences. Newly-qualified GPs have been able to earn such limited incomes that the rate of return on their education is low, and they have in some cases been forced out of medicine altogether. Although excess supply of health professionals has been an acknowledged problem since the 1970s, only in the late 1990s attempts were made to address it (European Observatory, 2007).

The Federal government introduced in 1996 the Practice of Medicine Act, which empowers the Federal Ministry of Public Health to plan and limit the number of physicians and dentists that may apply for getting a licence to practise under the national health insurance system. At the same time the Committee for Medical Supply Planning was established to give advice on the numbers of physicians and dentists qualified to practise in Belgium. This committee proposed in 1997 a *numerus clausus* mechanism. Since 2004, quotas determined the number of new physicians allowed to submit a training plan and to further register with the National Institute for Sickness and Disability Insurance. Later, the remit of this committee was extended to cover physiotherapists, nurses, midwives and logopedics.

The committee is responsible for formulating proposals to the Federal Minister of Public Health on the annual number of candidates per community that are eligible for being granted the professional titles of physician, dentist or physiotherapist, after obtaining the relevant diploma. Furthermore, the committee has to evaluate on an ongoing basis the impact of its proposals on the training for these professionals. An annual report is drawn up on the relationship between needs, studies and moving on to practical training, with a view to obtaining the special professional titles of physician, dentist and physiotherapist.

The goals of the Federal government with respect to physician planning can be summarized in two aspects, namely solving the geographic imbalance between the two communities, and fighting supplier induced demand (SID):

1. The Federal government has computed the quotas in such a way that the existing discrepancy in medical density between the North and the South of the country should gradually disappear. The restriction mechanism was applied immediately after the basic training and limited the number of trainees (GP or specialist) who can access the specialisation. The maximum number of medical graduates (already

holding a diploma in medicine) accepted for further training leading to practising with licence was 700 for the year 2004, 650 for the year 2005 and 600 for the year 2006 (in comparison to approximately 1,200 licences in 1999). Furthermore, the inflow has to be shared between the Flemish Community (60%) and the French Community (40%), and between GP (43%) and specialist (57%) training.

2. Conditions exist in Belgium for SID. Although decreasing, the physician-to-population ratio in Belgium remains high with large interregional differences. Several other characteristics of the Belgian health care market could favour physician inducement. In short, Belgian physicians are dominantly paid fee-for-service, patients are fully insured by the compulsory health insurance (except for co-payments) and prices are fixed for GPs. In a fixed fee-for-service system, individual physicians can only offset a decrease in income due to an increase in the supply of physicians by generating more patient contacts or by attracting more patients.

5.4.1.1 Different regulations in selecting students

The Federal Minister of Public Health fixes yearly the number of practice licences available to trainees. However, the Community Ministers of Education bear the responsibility to adapt students' intake so as it fits the number of trainees who will be eventually allowed to further specialize as GPs or specialists. This regulation of students' intake was implemented differently in the Flemish Community, which introduced an entrance examination, and in the French Community, which opted for a selection procedure after the first year of study.

5.4.1.2 The Flemish community

The Flemish community has adopted an immediate selection procedure by means of an entrance examination. It is an exam and not a competition: everyone who passes the exam is eligible to register in university training, without any number restriction. Each student can try to pass this examination more than once.

Globally, taking into account the 22 sessions organised since 1997, 19,283 candidates were registered of which 42.6% succeeded, i.e. 8,214 candidates. The low success rate for this entrance exam does not seem to discourage candidates, who are more numerous year after year. Students having succeeded receive an attestation and can register in any Flemish university. Nevertheless, that does not mean that all successful candidates will do so (KCE, 2008).

A mean of 82.4% of successful candidates will actually begin training in medicine or dentistry. Among them, 90% will opt for medicine; the remaining 10% choosing dentistry.

The entrance exam seems to effectively act as a filter before the entrance at the university. After this difficult stage, the success rate during medical studies is quite high (over 80% since 1997 at the end of the first year) (Janssen, 2006).

5.4.1.3 The French community

The French Community adopted, in 1996 and 1997, a selection system at the end of the third year of training. The selection was based on the results of the first three years of university training. The selection tests were introduced for the first time in 1997-1998.
In 2003, the selection process was suppressed, effectively allowing all students to keep on training after the third university year.
In 2006, the selection was re-initiated but, this time, at the end of the first year on the basis of exams results.

Numbers of attestations giving access to second year are spread between universities respecting historical sharing. The sharing will be reviewed every 5 years from 2010 onwards, according to numbers of first cycle students per university.

Although the quota was set at 333 for 2012, 420 students were admitted in the second year to compensate failures and withdrawals from the training and to allow immunized posts (overall 17 posts in data management, forensic medicine, occupational medicine, research). Also, a limited number (5 per university) of students having a foreign valid first cycle diploma delivered by a foreign university, can access to the second cycle, i.e. outside the selection exam.

Students who are not admitted to the second year can use their training credits in other teaching orientations such as biomedical sciences, chemical sciences, pharmacy, bio-engineer, physiotherapy and rehabilitation. Nevertheless, unselected students can also make the choice of taking the exam another time, but they can not enjoy credits or reports of results. Students who did not pass the exam can take it again, but not more than once.

Between 2004 and 2006, the overall number of seventh year students was 8.7% higher than the fixed number of training positions for specialisation (including GP). This excess will be more important from 2008 onwards due to the lack of regulation in 2003-2005 (KCE, 2008).

5.4.1.4 Difference between quotas and training plans

After the completion of the seventh study year, students can chose their specialisation. The total number of attestations delivered by the Flemish and French community should not exceed the quotas set by the Committee of Medical Supply Planning.

In reality discrepancies can be observed between requirements as defined by the legal quotas and actual fulfilled positions. These differences are particularly significant for specialists, who in the period between 2004 and 2006 show a difference of 19.5% and is more marked in the French community.

Table 4 summarises these differences between quotas and training plans.

Number of training plans 2004-2006		Flemish community	French community	Belgium
GPs	Quotas	540	360	900
	Fulfilled	355	315	670
	Difference	-185 (-34.2%)	-45 (-12.5%)	-230 (-25.5%)
Specialists	Quotas	720	480	1200
	Fulfilled	836	598	1434
	Difference	+116 (+16.1%)	+118 (+24.6%)	+234 (+19.5%)
Overall	Quotas	1260	840	2100
	Fulfilled	1191	913	2104
	Difference	-69 (-5.5%)	+73 (+8.7%)	+4 (+0.2%)

Table 4. Differences between quotas and training plans by community and GPs and specialists, 2004-2006
Source: KCE, 2008

Some of the minimum numbers guaranteeing renewal of the human stock per specialty is not guaranteed. In the Flemish community, this is the case for psychiatry (64% of the minimum required), for geriatrics (16.7%), for clinical biology (62.5%), and in the French community for geriatrics (33.3%) and for clinical biology (88.9%).

5.5 Forecasting medical supply and requirement

Several models have been implemented since the implementation of the *numerus clausus* to assess the future medical manpower. Most models use a "stock-and-flow" approach, that is, projections are based on a base-year stock of physicians, and the size of this stock is subject to exogenous factors such as inflows and outflows.

The current model used by the Committee for Medical Supply Planning uses the following parameters: current stock (registered and licensed physicians), annual inflow (national and international), demographic factors (feminisation of profession and ageing), and outflow (mortality).

The KCE (2008) discusses this model and points out its limitations. Two aspects make it in particular hard to make correct predictions: (1) in such a model the future is forecasted on the basis of past or current known events, any inaccuracy in the input data will sum up through the years and result in potentially large imprecision of estimates;[34] (2) it is a supply-based model that attempts to forecast requirements of physicians as a result of current trends observed in the workforce.

According to KCE (2008) the lack of precision of the forecast can be compensated by a great flexibility of the system. The *numerus clausus* does not primarily limit the number of training positions, but the number of practising licences available to graduates.
This number can be revised every year, so as required numbers of physicians can be fulfilled immediately, provided that enough graduates are available, i.e. the number of graduates exceeds the quota previously fixed for that year. This has been the case so far.

In 2011, seven years after the implementation of the *numerus clausus*, there will be an excess of more or less 800 medical doctors (+/- 300 in the Flemish community and +/- 500 in the French community), comparing to quotas set for general practitioners and medical specialists. However, in the absence of adaptation of quotas, these medical doctors will have to opt for an "out-of-quota" speciality (child psychiatry, acute medicine, emergency medicine, researchers
involved in regulated specialties), to train as medical doctors in a foreign country, or to choose a professional activity not requiring an INAMI/RIZIV licence.

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34 For example productivity changes are not counted in this model, as well as the drop-out rate.

A last difficulty met in recent years is about fulfilling specific quotas. Although the global quotas were respected during the period 2004-2006 (+0.2%), 25.5% of the quotas were unfilled for GPs. The phenomenon is also noticed in other specialities.

5.6 Empirical results of SID of the Belgian specialists

As previously noticed the physician-to-population ratio in Belgium is high when compared to other countries and shows large interregional differences.
Moreover, the system is characterised by a fee-for-service compensation scheme for doctors and full insurance coverage for citizens. KCE (2008) has investigated the existence of SID in Belgium, operating in the form of a positive correlation between physician density and healthcare utilisation. This correlation should be interpreted cautiously: the physician density variable might be endogenous[35] and the correlation could reflect an availability effect (inducement) due to lower opportunity costs in terms of waiting and travelling costs (patient demand respond).

Schaumans (2007) shows that the necessary condition for inducement is that the coefficient of GP density is estimated significantly larger than minus 1. This result is derived from the relation between consumption per GP and consumption per capita, both at the level of the municipality. The rationale is that supplier inducement will cause a positive correlation between GP density and per capita consumption. In the absence of changing physician (and patient) behaviour, a percentage increase in physician density of x, reduces the number of patients and hence consumption per GP by the same percentage. A necessary assumption is that the reduction in consumption is the same for all GPs in the municipality. Instead of assuming a proportional reduction in the workload of each GP in the municipality, alternative assumptions may be formulated (e.g. a larger decrease in workload for GPs with an existing workload above a cut-off point). Research on SID was performed both for GPs and

35 The number of physicians in a geographical area is potentially endogenous since physicians may be attracted by certain locations due to the level of demand. To correct for endogeneity bias in a cross-section analysis, two econometric approaches can be used, namely the two-stage least squares and the instrumental variables. Instrumental variables regression avoids bias provided that good instruments are available. Common instruments in the SID literature are population density or size and per capita income of the relevant geographical area.

specialists in Belgium.
Results on Belgian GP density measured in the municipality provide only weak evidence in favour of the inducement hypothesis. High levels of GP density generate a slight increase in the average number of visits per patient, but the effect is too depending upon the model specification. For the volume measures, the findings are consistent with the inducement hypothesis. Moving to the level of the arrondissement to take account of border crossing, the inducement effects for the volume measures disappear.
The evidence supporting SID is far more conclusive for specialists. While intensity of care is only positively correlated with specialist density for psychiatrists, the findings for the number of consultations per specialist support the notion of SID for all specialties.

