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**The singularity of the German doctorate as a signal for talent:  
Causes, consequences and future developments**

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# **The singularity of the German doctorate as a signal for talent: Causes, consequences and future developments**

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## ***ABSTRACT***

Internationally unparalleled fractions of doctoral degree holders among German top managers and superior career perspectives for German university graduates holding a doctoral degree suggest that the traditional German doctorate has not been primarily perceived as a specialized indicator for abilities to conduct research in a certain scientific field, but rather as an indicator for a more general form of human capital, which we refer to as talent. In order to convince on the labor market, educational credentials have to be validated somehow. We discuss alternative validation mechanisms which can be attributed to the higher education systems of the U.S., France, and Germany. By defining specific "model educational paths" the problem of signal validation explains the singularity of the German doctorate. The educational paths of top managers in a sample of the 100 largest companies in these countries is consistent with our theoretical conjectures. A shift from the traditional German chair-based model in doctoral education to formal programs is likely to alter the signaling content of the German doctorate. Future options for signaling talent are closely tied to the reform of the German higher education system. (JEL: D82, I21, J24, J44)

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## *1. Introduction*

Comparative international studies of top management careers routinely point to the unparalleled percentage of doctoral degree holders among German top managers (e.g. Hartmann 1999, 2000). Moreover, empirical studies devoted to the analysis of career perspectives among German university graduates report superior career opportunities for the candidates holding a doctoral degree (Enders and Bornmann 2001).

These findings indicate that the traditional German doctoral education was not exclusively directed at the scientific labor market. Unlike the U.S. American Ph.D. and the doctorates in many other countries, the German doctoral degree has obviously not been perceived as a specialized indicator for abilities to conduct research in a certain scientific field by the labor market. In order to serve as an ‘accelerator’ for a management career in business and public administration, the German doctoral degree must have been rather understood as an indicator for a more general form of human capital. For reasons of simplicity we will speak of ‘talent’ when we refer to this kind of general human capital, which enhances the productivity of a candidate in many different employments.

This interpretation of the traditional German doctorate as an indicator for talent raises different puzzles: Which economic mechanisms produce this singular property of the German doctorate as compared to doctoral degrees in other countries? Which economic mechanisms substitute for this property of the German doctorate in other countries? Will this specific property of the German doctorate prevail considering the recent changes and reforms in German higher education?

The general role of indicators for talent has been extensively studied in labor economics. Employers cannot assess the human capital of potential employees without cost. The productivity of job applicants is difficult to measure *ex ante*. With time, employers may learn more about the workers’ true productivity and subsequently modify the provided employment conditions. However, in many professional services and for higher job levels in general the productivity of a worker may never become fully observable, since labor output depends on multiple and complex exogenous variables. Consequently, employers frequently face a substantial risk of adverse selection in their employment decisions.

The negative effects of information asymmetries between employees and employers are not only borne by the latter. Employees are equally concerned, since wages and career options reflect average qualities rather than the applicants’ individual endowment. Individuals with an above-average talent have strong incentives to reduce information asymmetries and to actively communicate their superior potential. As Arrow (1973) pointed out, among other things, higher education could function as a filter in this context. Certifying

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that individuals have ‘passed’ through specific filter devices, educational credentials could serve as signals for certain aspects of human capital that employers may find valuable.

However, as a consequence of institutional differences between the higher education systems of different countries, filter functionalities may also vary from country to country. Presumably individuals endowed with the abilities and motivation to pursue a top management career, which we will refer to as high potentials, will have to follow specific ‘model educational paths’ defined by the institutional set-up of their national higher education systems, in order to signal their talent to employers.

Untangling the singular role of the doctorate for top management careers in Germany means untangling the importance of different ‘model educational paths’ for signaling talent in the context of different national higher education systems. Such differences in signaling requirements across countries have not received much attention in the literature so far due to a lack of interest in the specific problem of signal validation. The signaling of talent via educational credentials has been analyzed in detail.<sup>1</sup> Following the seminal work of Arrow (1973), Spence (1973) and Stiglitz (1975) a large body of empirical research testing the so called ‘signaling-’ or ‘screening-hypothesis’ has developed.<sup>2</sup> Explicitly or implicitly it is always assumed in this literature that the degree issuing institutions have the right incentives to perform their filtering role well. However, the credibility of degrees is not at all that obvious.