5.7 Conclusion

The postgraduate medical education system in Belgium has made a shift in the mid 1990's from market forces towards regulation. In relation to Shleifer's enforcement theory, the laissez-faire regulation strategy in the Belgium education market caused negative welfare effects by decreasing quality of treatment and increasing SID. In the mid 1990's, Belgium made a shift along the institutional possibility frontier by introducing regulatory bodies, which reduced the total amount of enrolees into graduate and postgraduate medical education. These bodies also had the task to work out a more rational future planning of the medical workforce. Until now, it is not clear yet what the effects of more regulation will be. However, a more rationalised planning of the workforce might lead to an increase in welfare as laissez-faire regulation has proved to lead to negative welfare effects.

6 Postgraduate medical education in England

The English postgraduate education system for medical specialists has been chosen as a case study as it strongly depends on public intervention. Public authorities within the NHS system are responsible for medical workforce planning, its financing and the assurance of quality of education. On the one hand, according to the enforcement theory by Shleifer (2005), the English education market might experience some inefficiency as it strongly depends on political decision making. On the other hand, the education system might be efficient as governmental control prevents from disorder as market discipline might not work out in the sector of postgraduate medical education. After providing a short overview of the design of the postgraduate medical education system in England, this chapter deals with the financing and quality of training. It will sum up with a short analysis of the efficiency of the system.

6.1 Stages in postgraduate medical education

After graduating from medical school and completing a two-year generic training programme, which forms the bridge between medical school and specialist/general practice training (the so-called foundation training[36]), many doctors complete a third stage, postgraduate training, to become a GP or specialist (consultant in English terminology). The standards for this stage of training are set by the Postgraduate Medical Education and Training Board (PMETB) and are published in the *Principles of Good Medical Education and Training (2005)*[37]

In 2007 the four UK Health Departments agreed on a new career framework for doctors. Future doctors have to undergo a run-through training, which is a period lasting for several years that is a following up of the foundation programme, when doctors train to specialise in either general practice or a specialty. Structured specialist and GP training programmes begin with a competitive entry process followed by a period

36 Foundation Programme [http://www.foundationprogramme.nhs.uk/pages/home]

37 A different institution, namely the General Medicine Council (GMC), sets the standards and outcomes for basic medical education in the UK. This covers undergraduate education and the first year of training after graduation.

of continuous training. This will lead to the award of a Certificate of Completion Training (CCT), subject to satisfactory in-training assessment and progress.

Many specialty programmes will initially be broad-based (e.g. medicine). As they progress, doctors will narrow their focus to a particular specialist field (e.g. cardiology).
Progression through this kind of training is based on the achievement of competencies and will, on average, take approximately three years of training for general practice, and five to seven years for other specialties. The exact length of training therefore depends upon the career area/ specialty in which the doctor wishes to work and the rate of achievement of competencies. Specialist and GP training programmes are delivered through a range of organisations, overseen and supported by postgraduate deans. A doctor can compete for a place on a run-through specialty training programme to begin immediately upon successful completion of the foundation training and will be registered in the Specialty Registrar (StR) in a hospital specialty or in general practice.[38] Table 5 visualises the different stages in National Health Service (NHS) medical career grades.

Alternatively, doctors can apply for career posts, fixed term specialist training posts and for other specialist GP run-through training programmes. These programmes may begin at a more senior level than those just leaving the foundation training. If a doctor wishes to go into an academic medical career, they will usually need a research degree

38 The Specialty Registrar is a new training grade introduced in 2007 in the UK medical training as part of the Modernising Medical Careers programme.

<table>
<tr><th></th><th colspan="2">System (Modernising Medical Careers) as from 2007</th></tr>
<tr><td>Year 1</td><td colspan="2" rowspan="2">Foundation House Officer – 2 years</td></tr>
<tr><td>Year 2</td></tr>
<tr><td>Year 3</td><td rowspan="3">Specialty Registrar (StR) in a hospital specialty: 6 years</td><td rowspan="3">Specialty Registrar (StR) in general practice: 3 years</td></tr>
<tr><td>Year 4</td></tr>
<tr><td>Year 5</td></tr>
<tr><td>Year 6 to 8</td><td rowspan="2">General practitioner - total time in training: 5 years</td></tr>
<tr><td>Year 9</td><td>Consultant - total time in training: 8 years</td></tr>
<tr><td>Optional</td><td>Training may be extended by pursuing medical research (usually another 2-3 years), with clinical duties as well</td><td>Training may be extended by obtaining as Academic Fellowship for research</td></tr>
</table>

Table 5. The NHS medical careers grades
Source: http://www.mmc.nhs.uk/

There are other options available for doctors who successfully complete the foundation training, but do not go into run-through specialist or GP training programmes. They can apply to enter fixed term specialist training posts. Each year-long post must be applied for separately. These will only be available in hospital settings and are educationally approved training posts. These posts will reflect the first and second years of a specialist training curriculum so that a doctor will be able to achieve competences to those level. There will be no developmental training past the second year for doctors staying in these posts. No post will be offered at the third year level of specialist training or beyond.
At any time whilst working in these posts, doctors will be able to apply for a specialist or GP run-through training post or a fixed-term specialist training post in another specialty.

Strategic health authorities are managing the recruitment of the majority of training posts through their local deaneries and NHS trusts. Some specialties are recruiting by means of a national process handled by a lead agency or deanery on behalf of all deaneries. The approved exceptions to a locally organised recruitment are: small specialties, which have so few posts that it is better for recruitment to be organised nationally; larger specialties for which shortlisting and interview processes and scoring systems across the country have been standardised, so that an applicant's score from one unit of application (UoA) can be compared fairly with another applicant's score from another UoA, and; Academic Clinical

Fellowships, for which there is an established nationally organised process.

Figure 9, taken from the website "Modernising Medical Careers", illustrates at a glance the recruitment process for 2009 specialty training in England.

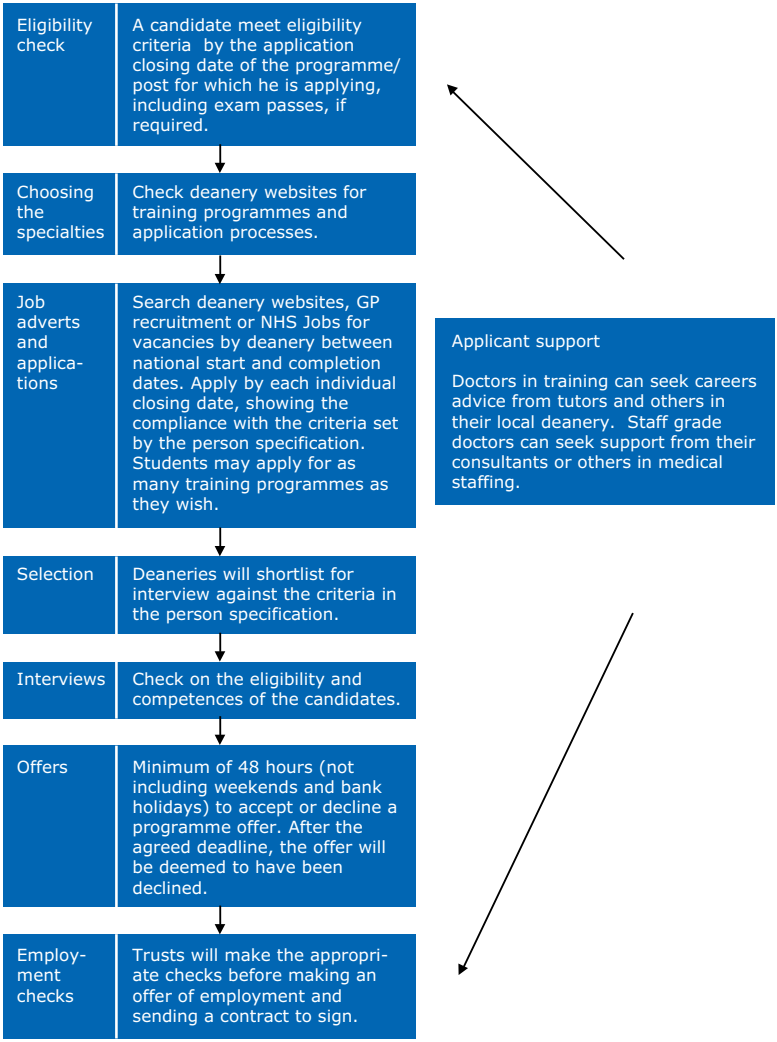

Figure 9. View of the recruitment process for 2009 specialty training in England
Source: www.Modernising Medical Careers, 2008

6.2 Financing

The whole NHS system is mainly financed by taxes. The government decides on the total amount of money the NHS has available. The money spend on education of doctors is part of the overall budget the NHS receives.

According to the Personal Social Services Research Unit (2007), becoming a consultant (i.e. senior specialist) requires an investment of £348,606. These costs include the net costs of the hospital (difference of benefits stemming from the work of junior doctor and the extra money spent on education) and the expenditures of the prospective specialist (living costs during the training and tuition fee) both in the pre-registration and the postgraduate period. While doing postgraduate education, doctors receive a salary by the hospital.

6.2.1 Sources of financing

The primary financing source of the development of NHS personnel is the Multi-Professional Education and Training budget (MPET). The budget is compounded from 3 sub-budgets (Non Medical Education and Training (NMET), Medical and Dental Education Levy (MADEL), and Service Increment for Teaching (SIFT)), which are used for the improvement of skills of different groups of personnel. NMET is aimed to support the pre-registration education and training of *non-medical* professionals and some aspects of their post-registration education. MADEL is the funding source of *postgraduate education of doctors* in the primary and secondary care, while SIFT offers support in the *undergraduate* education of doctors, especially for organisations providing clinical placements (Cheshire and Merseyside SHA, 2005). The MPET budget totals up (based on 2007/8 budgets) to approximately £4.31 billion, and the distribution between the NMET, MADEL and SIFT is 42%, 37% and 21% respectively. (Department of Health, 2008). It is worth to note that there is no earmarked support for placements for, among others, nurses, midwives and the allied health professions (Department of Health, 2002).[39]

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39 *Consultants* are senior specialists who have at least 8 years of total time in training. *Allied health professionals* are involved with the delivery of health or related services pertaining to the identification, evaluation and prevention of diseases and disorders; dietary and nutrition services; rehabilitation and health systems management, among others. Allied health professionals, to name a few, include dental hygienists, diagnostic medical sonographers, dieticians, medical technologists, occupational therapists, physical therapists, radiographers, respiratory therapists, and speech language pathologists. [Definition retrieved from http://www.asahp.org/definition.htm]

The three elements of the MPET budget were created separately during the '90s, and each had own processes, procedures and allocation rules. The detached feature of the budgets hindered an integrated approach to workforce improvement (across different professional groups), and diminished the education possibilities of professions that were not included in the target groups of the main budgets. Hence the NHS Workforce Planning Review of 2000 recommended major changes, which would promote a more flexible, integrated approach to workforce development. The aim was to develop a system which enables the NHS staff locally and nationally to react to changes in patient needs. As a consequence of these considerations, the three separate budgets (NMET, MADEL, SIFT) were merged into one bundled budget in 2001. However, breaking the barriers among the different financial sources was not entirely successful, and NMET, MADEL and SIFT remain mainly intact so far (Mallet, 2006).

The Medical and Dental Education Levy was introduced in 1996 with the aim to ensure that the funding does not provide disincentives to train the appropriate number of doctors and dentist. The long-term interest of hospitals is also to maintain the high level of qualification of the staff in order to be able to provide top quality services. However, if funding is not evenly distributed across NHS organisations, short term financial incentives may come to the front. MADEL is designed to prevent from these imbalances and supports:

- the salary costs of doctors, GPs, and dentists in training
- study leave, and the pay and non-pay costs of former postgraduate centres and libraries (many now providing a learning resource for all staff - though little access is available to those without a professional qualification) that are to be found at most general hospital and teaching hospital sites
- continuing professional development and continuous assessment of GPs
- Public Health training scheme and Dental Public Health
- Deanery[40] running costs
- medical and dental educational development initiatives (Mallett, 2006, p.4)

40 "Postgraduate Deaneries (or equivalents) in the UK are responsible for implementing specialty training in accordance with PMETB approved specialty curricula. Postgraduate Deans work with Royal Colleges/Faculties and local healthcare providers to quality manage the delivery of postgraduate medical training to PMETB standards. The standards that must be delivered are normally set out in educational contracts between the Postgraduate Deaneries and educational providers." (Department of Health, 2007, p.11) An NHS Deanery is a regional organisation. Deaneries are each advised by a Specialty Training Committee (STC), which includes consultants.

It is important to note that MADEL funds only the direct costs of the education, and it does not reflect the true expenditures, but it rather can be considered as a contribution to the education of the staff. According to the analysis of Mallett (2006), the salary costs add up to the 85% of MADEL, and a further 7% is spent on study leave and postgraduate centres and libraries. At national level only 0.5% of the MADEL budget was available for developmental initiatives.

6.2.2 Allocation of the budget

The Multi-Professional Education and Training budget is a revenue source from the Department
of Health to the Strategic Health Authorities (SHAs). The SHAs are responsible for managing the NHS locally, which means that an SHA

- develops plans for improving healthcare services
- supervises the quality and performance of local healthcare services
- decides on capacity increase
- makes sure that national priorities are incorporated in local health service plans[41]

In practice, Strategic Health Authorities decide on the allocation of MPET budget across different education programmes and NHS organisations. Figure 10 shows the role of different agencies in resource allocation decisions and the funding flows beginning at the Department of Health and ending at the NHS organisations.

41 Source (http://www.nhs.uk/aboutnhs/HowtheNHSworks/authoritiesandtrusts/Pages/authoritiesandtrusts.aspx)

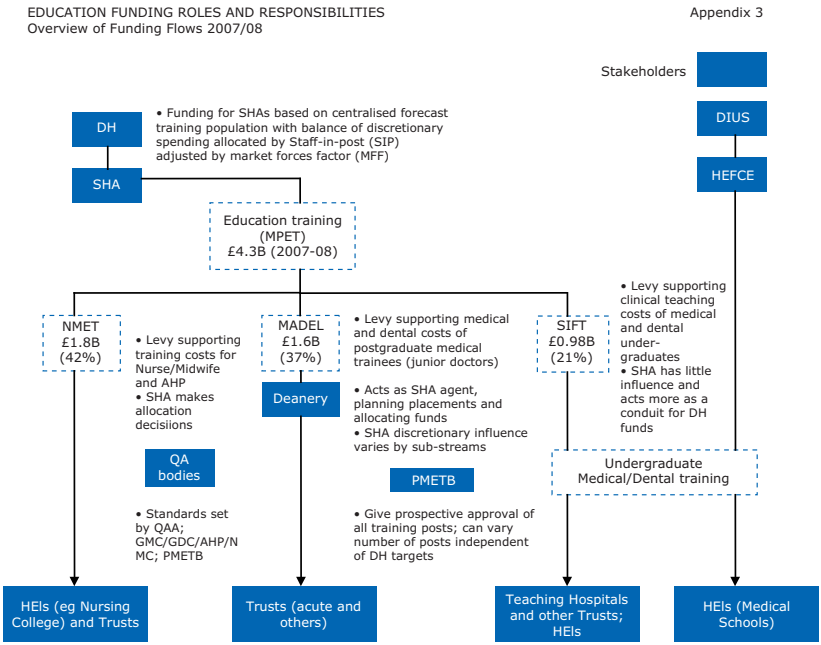

Figure 10. Funding Flows
Source: Yorkshire and the Humber SHA, 2008, Appendix A

The calculations to allocate the total budget across local SHAs follow an "equitable allocative methodology" based on forecast training populations for different groups of staff. As far as possible salary and fee levels have been standardised and discretionary funds and learner growth has been allocated, having regard to total staff-in-post weighted by market forces factors[42] relating to staff. Local (SHA level) discretion has been allowed in the use of funding, however it has been expected that the principle of equity would be applied." (Mallett, 2006, p.2)

42 Market Forces Factor is usually used to correct for unavoidable geographical cost differences. It comprises three weighted cost indexes: (1) staff index based on variations in wages in the private sector, (2) building index based on the moving average of tender prices for private and public building contracts, (3) land index based on the land value per hectare (Boyle, 2007).

As the Yorkshire and the Humber Strategic Health Authority observes, there is little possibility for the SHAs to make significant changes in the workforce planning and its funding. The main reasons are (1) offering the possibility to junior doctors to become a specialist involves a commitment of several years because the conditions of the training cannot be changed in the meantime (2) contracts with Higher Education Institutes in force (during more years), (3) centrally set number of training places and recommendations for both under- and postgraduate education. (Yorkshire and the Humber SHA, 2008).

6.3 Quality assurance of medical education in England

England has two main regulating agencies concerning the quality of the education of medical specialists: The Postgraduate Medical Education and Training Board (PMETB) and the Medical Royal Colleges. Furthermore, the European Union impacts on quality of education by introducing a Working Time Directive. In the following, the three factors will be outlined.

6.3.1 Royal Medical Colleges

Since 1550 England has Royal Colleges for every medical specialty. The royal medical colleges have been set up by physicians, medical specialists and teachers. The actions they perform can be seen as a form of self-regulation because it is not obligatory by law, but not complying does have consequences (nation-wide examinations). These colleges govern the medical specialties according to the assessments of education and training via nationwide examinations and awards the qualification in the specific specialty. In addition, they issue clinical guidelines and perform medical auditing. The colleges make use of a system of independent, national standard settings and take care of the nation-wide examinations for different specialties (European Observatory on Health Care Systems, 1999).

The Royal College of Surgeons (RCS) for example is a self-regulating body concerning the quality of surgeons (RCS, 2002). The Membership of the Royal College of Surgeons (MRCS) examinations are nationwide examinations that surgeons have to pass to be accepted as a member of the RCS. These examinations are competency-based and consists of multiple choice questions and an objective structured clinical examination that consists of 16 parts that take place in areas like anatomy, surgical skills and communication skills (Intercollegiate MRCS, 2008). Furthermore, the RCS has inspection teams that visit hospitals to inspect the training of surgeons. The visits take place in cooperation with representatives from

general practice and with postgraduate deans. The organisation is locally and is sponsored by the hospital chief executives (RCS, 2002).

All Royal Colleges use 'copying' (section 3.2: Enforced self-regulation) to reach better quality in education. The English system of education and training is a national system adopted in the whole United Kingdom. Even beyond national borders surgeons try to learn from each other. On a European scale Royal Colleges work together with the Royal Colleges European (RCE) and try to work out best practices that will be transferred to the joining countries.

6.3.2 The Postgraduate Medical Education and Training Board

In 2005 the quality assuring and inspection role of the Medical Royal Colleges has widely been taken over by the Postgraduate Medical Education and Training Board (PMETB). The PMETB came into existence via legislation. The PMETB is the regulatory body responsible for the postgraduate medical education and training (medical specialist education) (www.pmetb.org.uk). This board was set up through the General and Specialist Medical Practice (Education, Training and Qualifications) Order in 2003. The board is accountable to the Parliament but acts independently from the government. The actions and realisation of the standards can therefore not be seen as enforced self-regulation.
The goal of the PMETB is to ensure that postgraduate training for doctors is of the highest standard and that the knowledge, skills and experience of practicing physicians is improved.
They are doing this by assuring quality and by certification.

Quality assurance by the PMETB
PMETB strives for consistency and standardisation in the curricula of the different teaching hospitals. Therefore, the PMETB sets the overarching principles under which selection for teaching facilities takes place..