The market for ‘filtering services’, too, is characterized by substantial information asymmetries. Employers, for example, who intend to overcome information asymmetries in the labor market by using educational credentials as a signal for talent are situated outside the higher education system and should have serious difficulties to evaluate whether a certain university performs the selection and education of its students in accordance to a promised level of effort and care. Why should potential employers trust the services of a particular university and associate her credentials with human capital of a certain quality if filtering causes costs? Or to put it differently, which mechanisms successfully prevent

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<sup>1</sup>. Riley (2001) provides an excellent survey.

<sup>2</sup>. See e.g. Grubb (1993), Cohn, Kiker, and Medes de Oliveira (1987), Katz and Ziderman (1980), Riley (1979) and Wolpin (1977). For a review c.f. Groot and Oosterbeck (1994).

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cheating by the degree issuing institution? In order to convince on the labor market, educational credentials have to be validated somehow.

The analysis presented in our paper shows that this problem of ‘signal validation’, which precedes the problem of signaling talent, is handled differently in different national higher education systems. Specific national ‘model educational paths’ simply reflect this validation diversity. The unparalleled percentage of doctoral degree holders among German top managers is a consequence of the fact that doctoral education is part of the ‘model educational path’ of high potentials in Germany, but not in other countries. We proceed through several steps in order to derive our results.

Starting from Arrow’s hypothesis that higher education is as a ‘filter’ for human capital, we discuss two ideal filter-designs that fulfil the requirement of signal validation in section 2. In what we term the ‘competitive validation model’ market forces ensure the credibility of filtering services, whereas in the ‘bureaucratic validation model’ it is government control that performs this function. As ideal types these two arrangements provide a framework that can be used to classify the higher education systems of the U.S., France and Germany. We infer ‘model educational paths’ for candidates wishing to signal their talent in the domestic labor markets of these three countries (section 3). This analysis explains why the doctorate is an attractive signal for German high potentials and why U.S. and French high potentials are likely to follow different routes. In section 4 we confront the inferred ‘model educational paths’ with empirical information on top management careers in those three countries. The results are consistent with the expectations. In section 5 we consider recent reforms in German higher education, which have the potential to change the signaling content of the German doctorate and to provide German high potentials with alternative instruments to signal their talent in the future.

## *2. Ideal filter designs in higher education*

### *2.1 The competitive validation model: Performance-related rewards, commitment and the evolution of hierarchical higher education markets*

What we call the competitive validation model is characterized by a high degree of competition between schools and a low degree of state regulation. Institutions of higher education are autonomous and substantially free in most aspects of their decisions. They plan, realize and modify their curriculum, select their student bodies and have far-reaching

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financial autonomy with all its implications. They are free to accumulate wealth through all methods of fund raising. This implies, of course, that they can also charge tuition fees that are paid for by their customers, the students. The amounts charged as well as the salaries paid to their scientific personnel are market prices, in the sense that they are not restricted by state regulation. Universities compete for scarce input-factors like talented students and professors as well as for research contracts that may be both privately and publicly funded.

Because universities individually take in the proceeds from donations, research contracts, tuition fees and other sources, this competitive setting entails the potential for performance-related rewards. Schools that continue to deliver high quality in research and teaching gain reputation which in turn spurs the demand for their services and ultimately augments their disposable income. However, if the markets are to reward universities in accordance to the quality of the services provided by them, they must be able to discern the quality of these services without undue cost.

The competitive validation model presupposes that institutions of higher education succeed to signal their own quality into the markets they serve. In the market for filtering services, which is the focus of interest in our analysis, students earn degrees in order to be able to signal a certain quality of human capital to potential employers. But why should potential employers trust the services of a certain university and associate the issued credentials with human capital of a certain promised quality? The answer proposed here is: Because the universities can design mechanisms that credibly reveal information about the quality of their filtering services. In other words: In the competitive model the ‘meta-signaling’ of universities in the market for filtering services validates their degrees issued as signals in the labor market.