Most of the quality assurance by the PMETB lies in the cross specialty visits programme. The purpose of these visits is to monitor in how far the training standards are met and to approve or not the training programmes of different specialties. Complementary to these visits are the triggered visits. These visits take place when there is the suspicion of a serious educational failure that needs a rapid investigation to satisfy the concerns. These triggered visits need not to be confused with the surprised visits that were discussed in section 3.3.1: Financial incentives.

PMETB also tries to reveal the perception of the medical specialists in training with the help of national surveys. These surveys contain questions to measure the trainee's perceptions of the teaching hospitals compliance

with the generic standard for training set by the PMETB. Reporting tools have been given to deaneries and the medical royal colleges to produce reports on specialties per location. With the help of these report cards the perceptions of the trainees of one location can be compared with the nationwide perceptions. Benchmarking could be created in this way.

Certification by the PMETB
PMETB provides certification of doctors for application to the specialists registers. They also give aid and advice on how to qualify for a certification (like having followed a PMETB approved training programme).

Evaluating the outcomes of post-graduate medical education is also done by the board. This is to make sure that the (tomorrow's) needs of patients, trainees and the national health sector are met.

6.3.3 Rationing working hours

The European working time directive applies to all EU Member States. Various medical Royal Colleges recognise the need for such a directive since the performance of tired physicians may endanger patients and their own health (RCS ,2003). Rationing work hours would also help residents to better absorb and comprehend the teaching materials.

Several goals and actions haven been drawn out to overcome the negative consequences (see section 3.4.3: Resident hours) for teaching hospitals due to this measure. Solutions were amongst others seen in more efficient planning of the operating rooms and improving the efficacy and efficiency of medical specialists training. These reactions imply that the instalment of the directive achieved more than the direct goal of well-rested physicians. More attention was given to efficiency. Also NHS notices that the directive has had no negative impact on medical specialists education (Department of Health, 2005).

6.4 Regulation of workforce supply

The planning of medical workforce has been high on the political agenda of the UK in the last decennia. Realising the importance of this subject, the Health Committee undertook an inquiry of health service workforce planning in 1999. This recommendation was accepted and in 2000 the Government published a blueprint for workforce planning *(A Health Service of all the talents)*. In the same year, targets were set for a large increase in the number of staff employed by the NHS in the NHS Plan. There was also to be a significant expansion in the number of training places for physicians. The main recommendations included indeed the development of a more integrated planning system, increasing medical student numbers by 1,000 per year and the introduction of a single pay system[43] for all NHS staff. Increasing the size of the NHS workforce was set out in order to meet exacting new service goals, particularly reductions in waiting times.

In 2005 the first concerns started to emerge about the implementation of the plan. While figures for a planned expansion of the workforce were set out in the NHS Plan in 2000, a range of pressures, from the European Working Time Directive[44] to central targets, combined to cause the health service to employ ever more staff.
Two effects became visible: first, in spite of the record funding increases that accompanied the NHS Plan, the health service has experienced increasing deficits in recent years. Total net NHS deficits in 2004–2005 amounted to £221 million, and this went up to £547 million in 2005-2006. The emergence of deficits has placed significant pressure on NHS organisations to reduce workforce costs. Cost saving measures have included job reductions, education and training cuts, and some compulsory redundancies.
Second, there was a major expansion in workforce numbers up to around 2005, followed by the emergence of deficits in 2004–05 with consequences including cuts in domestic training capacity and graduate unemployment.

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43 This to replace the 11 separate negotiating bodies.

44 The European Working Time Directive 93/104/EC, which restricts employees to 48 working hours per week, came into effect in the UK in October 1998. In August 2004, the directive was extended to cover doctors in training, who were limited to working no more than 58 hours per week. This will be further extended in 2009 to reduce doctors in training to working a maximum of 48 hours per week. These changes are having a significant effect on workforce capacity, as junior doctors have traditionally worked considerably more than 58 hours per week.

6.4.1 Medical Supply Planning

In the UK there is a large number of organisations, both at national and local level, that are involved in the health workforce planning activities (Health Committee, 2007).

These mainly are:

- **Department of Health**: Oversight of workforce planning system; monitoring of SHAs; development of new policies; distribution of education funding; commissioning of undergraduate medical education.
- **Strategic Health Authorities**: Commissioning of non-medical education and training; creation of regional workforce plans (from 2004); oversight of local workforce planning (from 2002).
- **Workforce Development Confederations**: Commissioning of non-medical education and training; creation of regional workforce plans (until 2004).
- **Primary Care Trusts**: Creation of local workforce plans; provision of workforce information; provision of primary care training placements (from 2001).
- **Provider organisations (NHS trusts, Foundation trusts and non-NHS providers)**: Creation of local workforce plans; provision of workforce information; provision of training placements.
- **NHS Employers**: Negotiation of national workforce contracts (from 2004).
- **NHS Workforce Review Team**: National level analysis of future workforce requirements and publication of annual recommendations.
- **National Workforce Projects**: coordination of response to specific workforce challenges; development of workforce planning capacity (from 2005)
- **NHS Modernisation Agency**: Collecting best practice on workforce development; oversight of introduction of new clinical roles (until 2005).
- **NHS Institute for Innovation and Improvement**: Helping organisations to improve workforce productivity (from 2005).
- **Skills for Health**: Sector Skills Council for health (from 2002); creation of competence frameworks.
- **Postgraduate Medical Education and Training Board**: Organisation of postgraduate medical training at national level (from 2005).
- **Postgraduate medical deaneries**: Organisation of postgraduate medical training at regional level.
- **Higher and further education providers**: Provision of undergraduate and vocational training courses.
- **Royal Colleges, trades unions and other membership organisations**: Provision of workforce information; negotiation of workforce contracts.
- **Healthcare regulators**: Registration of healthcare staff.

In general the Health Committee (2007) has remarked the lack of integration between workforce planning and financial planning. Failures were/are present both at local level with some organisations continuing to recruit large numbers of staff in spite of rising financial deficits, and at national level with the Department of Health failing to ensure that targets for increasing staff numbers were consistent with the level of funding available.

According to Bloor and Maynard (2003) forecasting of medical workforce is based on existing medical numbers and future demand for healthcare and healthcare expenditure.
Planning for the medical workforce is determined by a relatively crude forecasting method, based on the existing supply of doctors, changes in supply such as likely retirements and other losses to the profession, and a prediction of the future demand for health care. Demand predictions tend to be based on demographic change, assuming that the same doctor/patient ratio is required for future generations.

6.4.2 Workforce cycles

Workforce expansion (2000-2005)
The number of staff employed by the NHS increased by 260,000 between 1999 and 2005, an increase in workforce size of more than 24%. Over this period the number of GPs increased by 17%, nurses by 22%, consultants by 37%, staff employed in 'central functions' by 42% and in senior management by 62%. These figures far exceeded those proposed in the NHS Plan. Increases in numbers across a range of staff groups are shown in the table 6.

Staff Group	Total (1999)	Total (2005)	% Increase (1999-2005)
All	1,098,348	1,366,030	24.4%
Doctors (all)	94,953	122,987	29.5%
Consultants	23,321	31,993	37.2%
GPs	29,987	35,302	17.7%
Nurses	329,637	404,161	22.6%
Allied health professionals	47,920	61,082	27.5%
Scientific and technical	54,471	73,452	34.8%
Clinical support staff	296,619	376,219	26.8
Central functions	73,996	105,565	42.7%
Senior management	24,287	39,391	62.2%

Table 6. NHS workforce growth by staff group, 1999-2005 (headcount)
Source: Department of Health, 2007

Unfortunately, these increases in medical workforce were not coupled with increases in productivity. An often mentioned problem is that in some trusts workforce planning was
undertaken without reference to financial planning. Therefore new staff members were employed by organisations which did not have the money to pay them (Health Committee, 2007).

In order to achieve the increases in staff members proposed by the NHS Plan a number of different approaches were used, namely increased domestic training capacity, efforts to encourage UK staff to return to work, and an expansion in international recruitment. International recruitment was one of the main means of increasing staff numbers, particularly between 2000 and 2003.

The National Health Service (NHS) of England depends heavily on the services of doctors who obtained their primary medical qualification outside the country. International medical graduates constitute 32% of the medical workforce with more than one-in-three hospital doctors and one-in-five general practitioners having qualified overseas (Hann et al., 2008). To reduce this dependency and sustain overall workforce growth, five new medical schools were introduced in 2000, increasing graduate output by 60% (Eaton, 2006).
The growth in international recruitment between 1999 and 2005 was considerable. In medicine, for example, around 60,000 doctors registered with the General Medical Council between 2002 and 2005. Of these, 31%

had qualified in the UK, 16% qualified in the rest of the European Economic Area (EEA), and the remaining 53% outside the EEA. The growth in the number of doctors who qualified outside the UK as a proportion of the total medical workforce is shown in the table 7.

Year	1999	2000	2001	2002	2003	2004	2005
UK doctors qualified within United Kingdom	72.4	72.2	71.9	70.5	69.5	67.8	66.4
UK doctors qualified in remainder of the EEA	5.6	5.4	5.4	5.5	5.5	5.6	5.7
UK doctors qualified elsewhere in the world	22.0	22.4	22.7	24.0	25.0	26.7	27.8

Table 7. The UK medical workforce by area of qualification, 1999-2005 (percentages)
Source: Department of Health, 2007

The 2000 NHS Plan set targets for expanding the domestic training capacity. The number of people beginning training of clinical professions increased very rapidly between 1999 and 2005. This is shown in table 8.

Year	1999	2000	2001	2002	2003	2004	2005	% increase 1999-2005
Medicine	3,972	4,300	4,713	5,277	6,082	6,294	6,298	58.6%
Dentistry	647	672	672	711	726	722	919	42.0%
Nursing	17,692	18,923	20,610	21,736	22,815	24,069	23,651	33.7%
Physiotherapy	1,473	1,780	2,157	2,345	2,418	2,360	2,360	60.2%
Occupational Therapy	1,173	1,385	1,563	1,692	1,822	1,981	2,008	71.2%
Radiography	581	578	690	818	833	860	864	48.7%

Table 8. UK healthcare training places, 1999-2005
Source: Department of Health, 2007

Because of the existing time lag between the number of students entering training from 2000 onwards and the effective increases in workforce output (in 2006 in the case of medicine and in 2003 in the case of most other health professions), we can conclude that the most concentrated period of growth in staff numbers, between 2000 and 2003, cannot be accounted for

by the growth in UK training numbers; rather it resulted from international recruitment and other developments.

Difference between quotas and training plans

The NHS plan of 2000 was a major reason for increasing the number of NHS staff. However, the actual growth exceeded by far the targets and projections for almost all staff groups (Health Committee, 2007).
There was 340% increase in excess of the number of nurses during the period 1999-2004; GPs exceeded the target by 105%, and consultants (i.e. senior specialists) were 3% under the target. Table 9 shows a comparison of the NHS plan growth target with the actual workforce growth.

Staff Group	Projected new staff: 1999-2004	Actual new staff: 1999-2004	Variance
Consultants	7,500	7,329	3% undertarget
GPs	2,000	4,098	105% over target
Nurses	20,000	67,878	340% over target
Allied health professionals	6,500	11,039	69% over target

Table 9. 2000 NHS Plan growth targets with actual workforce growth, 1999-2004 (headcount)
Source: Department of Health, 2007

Workforce contraction (2005 onwards)

As from 2005 on, when it became evident that there was a surplus of medical workforce , there was a sudden change in the healthcare workforce trends. Because of the workforce expansion that took place between 1999 and 2005, and that caused consequently serious financial deficits, attention was then paid to the downturn of healthcare manpower.

The Health Committee (2007) reports savings on workforce costs in two main areas:

- Many provider organisations, who employed the great majority of NHS staff, have made direct savings by freezing or removing vacant posts, by not replacing retiring staff or, in a small number of cases, through compulsory staff redundancies; and
- Many Strategic Health Authorities have returned large surpluses in order to compensate for deficits elsewhere in the system (SHAs returned surpluses totalling £524 million in 2005–06); the savings required to achieve such surpluses have come mainly through cuts in education and training provision.

Statistics show that in the course of 2006 the total number of NHS staff fell by 11,000. Job reductions have been announced by a large number of NHS bodies, including organisations that had recently recruited large numbers of staff. The number of compulsory redundancies is significant but considerably lower than the number of job reductions.

In addition, there was a freeze on the number of overseas medical staff. Anecdotal evidence suggests that, by 2006, domestic supply may have exceeded demand with new graduates finding it difficult to obtain employment. The government accordingly withdrew permit-free immigration for doctors in April 2006 and NHS employers must now appoint doctors who qualified within the European Union in preference to others (NHS Employers, 2006). The negative impact this has had on international medical graduates, following as it does on a period of active recruitment abroad, may have a lasting effect on England's ability to compete successfully in the global market for medical labour [Eaton, 2006; Natarajan and Rivikumar, 2006).

In parallel with staff numbers there is evidence of a recent downturn in training numbers. As in the case of job reductions, witnesses stressed that cuts in education and training places had often taken place in order to maximise financial savings rather than because of a reduction in demand for clinical staff.

Another serious consequence to take into consideration is that healthcare graduates have found increasing difficulties in finding a job within the NHS (Health Committee, 2007). Once again, it seems that graduate unemployment has not occurred because staff were not needed but rather because of financial pressures (to make savings), and the failure to plan for the output of increases in domestic training capacity.

6.5 Conclusion

Workforce planning in England is a public task. The government heavily influences the amount of medical workforce by allocating budgets for postgraduate medical education. Supervision on quality is independent from the government, but has to report to the parliament. The decisions taken in the past ten years show that medical workforce heavily depends on political decisions, which are not taken by rational planning, but mostly by budget constraints. This leads to heavy fluctuations in education places within and for all specialties. England shows that medical workforce planning needs to be rational and on a long-term basis. When looking at the approach of enforcement theory, it can be stated that the strong

governmental influence on budgets is a central cause of the problems in medical education across the last decennium in England. Moreover, governmental support for brain gain from other countries does not support a well thought-out strategy on medical workforce education. Such an incentive creates problems for foreign policy because other countries loose costly highly educated personnel.

The shift towards an independent authority concerning the quality of postgraduate medical education is a good step to create more independence of education from governmental day-to day decision making. With respect to the enforcement theory, it might be advantageous for England to provide a long-term strategy concerning the budget necessary for postgraduate education. This should be paired with the establishment of an authority that tries to make realistic projections for the future need of personnel in healthcare in England.

7 Conclusion

This research paper analysed the postgraduate medical education market by relying on the framework offered by different regulation theories. The approaches of the public interest, contract, capture and enforcement theory have all been used; from the analysis it appears that the enforcement theory offers the best means to analyse this market.
In this concluding section the research question of this paper will be answered: *Are there reasons to regulate the postgraduate medical education market? If yes, what are the effects of the different regulatory tools?* To formulate an answer, the sub-questions posed in the introductory chapter will be first answered.

Should the government support postgraduate medical education, or can market forces provide socially desirable outcomes?
The organisation of the postgraduate medical education market differs between countries. This holds for the planning of workforce supply, for the financing, as well as for quality assurance. The economic theory on regulation does not provide a clear-cut first best option about how to regulate the market. The enforcement theory states that a free market is preferable, when there is enough self-regulation of the market players. However, total state ownership is preferable when monopolistic behaviour by parties cannot be tackled by other regulation tools.
When looking at regulatory practice, the enforcement theory suggests that states have to choose a regulatory strategy that fits in the general culture of the specific market segment within the given country.
There is thus not one specific formula to reform in the same manner the postgraduate medical education market in each country.

However, we can identify some market failures that likely occur in every country. First of all, the postgraduate medical education market does not fulfil a number of criteria of perfect competition. There is usually a limited number of suppliers and therefore there exists the chance of an abuse of market power, which diminishes the gains of consumers (residents). We specify three aspects that should be tackled by governmental intervention: financing, quality and number of training places. Capital and insurance markets seem to be unable to solve the market failure in financing the education and so state insurance and/or subsidy to the teaching hospitals or residents is necessary. The quality of the education may be guaranteed by institutions and instruments developed in a free market environment, but the emergence of these may also be missing. Monitoring activity or even regulation of quality may be necessary in some situations.

The free market can also fail to balance the demand and supply of specialist workforce in the labour market. The postgraduate medical training takes a longer period and so cycles may appear in the workforce supply. State planning may help to find a better match of need for the work of specialists and the number of residents finishing their training each year.

Who should bear the costs of postgraduate medical training?
The intervention of governmental institutions in the financing of the costs for the postgraduate medical education programmes is desirable. When hospitals have to bear the costs a free riding problem may arise.
If residents have to pay there is a high risk that too few medical specialists will be trained due to distorted financial incentives and unavoidable risks, such as the failure of completing the studies and meeting expectations when looking for a job. These problems can be solved with a proper regulation of the capital and insurance market, or by providing subsidies. The method of financing would be most effective in the form of human capital funds or subsidised loans to residents. This has the advantage that the market forces can remain the main coordinating mechanism in the postgraduate medical training programmes.

How can we guarantee that the education of specialists is of high quality?
Concerning the quality of postgraduate medical education programmes, (enforced) self-regulation of specialists can result in higher quality than governmental regulation. Hospitals have incentives to show that their training programmes are of high quality.

Is it necessary to centrally plan the volume of healthcare workforce supply? How can we match the supply with the demand for the services for physicians over time?
The last important factor in the market of postgraduate medical education is the question to what extend the workforce supply should be regulated. To determine the right amount of medical specialists in the course of time, need-based planning is an instrument. Given the forecast, it is possible to identify the right amount of specialists to be trained. For countries with strong regulation in healthcare, the right amount of workforce is essential to avoid waiting lists due to shortages of specialists or supplier induced demand due to oversupply of specialists. At the same time, increased influence of the government makes the total amount of training positions dependent on political decision making and the risk of "bad" planning remains an issue. This is disadvantageous as politics tend to be myopic and usually does not sufficiently consider the long-term goals and measures that are necessary to reach them. In conclusion, it is important to use objective methods in workforce planning and uncouple it from day-to-day decisions in the political arena.

Based on the answers of the above questions we can state that there are indeed reasons to regulate the postgraduate medical education market. The consequences of regulation depend however on the situation of each specific country. For this purpose we analysed in the second part of the paper two countries, Belgium and England, which differs in the set-up of their healthcare system and the organisation of their postgraduate medical education programmes.

The postgraduate medical education system in Belgium has made a shift in the mid 1990's from market forces towards regulation. The *laissez-faire* regulation strategy in the Belgium education market caused negative welfare effects by decreasing quality of treatment and increasing SID. Since the introduction of regulatory bodies the total amount of residents has decreased. However, it is too early to assess what are the precise effects of increased regulation in this sector. It is expected that a rationalised planning of the workforce might lead to an increase in welfare.

In England the postgraduate medical education programmes are regulated by the government, which heavily influences the amount of medical workforce by allocating budgets for postgraduate medical education. The decisions taken in the past ten years show that medical workforce heavily depends on political decisions, which are not taken by rational planning, but mostly by budget constraints. This leads to heavy fluctuations in education places within and for all specialties. A critical point of the English system is that the strong governmental influence on budgets has caused in the last decennium strong fluctuations of the workforce. In this respect the recent shift towards an independent authority supervising the quality of the postgraduate medical education market is a good step to create independence of education from governmental day-to day decision making.

To conclude, the organisation of the postgraduate medical education needs to be regulated rather than being fully left to market forces. When analysing the set-up of this market one should consider not only economic principles but also cultural and socio-economic factors in order to determine the national regulation strategy for this sector.

References

Adams, O. (1992), Management of Human Resources in Health Care: the Canadian Experience, *Health Economics*,1(2), pp. 131-143.

Akerlof, G.A. (1970). The Market for 'Lemons': Quality Uncertainty and the Market Mechanism. *Quarterly Journal of Economics,* 84(3), pp. 488–500.

Andreosso, B., and D. Jacobson (2005). Industrial Economics & Organisation: A European Perspective. 2nd ed. Maidenhead: McGraw-Hill Education.

Anderson, G. F. and J. R. Lave (1987). Financing graduate medical education and biomedical research: whose responsibility? *Health Policy*, 7(1), pp. 3-12.

Anderson, G.F., K.C. Han, R.H. Miller and M.E. Johns (1997), A comparison of three methods for estimating the requirements for medical specialists: the case of otolaryngologists, *Health Services Research* 32(2), pp.139-153.