Now, which is the potential starting point for this meta-signaling of universities? Technological peculiarities of university production are at the core of the signaling mechanism. The production process of higher education is determined to a high degree by the input it receives – that is, by human capital. Talented and motivated students and professors play a crucial role in teaching and research. Strong peer effects increase the importance of human capital (Astin 1993; Pascarella and Terenzini 1991). In a group of talented and motivated students (and professors) nobody wants to fall behind. Everyone benefits from the motivation and abilities of his peers. Rothschild and White (1995) speak of a ‘customer-based production technology’ to stress the dominant role of the students (the customers) for the output produced by universities. Universities devoting more care and skill to securing the high quality of their students (and academics) will also produce better results, especially in the face of strong peer effects. Under these ‘technological’ conditions universities can signal high quality output if the markets somehow perceive that only outstanding applicants

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(students and academics) are chosen and promoted at all stages of production. Input selectivity is a key to output quality in this industry.

However, at this point we must ask how a high degree of input selectivity can be communicated into the markets. Low admission quotas for their programs, for instance, are self-communicating since a university denying access to many applicants automatically produces the experience of rejection within the segment of potential applicants. Presumably, however, the information of admission quotas does not reach far enough.

Strictly speaking, the lowest admission rate only indicates a favorable access position of a university within the corresponding market segment of potential students. A university which can afford to reject the most applicants in a certain market segment of potential students has some priority over its rivals when checking the whole 'student supply'. Yet, the crucial question remains unanswered: Why should a favorable position in this pecking order in fact be used to select the most talented students? Or to put it differently: How can it be assured that universities using their superior access position to the detriment of their customers (other students and employers) – e.g. in not selecting according to talent and motivation – harm their own prospects?

Another peculiarity of higher education turns out to be the right starting point for the design of mechanisms suited to overcome this difficulty. Students cannot fully evaluate the quality of the education received before and even immediately after consumption. However, based on various social comparisons with colleagues, friends, peers or relatives, graduates will begin to gain a more precise understanding of the true value of their education and the degree they obtained in the course of their lives and careers.

Universities in a competitive setting may use this slow quality revelation feature of higher education to build up a commitment mechanism. By offering their graduates the possibility to pay for their education at times when they have better learned about its true value and according to how satisfied they are with it, universities can make themselves deliberately dependent on the future evaluation of their graduates.

At first sight, this seems to stand in contradiction to the payment of up-front tuition fees. In a competitive setting, however, tuition fees generally cover only a fraction of the total cost of education. Universities tap a variety of different revenue sources. The ratio between tuition fees and total cost of education should become smaller, the more renowned the schools are. Only the students of vocational schools at the lower end of the reputational spectrum should fully pay for the expenses of their own education. Even if students at top-schools pay higher fees in absolute terms, they should receive an education whose costs by far exceed the fees. The commitment mechanism described above requires that the commit-

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ting school gives an ‘advance’ to its students. The greater this advance becomes, the more the school is dependent on future income generated by its graduates.

In a certain sense the university makes itself a ‘financial hostage’, which its students may release after the quality of its services has been revealed. Therefore, advances of this kind are an integral part of the mechanism that validates signals like the discussed input selectivity. The university that takes the risk of such an initial loss is bound to perform its job in a superior way in order to produce the successful graduates enabling it to recuperate for these losses later in time.

In order for the described commitment mechanism to work, alumni do not necessarily have to make contributions from their private income in order to pay back their alma mater. Above-average success of graduates in a competitive setting positively reacts upon universities in many ways. *Ceteris paribus* successful graduates are able to give more financial and other support to their alma mater not only as private persons but also as officers in firms or administrators in government and other state agencies. Moreover, they have a higher influence on third parties and institutions that may sponsor the education system. The willingness of sponsors to donate money to schools is augmented by the success of their graduates, firstly because success captures the attention of donors, and secondly because donors prefer institutions that prove to ‘make something’ out of their money (Weisbrod and Dominguez 1986). In addition, above-average success of graduates captures the attention of firms, which may spur the demand for research and consulting services offered by the university and at the same time facilitate the job-hunting process of current graduates considerably. Higher starting salaries for graduates consequently allow for higher tuition fees and yet higher educational cost, and so forth.

The whole signaling process is subject to significant path-dependencies, as can be shown in the context of input-selectivity. As soon as some university gains the reputation to produce graduates with above-average human capital, a positive feedback loop is triggered. Highly talented and motivated students recognise that they can only communicate their superior human capital to potential employers if they also graduate at this school. To be rated as second category in the labor market is particularly unattractive for those students talented enough to make it through a top-school. Due to a larger pool of highly talented and motivated applicants, top-schools can perform a more rigid selection and thereby further improve their input quality. Via lower ratios of applicants to admissions, universities can at the same time signal the superior quality of their output. The reputation of an institution rises, and in return its opportunity for selectivity is further increased. Unsatisfied student demand and a schools’ reputation are correlated or as Frank and Cook (1995, p. 36) put it ‘success breads success’.

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In a competitive environment path-dependencies lead to a differentiated and rather stable hierarchy of universities, which Winston (1999, p. 13) refers to as a 'hierarchical higher education market'. Only a few universities may achieve the reputation of a top-school, independently of how high the average quality and total number of institutions might be. Just like in every tournament, the top places are limited by definition.

In a hierarchical higher education market, every school performs a distinct signaling role by attracting only a defined segment of the student population and serving a specific segment of the labor market. Students select themselves into those schools whose educational level suits their abilities and further plans best and employers in turn hire graduates from those schools which meet their specific human capital demand best.

#### *2.2 The bureaucratic validation model: Monitoring of predefined quality differences between schools by the state*

Bureaucratic higher education systems are characterized by a high degree of state regulation and, in their extreme form, the complete absence of competition between schools. Universities have no or very little financial autonomy, which not only means that they are dependent on the state as the main financier of higher education. It also means that the utilization of funds within universities is limited by a prespecified official allocation system based on yearly budgets that allows for little discretion at the university level. The accumulation of wealth is not an option in a financial system, where yearly budgets must be spent in order to preserve the chance of renewal for the next period. Moreover, the state regulates the allocation of students and academics to schools by defining application criteria and selection procedures, which are obligatory throughout the system. Tuition fees, if they exist at all, are not market prices but rather taxes charged by the state according to a uniform scheme.

Under this regime there is no possibility for the universities – and no necessity either – to make themselves dependent on the future success of their graduates. The well-being and sustainability of a school is at the discretion of the state and not - as in the competitive model - tied to the valuation of the quality of its services by market forces.

Consequently, quality differences between schools or types of schools need to be predefined by the state as well. The state can do so by setting different standards for curricula, by prescribing different admission and promotion procedures for students and academics and by redistributing financial and other complementary resources in accordance to the desired quality segmentation. In the bureaucratic model school reputation is determined by ration-

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ing inputs. The structure of bureaucratic higher education systems therefore may be uniform or it may deliberately assign schools to different quality standards. It even may provide a segment of elite-education. This, of course, presupposes the allocation of outstanding financial and complementary resources to a small number of schools that is accompanied by a deliberate redirection of superior student and academic talent to these places.

Commitment mechanisms of the kind employed in the competitive model at the university level are out of question in this bureaucratic setting. Only the state can prevent the erosion of the predefined quality standards over time by closely monitoring the compliance of the institutions of higher education to the regulations. These monitoring activities of the state, however, cannot be completely observed and evaluated by outsiders. Again, a problem of validation arises. Why should potential students and employers trust into the monitoring activities of the state and associate certain degrees conferred with a specific level of educational quality or human capital promised *ex ante*?

Since commitment mechanisms are curbed at the university level in this bureaucratic regime, it is again up to the state to back up the credibility of the performed monitoring activities. The prominent instrument in this context is the crafting of a consistent public employment policy. By defining entry standards and qualification requirements for the whole range of careers within the public administration, the state validates whatever concept of higher education he decided to implement. To be effective, this validation strategy presupposes a sufficient number of positions in the public sector to be filled at any point in time. Obviously, the strategy is easier to implement in rather centralized economic systems with a pronounced government sector. The more differentiated the requirements for human capital in the administration are, the more quality segments in higher education can be successfully stabilized by the employment policy of the state.

The descriptions given so far refer to ideal validation models. In practice, the boundaries between the described ideal types may be more blurred. Intermediate forms like for example competitive systems, in which public and private institutions coexist and both receive state subsidies, and bureaucratic systems, in which some areas remain unregulated, may emerge.