Anderson, G.M., D. Halcoussis, L. Johnston and A.D. Lowenberg (2000). Regulatory barriers to entry in healthcare industry: the case of alternative medicine. *The Quarterly review of Economics and Finance,* 40, pp. 485-502.

Angus, D.C., M.A. Kelley, R.J. Schmitz, A. White and J. Popovich Jr. (2000), Caring for the Critically Ill Patient. Current and Projected Workforce Requirements for Care of the Critically Ill and Patients with Pulmonary Disease: can we meet the requirements of an aging population?, *Journal of the American Medical Association,* 284(21), pp. 2762-2770.

Antares Consulting (2003). Analyse van de kosten van onderzoek en opleiding in de universitaire ziekenhuizen. www.univ-hospitals.be/cms/upload/pdf/pptAntaresnl.pdf

Armour, B.S. PhD; M.M. Pitts, PhD; R. Maclean, MD, MBA; C. Cangialose, PhD; M. Kishel, MD; H. Imai, MD, PhD; and J. Etchason, MD (2001). The Effect of Explicit Financial Incentives on Physician Behaviour. *American Medical Association,* 161, pp. 1261-1266.

Arrow, K. (1963). Uncertainty and the welfare economics of medical care. *The American Economic Review*, 53(5), pp. 141-149.

Australian Medical Workforce Advisory, Party AGPW (2005), General Practice Workforce Modelling, Australia: Sydney.

Ayres, I. and J. Braithwaite (1992). Responsive Regulation; Transcending the Deregulation Debate. Oxford Socio-Legal Studies. Oxford University Press, Inc. New York.

Baker, G.P., M. C. Jensen and K.J. Murphy (1988). Compensation and Incentives: Practice VS. Theory. *Journal of Finance*, 43(3), pp. 593 - 616.

Barr, N. (2004): Higher Education Funding. *Oxford Review of Economic Policy*, 20(2), pp. 264-283.

Bartram, D., J. Foster, P.A. Lindley, A.J. Brown, and S. Nixon (1993). Learning Climate Questionnaire (LCQ) : Background and Technical Information . Oxford : Employment Service and Newland Park Associates Ltd.

Bashook, P. G. and J. Parboosingh (1998). Continuing medical education: Recertification and the maintenance of competence. *British Medical journal,* 316, pp. 545-548.

Becker, G. S. (1964). Human capital: A theoretical and empirical analysis with special reference to higher education. New York: Columbia University Press.

Bennett, S. and L.M. Franco (2000). Health worker motivation and health sector reform. *PHR Primer for policy makers.* Washington: PHR Project.

Birch, S. (1988). The Identification of Supplier-inducement in a Fixed Price System of Health Care Provision: The case of dentistry in the United Kingdom. *Journal of Health Economics* 7, pp. 129-150.

Bloor, K. and A. Maynard (2003). *Planning Human Resources in Health Care: Towards an Economic Approach. An International Comparative Review*. Report for the Canadian Health Services Research Foundation.

Bolton, P. and M. Dewatripont (2005). Contract Theory. Cambridge, Massachusetts. MIT Press.

Boyle, S. (2007). Payment by Results in England, *Eurohealth* 13(1), pp. 12-16.

Branch, W. A. (2002). Local convergence properties of a cobweb model with rationally heterogeneous expectations, *Journal of Economic Dynamics and Control,* 27(1), pp. 63-85.

Brennan, T.A. (1998). The role of regulation in Quality Improvement. *The Millbank Quarterly,* 76(4), pp. 709-732.

Brennan, T.A. and D. M. Berwick (1996). New Rules, Regulation, Markets and the Quality of American Health Care. Jossey-Bass Publishers, San Francisco.

Buddeberg-Fischer, B., R. Klaghofer, T. Abel and C. Buddeberg (2006). Swiss Residents' Speciality Choices – impact of gender, personality traits, career motivation and life goals. *British Medical Center Health Services Research,* 6,137.

Burstin H.R., S.R. Lipsitz, and T. A. Brennan (1992). Socioeconomic Status and Risk for Substandard Medical Care. *Journal of the American Medical Association,* 268, pp. 2383–2387.

Casalino, L. P. (1999). The Unintended Consequences of Measuring Quality on the Quality of Medical Care. *New England Journal of Medicine,* 341, pp. 1147-1150.

Charap, M. MD. (2004). Reducing Resident Work Hours: Unproven Assumptions and Unforeseen Outcomes. *Annals of Internal Medicine,* 140, pp. 814-815.

Cheshire and Merseyside Strategic Health Authority (2005). Non-Medical Education Training, Guidance Notes 2005-06. [Retrieved from http://www.cmtpct.nhs.uk/documents/career%20deve/MPETGuidanceSept.doc on 12 December 2008].

Coase, R. (1960). The problem of social cost. Journal of Law and Economics, 3, pp. 1–44

Commander, S., M. Kangasniemi and L. A. Winters (2004). Is the Medical Brain Drain Beneficial? Evidence from Overseas Doctors in the UK. *CEP Discussion Papers,* number dp0618. LSE (London school of economics).

Cooper, R. A. and L. A. Aiken (2001). Human Inputs: The Health Care Workforce and Medical Markets. *Journal of Health Politics, Policy and law,* 26(5), pp. 925-939.

Cooper, R.A., T.E. Getzen and P. Laud (2003), Economic expansion is a major determinant of physician supply and utilization, *Health Services Research*,38(2), pp.675-696.

Corens, D. (2007). Health system review: Belgium. Health Systems in Transition, 9(2), pp. 1–172.

Cromwell, J. and J.B. Mitchell (1986). Physician-induced demand for surgery. *Journal of Health Economics*, 5(4),. pp. 293-313.

Davis. D.J. and C. Ringsted (2006). Accreditation of Undergraduate and Graduate Medical Education: How Do the Standards Contribute to Quality? *Advances in Health Sciences Education,* 11, pp. 305–313.

Deci, E. 1972. The Effects of Contingent and Non-Contingent Rewards and Controls on Intrinsic Motivation. *Organisational Behavior and Human Performance,* 8, pp. 217-229.

Department of Health (2002). Funding Learning and Development for the Healthcare Workforce. [Retrieved from http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4006543 on 12 December 2008].

Department of Health (2005). NHS response to European Working Time Directive results in better patient care. Department of Health. [Retrieved from http://www.dh.gov.uk/en/Publicationsandstatistics/Pressreleases/DH_4118010 on 4 December 2008].

Department of Health (2007). Guide to Postgraduate Specialty Training in the UK, First Edition. [Retrieved from http://www.mmc.nhs.uk/Docs/A%20Guide%20to%20Postgraduate%20Specialty%20Training%20in%20the%20UK%20(Gold%20Guide).doc on 12 December 2008].

Department of Health (2008). Funding Education and Training (presentation by Thompson, S). [Retrieved from http://www.healthcareworkforce.nhs.uk/dmdocuments/02%20ST%20Presentation%20to%20Masterclass%205th%20March%202008%20-%20Final%203rd%20March.ppt on 12 December 2008].

Dictionary of Economics, Second Edition, John Black, Oxford University Press, Oxford, New York, 2002)

Djankov, S., E. Glaeser, R. La Porta, R., F. Lopez-de-Selanes, and A. Shleifer (2003). The New Comparative Economics. *Journal of comparative economics,* 31, pp. 595-619.

Dranove, D. and P. Wehner (1994). Physician-induced demand for childbirths. *Journal of Health Economics,* 13, pp. 61-73.

Dubois, C.A., M. McKee, and E. Nolte (2006). *Human resources for health In Europe*. European Observatory on Health Systems and Policies Series, World Health Organisation. New York.

Dudley. R. A., R. H. Miller, T. Y. Korenbrot and H. S. Luft (1998). The Impact of Financial Incentives on Quality of Health Care. *The Milbank Quarterly*, 76(4), pp. 649-687.

Dussault, G. (1999). Human Resources Development: The Challenge of Health Sector Reform. Unpublished.

Eaton, L. (2006). Tossed aside, *British Medical Journal,* 332, pp. 932.

Ehrenberg, R. G. and G. T. Milkovich (1987). Compensation and Firm Performance. *NBER Working Paper, #2145.*

EIRO (2004). Working time; *developments in EU and national regulation, European Industrial relations observatory on-line*, TN0403108F, [Retrieved from http://www.eurofound.europa.eu/eiro/2004/03/feature/tn0403108f.htm
On 12 December 2008].

Eitel, F., S. Steiner and A. Tesche (1998). Quality Management: Making the Transition to Medical Education. *Medical Teacher,* 20(5), p. 445-450.

Epstein, A.H. (2006). Do Cardiac Surgery Report Cards Reduce Mortality? Assessing the Evidence. Medical Care Research and Review, 63 (4), pp. 403-426.

European Observatory on Health Care Systems (1999). *Health care systems in transition, United Kingdom.* Belgium: Brussels.

European Observatory on Health Systems and Policy (2007). *Health care systems in transition: Belgium,* Belgium: Brussels.

Ezekiel, M. (1938). The cobweb theorem. *Quarterly Journal of Economics*, 52(2), pp. 255-280.

Feldman, R. and R. Schleffer (1982). The Union Impact on Hospital Wages and Fringe Benefits. *Industrial and Labor Review*, 35(2), pp. 196-206.

Feldstein, P.J. (2005). Health Care Economics. 6th ed. Thomson Delmar Learning, USA.

Fiorito, R. and T. Kollintzas (2004). Public Goods, Merit Goods, and the Relation between Private and Government Consumption. European Economic Review, *48(6), pp.*1367-1398.

Folland, S., A.C. Goodman, M. Stano (2004). The Economics of Health and Health Care, 4th ed. Pearson Education International

Freeman, R. B. (1976). A Cobweb Model of the Supply and Starting Salary of New Engineers. *Industrial and Labor Relations Review*, 29 (2), pp. 236-248.

Frenk, J. (1994). Medicos, Educacion y Empleo. Mexico: Universidat de Guadalajara, pp. 273.

Friedman, M. (1962): Capitalism and Freedom, University of Chicago Press, USA.

Fuchs, V.R. (1978). The Supply of Surgeons and the Demand for Operations. *Journal of Human Resources*, 13, Supplement, pp. 35-56.

Fujisawa, R. and G. Lafortune (2008): The Remuneration of General Practitioners and Specialists in 14 OECD Countries: What are the factors influencing variations across countries?, *OECD Health Working Papers* No. 41.