3. *Signal validation and ‘model educational paths’ for high potentials in the U.S., France and Germany*

Higher education systems characterized by specific validation mechanisms for educational credentials should have a predictable effect on the educational choices of individuals intending to signal their talent. High potentials have particularly strong incentives to signal their talent, since they would incur the highest losses if treated according to average expectations by potential employers. Consequently, the propensity to ‘use’ the higher education system of their country as a signaling and certification system for talent in the Arrowian sense should be more accentuated among the members of this group. High potentials should follow specific ‘model educational paths’ that serve their interest to accelerate the revelation of their human capital best.

In the following section we infer this model educational path by analyzing the specific structure and the employed validation mechanisms in the higher education systems of the U.S., France and Germany. In the next step these model educational paths will be confronted with empirical evidence from top management careers in the respective countries. We assume that these top managers originated from the group of highly talented individuals.<sup>3</sup> Did and to what extent did they follow the model educational path inferred for their country?

3.1 *Hierarchical higher education market in the U.S.*

Higher education in the U.S. displays many distinctive features of the competitive model.<sup>4</sup> The industry consists of public and private institutions that compete for students, faculty, research money, donors and sponsors etc. In addition to the subsidies given to them by the state, these institutions actively raise funds from sources like tuition fees, donations, alumni-givings, research grants, sponsoring and the like. Together with the income earned

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<sup>3</sup>. This assumption is based on another assumption, which in its shortest form states that ‘labour markets may work slowly but they work’. Careers do not start at the top of organisations and promotion through the ranks is based on continuous evaluation. It takes time to reveal human capital, which is the reason why high potentials try to accelerate the revelation process through signals. However, ‘low potentials’ do not make it to the top, since the absence of human capital cannot be hidden through all the evaluation rounds necessary to be promoted again and again.

<sup>4</sup>. For an overview of the U.S. higher education system c.f. Geiger (2002).

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from the accumulated significant endowments these non-state sources in general make up for a significant fraction of total income. Competition has led to a broad differentiation and a rather stable hierarchy of schools. The more famous the school is, the bigger its ‘advance’ given to the students (in the sense of education costs not covered by up-front tuition) tends to become. Students at top-schools pay higher fees, but they receive an education that costs, in some cases, five times as much as these fees (Winston 1999).

Quality indicators are routinely applied in ratings of U.S. colleges and universities. Selectivity regarding the human capital input is attested by low admission quotas and high scores of accepted applicants in the standardized tests such as SAT and GMAT. Other popular indicators include starting salaries and placement statistics of graduates, as well as the university’s endowment and alumni-givings. All these indicators fit into the described commitment- and signaling-logic of the competitive model.

In a country with institutions of higher education that are hierarchically segmented into different reputation layers educational choices have clear signaling consequences. Highly talented and motivated students recognise that they can best communicate their superior human capital to potential employers if they attend one of the highly selective schools. Since selectivity is a relative criterion the number of elite schools suited for signaling purposes is restricted by definition.

The obvious advice for high potentials therefore is to ‘throw’ themselves into the most selective filter they can pass, hence to try to enroll at one of the few universities ranked as top-schools. These institutions have most effectively committed themselves to maximize graduate success. Documenting a positive evaluation of the applicants’ abilities and talent their credentials will convince best in the labor market.

3.2 *Bureaucracy with elite-education at the Grandes Écoles in France*

Higher education in France displays a number of features that can be associated with the bureaucratic model. The industry is dominated by public schools, which are heavily subsidized and operate within a framework defined by a broad array of regulative procedures (Musselin 1992; Chevaillier 1998). Ultimately, admission and promotion procedures, education policies and the allocation of resources within the French system of higher education are in control of the state.<sup>5</sup>

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<sup>5</sup>. The distribution of professorial talent to posts for example is managed by the central administration in a nation-wide ‘concours’ (Chevaillier 2001).

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The hierarchy of the French higher education system consists of several layers with a small group of prestigious Grandes Écoles forming an elite-segment at the top. Elite education has a long tradition in France. Already at the end of the 18<sup>th</sup> century, the first Grandes Écoles were founded with the mission to educate candidates for top positions in government and administration, a practice that continues until today. By systematically recruiting graduates of the Grandes Écoles for public service the state validates the degrees issued by these schools. In order to ensure that the administration is in constant demand of graduates from the respective Grandes Écoles, the systematic migration of senior state officers into the top management of large, state-controlled firms needs to be organized. This practice is called ‘pantouflage’ in France (Vaughan 1981). It serves the administration since it enables the continuous validation of elite education. At the same time the state also legitimizes the degrees of the other graduates of the Grandes Écoles, who take the direct route towards the private sector.

How should high potentials heading towards a top management career behave in this setting? Obviously, the model educational path for top managers in France should lead them through the selective filters of the state-defined elite schools and include a period of service in the state administration.

### *3.3 Bureaucracy without a predefined elite-segment in Germany and the doctorate as a signal for talent*

Similar to the French system, German higher education displays many features of the bureaucratic model. Universities are subject to rigid state regulation. Apart from a few and rather new schools, that are mostly devoted to business studies and serve only an insignificant fraction of the total student population, all institutions are state-owned. Regulatory procedures even cover schools in the emerging private segment, albeit to smaller extent.<sup>6</sup>

In contrast to France, however, the education politics of all German governments after the Second World War have not been conducive to the creation of an elite-segment among the institutions of higher education. The only hierarchical element within German higher education is formed by the distinction between ‘Universitäten’ and ‘Fachhochschulen’, where the latter offer a shorter and more practice-related curriculum and are not allowed to

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<sup>6</sup>. For a comprehensive description of the German higher education system c.f. Huisman (2003).

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conduct doctoral programs so far. Quality differences between these segments are stabilized by different career-paths and salaries in government service.

Apart from some insignificant exceptions the public Universitäten have to enroll all applicants with an 'Abitur' (the German high school diploma) allocated to them by a centralized state agency. This agency matches students to Universitäten along several criteria including Abitur-degrees and proximity to home, with the consequence that Universitäten have no or very little control over their student input. However, even if German universities would be able to control their student input more independently in future, the question arises if that factor taken by itself would make a big difference. Why should universities spend time, money, and energy on input control, if the future success of graduates does not significantly and in due time affect the university's resources?

Within the two segments of public Universitäten and Fachhochschulen state regulation clearly aims at securing a rather egalitarian structure. While it is true that certain establishments are somewhat more recognized than others at least for specific subjects, the hierarchy between schools is not as explicit or as transparent as in the U.S. or in France.<sup>7</sup> As a consequence, German students cannot really choose between filtering devices of different strength. This egalitarian set-up seems to be well understood in the business world. In a recent survey among Germany's largest 250 employers the importance of the school a graduate had completed ranked ninth out of ten categories influencing the employment decision. It followed behind criteria like internships with a company, language skills, final vote, stay in a foreign country and length of study and in front of the applicants' age only (Leffers 2003). Without a predefined elite-segment in higher education, which would enable the production of a more precise signal of their qualities, German high potentials have incentives to invest in additional revelation mechanisms in order to communicate their outstanding talent.

A prominent candidate among these additional revelation mechanisms is the German doctoral degree. In our perception the validity of the doctoral degree as a signal for talent is directly linked to one of the few competitive elements in German higher education: The incentives of German professors to manage their individual reputation. We do not intend to say that American or French professors lack these incentives. Instead, we want to stress that German professors employed at Universitäten still have them despite an otherwise egalitarian regulatory environment.

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<sup>7</sup>. Or as Enders and Teichler (1996, p. 439) state: 'German universities are assumed to be fairly homogeneous, as far as the quality of teaching and research is concerned.'

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Professors with a good reputation will be more successful when applying for vacant positions at other schools. The official salary scale leaves room for several increases, which may be offered to professors along with other resources by the respective state ministry as incentive to change or stay.<sup>8</sup> At the same time, the job market entails the option to choose one's location. This free choice of location becomes increasingly relevant in the face of peer effects and secondary occupations outside the university. Professors thus capitalize their individual reputation in working out new contracts with the state as well as with the 'customers' who pay for their services (expert reports, consulting or instruction) privately. Of course, reputation can also be satisfactory in itself, without being capitalized on secondary markets.