Gaufberg, E. (2006). Time To Care; When Thinking about Duty-hour Reform and Other Aspects of Residency Training, Remember that Patient Care Depends on the Soul of the Doctor. *Health affairs,* 27(3), pp. 845-849.

Gavel, P. (2004), Medical workforce planning in Australia: process, methodology and technical issues, *Cahiers de Sociologie et de Demographie Medicales,* 44(1), pp.7-42.

Gbadebo, A. L. and U. E. Reinhardt (2001). Economists on Academic Medicine: Elephants in a Porcelain Shop? *Health Affairs*, 20(2), pp. 148-152.

Gilsdorf, J. (2006). The Disappearing Doctors; Reduced Residents' Work Hours Sound Fine until the ResidentsóNow a Legion of Shift-worker PhysiciansóAre Rushing Out the Door or Aren't There. *Health affairs,* 27 (3), pp.850-854.

Goeree, J.K. and C.H. Hommes (2000). Heterogeneous Beliefs and the Non-linear Cobweb Model; Complex Nonlinear Dynamics and Computational Methods. *Journal of Economic Dynamics and Control*, 24(5), pp. 761-798.

Goodman, D.C., E.S. Fisher, T.A. Bubolz, E. Mohr, J.F. Poage and J.E. Wennberg (1996). Benchmarking the US physician workforce. An alternative to needs-based or demand-based planning, *JAMA* 276(22), pp. 1811-1817.

Green, B. A. and T. Johnson (1995). Replacing Residents with Midlevel Practitioners: A New York City-Area Analysis. *Health Affairs*, 14(2), pp. 192-198.

Green, J. and N. Wintfeld (1995). Report Cards on Cardiac Surgeons. Assessing New York State's Approach. The New England Journal of Medicine, 332(18), pp.1229-1233.

Grosskopf, S., D. Margaritis and V. Valdmanis (2001). The Effects of Teaching on Hospital Productivity, *Socio-Economic Planning Sciences,* 35, pp. 189–204.

Grumbach, K. MD., D. Osmond, Ph.D., K. Vranizan, MA., D. Jaffe, BA., and A.B. Bindman, MD. (1998). Primary Care Physicians' Experience of Financial Incentives in Managed-Care Systems. *The New England Journal of Medicine*, 339 (21), pp.1516-1521.

Grytten J., D. Holst and P. Laake (1990). Supplier inducement: its effect on dental services in Norway. *Journal of Health Economics*, 9, pp. 483-491.

Hall, T.L. (1998). Why Plan Human Resources for Health? *Human Resources for Health Development Journal,* 2(2), pp. 1-22.

Hann, M., B. Sibbald and R. Young (2008). Workforce participation among international medical graduates in the National Health Service of England: a retrospective longitudinal study, *Human Resources for Health* 6(9).

Health Committee (2007). Workforce Planning: Fourth Report of Session 2006-2007, London: the House of Commons.

Hillman, B.J., C.A. Joseph, M.R. Mabry, J.H. Sunshine, S.D. Kennedy, and M. Noether (1990). Frequency and Costs of Diagnostic Imaging in Office PracticeóA Comparison of Self-Referring and Radiologist- Referring Physicians. *New England Journal of Medicine,* 323. pp. 1604–1608.

Hoff, T.J., H. Phol and J. Bartfield (2004). Creating a Learning Environment to Produce Competent Residents: The Roles of Culture and Context, *Academic Medicine*, 79, pp. 532–540.

Holanda, M.C., C.A. Gondim Nogueira and F.C. Petterini (2008). Education regulation as an instrument of income distribution: The case of Ceara. *The Quarterly Review of Economics and Finance,* 48, pp. 377–388.

Hubens, A. and R. Van Hee (1993). Surgical Training in a Statutory Health Insurance System: Belgian Experience *World Journal of Surgeons,* 18 (5), pp. 667-670.

Hurley, J., R. Labelle and T. Rice (1990). The relationship between physician fees and the utilization of medical services in Ontario. *Advances in Health Economics and Health Services Research,* 11, pp. 49-78.

Hurley, J. and R. Labelle (1995). Relative fees and the utilization of physicians' services in Canada. *Health Economics*, 4, pp. 419-438.

Hurley, J. (2000). An Overview of the Normative Economics of the Health Sector, in: A.J. Culyer and J.P. Newhouse (eds) Handbook of Health Economics, Vol 1, Elsevier Science B.V, pp.56-118.

Imperato, P.J. (1988). Regulating Residency Programs in the Interest of Medical Education and Quality Assurance. *Journal of Community Health*, 13(2), pp. 67-69.

Incentives. Definition according to Bridgefieldgroep. [Retrieved from www.bridgefieldgroup.com/bridgefieldgroup/glos4.htm on 14 October 2008].

IOM, Institute of Medicine (2001). *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington DC: National Academies Press.

James, P. A. and J.W. Osborne (1999). A Measure of Medical Instructional Quality in Ambulatory Settings: The MedIQ. *Family Medicine*, 31(4), pp. 263-269.

Janssen, P. (2006). Koninklijke Academie voor Geneeskunde van Belgi' - Vlaanderens toelatingsexamen arts-tandarts - Resultaten na negen jaar werking. *Tijdschrijft voor Geneeskunde*, 62(22), pp. 1569-1581.

Jefferis, T. (2007). Selection for Specialist Training: What Can We Learn From Other Countries? *British Medical Journal,* 334, pp. 1302-1304.

KCE, Federaal Kenniscentrum voor de Gezondheidszorg (2008), Het aanbod van artsen in Belgi'. Huidige toestand en toekomstige uitdagingen, KCE Report 72A, Belgium: Brussels.

Khanna, M. and W.R.Q. Anton (2002). Corporate Environmental Management: Regulatory and Market-based Incentives. *Land Economics*, 78(4), pp.539-58.

Kishel, M. MD, H. Imai, MD, PhD and J. Etchason, MD (2001). The Effect of Explicit Financial Incentives on Physician Behaviour, *American Medical Association,* 161, pp. 1261-1266.

Kleiner, M.M. (2000). Occupational Licensing. *Journal of Economic Perspectives*, 14(4), pp. 189-202.

Kleiner, M.M. (2003). Occupational Licensing and Health Services: Who Gains and Who Loses? *Working paper*. University of Minnesota and the National Bureau of Economic Research.

Kohn L.T, J.M. Corrigan and M.S. Donaldson (2000). To Err Is Human: Building a Safer Health Care System. National Academy Press. Washington DC.

Kohn, A. (1988). Incentives Can be Bad for Business. *INC, 10(1), pp.* 93-94.

Koninklijk besluit van 25 april 2002 betreffende de vaststelling en de vereffening van het budget van financi'le middelen van de ziekenhuizen, http://www.ejustice.just.fgov.be/mopdf/2002/05/30_3.pdf

Kugler, A.D., and R. Sauer (2002). Doctors Without Borders? The Returns to an Occupational License for Society Immigrant Physicians in Israel. *Working Paper*.

Law, M.T., and S. Kim (2005). Specialization and Regulation: The Rise of Professionals and the Emergence of Occupational Licensing Regulation. *The Journal of Economic History*, 65(3), pp. 723-756.

Leffler, K. B. and C.M. Lindsay (1981). Markets for Medical Care and Medical Education: an Integrated Long-run Structural Approach. *The Journal of Human Resources,* 16 (1), pp. 20-40.

Linna, M., U. Häkkinnen and E. Linnakko (1998). An Econometric Study of Costs of Teaching and Research in Finnish Hospitals, *Health Economics,* 7, pp. 291–305.

Lippell, S. (2002). Creativity and medical education. *Medical Education*; 36, pp. 519–521.

Lipscomb, J., K.E. Kilpatrick, K.L. Lee and K.S. Pieper (1995), Determining VA physician requirements through empirically based models, *Health Services Research,* 29(6), pp. 697-717.

Lomas, J., G.L. Stoddart and M.L. Barer (1985). Supply projections as planning: a critical review of forecasting net physician requirements in Canada, *Social Science Medicine* 20(4), pp. 411-424.

Machado, M. P., R. Mora and A. Romero-Medina (2008). Can We Measure Hospital Quality From Physichians' Choices? Discussion paper, nr 6850, Centre for Economic Policy Research.

Mallett, S. (2006). Information Paper on NHS Funding of Workforce Development and its implications for the Widening Participation in Learning Strategy*, Department of Health*, WPSU17.

Manning, P.R. and L. DeBakey (1987). Medicine: preserving the passion. Springer-Verslag. New York.

McCarthy, T.R. (1985). The Competitive Nature of the Primary-care Physician Services Market. *Journal of Health Economics,* 4, pp. 93-117.

McGuire, T. G. (2000). Physician Agency, in: A.J. Culyer and J.P. Newhouse (eds) Handbook of Health Economics, Vol 1, Elsevier Science B.V, pp. 462-536.

McKay, N.L. (1990). The economic determinants of specialty choice by medical residents*. Journal of Health Economics*, 9, pp. 335-357.

Mechanic R., K. Coleman and A. Dobson (1998). Teaching Hospital Costs: Implications for Academic Missions in a Competitive Market. *Journal of the American Medical Association,* 280(11), pp. 1015-1019.

Mikkelsen, A., P.O. Saksvik, H.R. Eriksen and H. Ursin (1999). The Impact of Learning Opportunities and Decision Authority on Occupational Health. *Work & Stress*, 13(1), pp. 20-31.

Milgrom, P. and J. Roberts (1982). Predation, reputation and entry deterrence. *Journal of Economic Theory*, 27, pp. 280-312.

Ministerie van Volksgezondheid, Welzijn en Sport (2008).Wijziging Subsidieregeling zorgopleidingen 1e tranche, Regeling van de Minister van Volksgezondheid, Welzijn en Sport van 14 juli 2008, nr. MEVA/NBO-2859135.

Mitchell, J.M., and J.H. Sunshine (1992). Consequences of Physicians' Ownership of Health Care FacilitiesóJoint Ventures in Radiation Therapy. *New England Journal of Medicine,* 327, pp. 1497–1501.

Morgan, G., D. Wigg and J. Childs (2000). Projected requirements for radiation oncologists and trainees in Australia and New Zealand to 2007, *Australasian Radiology,* 44(1), pp.88-97.

Mukamel, D.B., A.L. Mushlin, D. Weimer, J. Zwanziger, T. Parker and I. Indridason (2000). Do Quality Report Cards Play a Role in HMOs' Contracting Practices? Evidence from New York State. *HSR: Health Services Research,* 35(1) part II, pp. 319-332.

Mulrooney, A. (2005) Development of an instrument to measure the practice vocational training environment in Ireland, Medical Teacher, 27, pp. 338–342.

Natarajan, A., and B. Rivikumar (2006). Requiem for international medical graduates, *Journal of the Royal Society of Medicine,* 99(6), pp. 272-273.

Nerlove, M. (1958). Adaptive Expectations and Cobweb Phenomena. *The Quarterly Journal of Economics*, 72(2), pp. 227-240.

Nerlove, M (1972). On Tuition and the Costs of Higher Education: Prolegomena to a Conceptual Framework. *The Journal of Political Economy*, Vol. 80, No. 3, Part 2: Investment in Education: The Equity-Efficiency Quandary, pp. S178-S218

Newhouse, J. P. and G. R. Wilensky (2001). Paying for Graduate Medical Education: the Debate Goes On. *Health Affairs*, 20(2), pp. 136-147.

NHS Employers (2006). Changes to the immigration rules for postgraduate doctors and dentists. [Retrieved from http://www.nhsemployers.org on 12 December 2008].

Noren, J. (1997). A National Physician Workforce Policy. *Public Health Reports*, 112, pp. 219-221.

Norwood A. D., E.K. Hicks, C.R. Thrush, M.B. Woods and J.A. Clardy (2006). A graduate medical education initiative to promote professional excellence among residency program coordinators*. Medical Education Online,* 11(34).

O'Brien-Pallas L., A. Baumann, G. Donner, G. Tomblin Murphy, J. Lochhaas-Gerlach, and M. Luba (2001). Forecasting Models for Human Resources in Health Care. *Journal of Advanced Nursing*, 33(1), pp. 120-129.

O'Brien-Pallas, L., Birch, S., Baumann, A., and Murphy, G.T. (2001), Integrating workforce planning, human resources, and service planning, WHO: Geneva.

Pagliero, M. (2005). What is the Objective of Professional Licensing? Evidence from the US Market for Lawyers. University of Turin. [Retrieved from http://www.fep.up.pt/conferences/earie2005/cd_rom/Session%20II/II.G/Pagliero.pdf on 8 November 2008].

Palacios, M. (2002): Human Capital Contracts: "Equity-like" Instruments for Financing Higher Education, *Policy Analysis No. 462*, Cato Institute, http://www.cato.org/pubs/pas/pa462.pdf

Pashigian, P.B. (1970). Rational Expectations and the Cobweb Theory. *The Journal of Political Economy*, 78(2), pp. 338-352.

Peck, C., M. McCall, B. McLaren and T. Rotem (2000). Continuing medical education and continuing professional development: international comparisons. *British Medical Journal,*; 320, pp. 432-435.

Persaud, D.D., R. Cockerill, G. Pink and G.Trope (1999a), Determining Ontario's supply and requirements for ophthalmologists in 2000 and 2005: A comparison of projected supply and requirements, *Canadian Journal of Ophthalmology,* 34(2), pp. 82-87.

Persaud, D.D., R. Cockerill, G. Pink and G. Trope (1999b), Determining Ontario's supply and requirements for ophthalmologists in 2000 and 2005: Methods, *Canadian Journal of Ophthalmology,* 34(2), pp. 74-81.

Pigou, A.C. (1920). The Economics of Welfare. 4th ed. London: Macmillan and Co.

PMETB (2007). Preparing doctors for the future: about PMETB, postgraduate Medical Education and Training Board. [Retrieved from http://www.pmetb.org.uk/fileadmin/user/Communications/Publications/Preparing_Doctors_for_the_future_About_PMETB.pdf on 4 December 2008].

PSSRU, Personal Social Services Research Unit (2007). Unit Costs of Health & Social Care 2007 (compiled by Curtis, L.). [Retrieved from http://www.pssru.ac.uk/pdf/uc/uc2007/uc2007.pdf on 12 December 2008].

RCS (2002). Detailed comments from the RCS to the Department of Health's consultation document 'Postgraduate Medical Education and Training: the Medical Education Standards Board'. Royal College of Surgeons of England. Registered charity no: 212808.

RCS (2003). The Royal College of Surgeons of England and the European Working Time Directive; A Policy Statement. [Retrieved from http://www.rcseng.ac.uk/rcseng/content/publications/docs/ewtd_policy_statement.html on 4 December 2008].

Rice, T. (1983). The Impact of Changing Medicare Reimbursement Rates on Physician-induced Demand. *Medical Care,* 21. pp. 803-815.

RIZIV (2005). 10 jaar accreditering bij de artsen. [Retrieved from http://www.vaskor.be/accreditering/ACCREDITERING%20BIJ%20DE%20ARTSEN%2010%20jaar.pdf on 12 December 2008].

Roff, S. (2005). New resources for measuring educational environment. *Medical Teacher,* 27(4), pp. 291–293.

Rosen, S., K. Murphy and J. Scheinkman (1994). Cattle Cycles. *Journal of Political Economy,* 102 (3), pp. 468-92.

Rottenberg, S. (1980). Occupational Licensure and Regulation. Washington: American Enterprise institute, pp. 1-10.

Schaumans, C. (2007). Supplier Inducement in the Belgian Primary Care Market, available at SSRN: http://ssrn.com/abstract=1021957.

Schepers, R. and A.F. Casparie (1997). Continuity or Discontinuity in the Self-regulation of the Belgian and Dutch Medical Professions, *Sociology of Health & Illness*, 19(5), pp.580-600.

Schroeder, S. (1992). Physician Supply and the US Medical Market Place. *Health Affairs,* 11, pp. 235-243.

Shleifer, A., E. Glaeser, R. La Porta, F. Lopez-de-Selanes and S. Djankov (2003). The New Comparative Economics. Institute for Economic Research Harvard University. *Discussion paper* No.2002.

Schleifer, A. (2005). Understanding Regulation. *European Financial Management*, 11(4), pp. 439-451.

Shipengrover, J. A. and P.A. James (1999). Measuring instructional quality in community-orientated medical education: looking into the black box. *Medical Education,* 33, p. 846-853

Shumway, J.M. (2004). Components of Quality: competence, leadership, teamwork, continuing learning and service. *Medical Teacher*, Vol. 26, No. 5, pp. 397–399.

Simoens, S. and J. Hurst (2006). The Supply of Physician Services in OECD Countries, *OECD Health Working Paper,* No. 21, Paris: OECD.

Slater, P. (1980). Wealth Addiction. New York: Dutton.

Sloan, F.A. and J. Valvona (1986). Uncovering the high costs of teaching hospitals. *Health Affairs*, 5(3), pp. 68-85.

Smith, A. (1776). Inquiry into the Nature and Causes of the Wealth of Nations. London: Methuen & Co., Ltd. 5th edition.

Stigler, G. (1971). The Theory of Economic Regulation. *Bell Journal of Economics*, 2, pp. 3-21.

Talbot, M. (2004). Monkey see, monkey do: a critique of the competency model in graduate medical education. Medical Education, 38, pp. 587–592.

Ter Hurne, H. (2005). De PDCA-cirkel In Zeven Stappen; Een stappenmodel voor verbetertrajecten en creativiteit. Management tools, 3, pp. 20-21.

Tirole, J. (1989). The Theory of Industrial Organisation. Cambridge, Massachusetts: MIT Press.

Thornton, J. and F. Esposto (2003): How Important are Economic Factors in Choice of Medical Specialty? *Health Economics*. 12, pp. 67–73.

Sharp, L.K., P.G. Bashook, M.S. Lipsky, S.D. Horowitz and S.H. Miller (2002). Specialty board certification and clinical outcomes: The missing link. *Academic Medicine*, 77, pp. 534–542.

Spike, N.A. and R.B. Hays (1999). Analysis by training status of performance in the certification examination for Australian family doctors. *Medical Education*, 33, pp. 612–615.

Yergan, J., A.B. Flood, P. Diehr, and J.P. LoGerfo (1988). Relationship Between Patient Source of Payment and the Intensity of Hospital Services. *Medical Care,* 26, pp. 1111–1114.

Yip, W. (1998). Physician Responses to Medical Fee Reductions: Changes in the Volume and Intensity of Supply of Coronary, Artery Bypass Graft (CABG) Surgeries in the Medicare and Private Sectors. *Journal of Health Economics,* 17, pp. 675-700.

Yorkshire and the Humber Strategic Health Authority (2008). Workforce and Education Directorate Outline Investment Plan 2008/09 (author: Gilpin, T). [Retrieved from http://www.yorksandhumber.nhs.uk/board_information/board_meetings/board_meetings_2008/february_2008/ on 12 December 2008].

Young, G.J., and B.B. Cohen (1991). Inequities in Hospital Care: The Massachusetts Experience. *Inquiry* 28, pp. 255–262.

Young, J.Q. and J.M. Coffman (1998). Overview of Graduate Medical Education-funding Streams, Policy Problems, and Options for Reform, *West Journal of Medicine*, 168, pp. 428-436.

Westert, G.,F. Schellevis, and J. van der Zee (2006). General Practice in the Netherlands: major findings from the second Dutch National Survey of General Practice. In: Westert G, Jabaaij L, Schellevis F, eds. Morbidity, performance and quality in primary care, pp. 3-9.

Winston, C. (1993). Economic deregulation: Days of reckoning for microeconomists. *Journal of economic literature,* 31. pp. 1263-1289.

Wolff, A. de (2004). Bestuur en kwaliteitszorg, *Basisschool Management*, 17 (6).

Wynn, B., C. Guarino, L. Morse and M. Cho (2006). Alternative Ways of Financing Graduate Medical Education, *RAND Health Working Paper Series*.

Zurn P., M. Dal Poz, B. Stilwell and O. Adams (2002). Imbalances in the health workforce, Briefing paper, *World Health Organisation*; Evidence and Information for Policy Health Service Provision.

Used websites

www.foundationprogramme.nhs.uk
http://www.gmc-uk.org/index.asp
http://www.pmetb.org.uk/
http://www.mmc.nhs.uk/

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