In order to understand how the incentives of German professors to manage their individual reputation contribute to the validation of the doctoral degree as a signal for talent we need to look at the relation between professors and doctoral candidates in the traditional chair-based organization of German Universitäten. The large majority of these candidates work as staff members with temporary contracts at university chairs (Enders and Teichler 1997). The status of personal assistant to the professor constitutes an extreme degree of dependence, since professors are not only superiors, deciding over contract renewals, but also academic teachers supervising and reviewing the doctoral thesis. In addition, German professors have substantial degrees of freedom when deciding how to employ their scientific personnel. For assistants only their obligation in teaching is contractually fixed. However, in addition to helping professors with lectures and exercises, assistants routinely support their principals with research assistance and perform various other activities. In the German chair-based organization professors have far-reaching and legitimized access to additional work power. Therefore, it is not completely exaggerated to portray the relation between professors and doctoral students as a temporary 'exploitation license'. Professors maximize the benefits of this license if they employ the most talented candidates only. This is the case, regardless if professors are interested in enhancing their own reputation within the research community or rather within the local business world. Assistants are 'valuable', independently of the professors' personal orientation and goals.

For firms that recruit graduates holding a doctoral degree for a future management career a sound scientific education seems to play a minor role anyway. What counts, however, is the selection of the candidate by the professor. Employers anticipate that professors will select carefully and make use of the information advantage stemming from their position as insiders, since they can enhance their own utility level through the 'exploitation license'. In

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<sup>8</sup>. For details on the current appointment procedure and the reward system of German professors c.f. Schimank (2001).

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fact, when selecting candidates and appointing his or her own staff the German professor for the first time benefits from using his or her superior information about the students he or she teaches. This holds, as mentioned already, for professors who are oriented towards research, as well as for those more interested in consulting or other business related activities. Talented and ambitious candidates maximize the value of the ‘exploitation license’ in both uses.

What does all of this mean for the expected model educational path of high potentials in Germany? As students they should have preferred Universitäten over Fachhochschulen, but at the university level, the identity of the school should be less important. The doctoral degree, on the other hand, should be widely spread among top managers.

#### *4. Educational paths of top managers in the U.S., France and Germany*

To examine the educational paths of top managers in the U.S., France and Germany we draw on systematic information compiled on Chief Executive Officers (CEO), Présidents Directeurs Généreaux (PDG) and Vorstandsvorsitzende (VV) of the one hundred largest companies in these three countries. The selection of the companies was conducted on the basis of market capitalization data from April 24 2001. Educational and career information has been obtained from various sources, including company homepages and different editions of ‘Marquis’s who’s who’ and ‘Who’s who in European business’. In some cases we were able to collect missing information by contacting the respective firms directly.

Presumably, the incentives to signal ability via educational credentials vary significantly with the status of a top manager. We therefore omitted inheritors, founders as well as a group that may be termed as ‘foreign governors’ from our sample. Inheritors get to the top of a firm due to their property rights, and not because they were able to convince potential employers of their outstanding qualities as managers. Inheritors should have a reduced need to signal ability to outside-owners or their agents. Another group that should be less focused on signaling managerial abilities to potential employers are founders heading their own firms. Finally, it is common practice that the top managers of subsidiaries abroad are appointed by the headquarters of the firm. These top managers are foreign governors in their country of operation. We do not intend to say, that foreign governors did not have to signal their above-average human capital. Of course they did, but on their domestic labor markets. Therefore they cannot be considered in an analysis of higher education as a filter in their host countries.

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In order to compare the educational paths of the remaining individuals we had to decide on which degrees to count. In the U.S. and France higher education is more modular than in Germany. Two or even more academic degrees may be awarded prior to the doctoral degree. In Germany at the time relevant for our analysis a single academic degree (Diplom, Magister or Staatsexamen) was awarded after completion of the entire 4-6 year higher education program. Taking into account of these differences our category 'higher education degrees' in table 1 includes bachelor's and master's degrees for the U.S., diplôme universitaire de technologie, license, maîtrise and diplôme d'ingénieur for France, and Diplom, Magister and Staatsexamen for Germany. The category 'doctoral degrees' refers to the U.S.-American Ph.D., the French doctorate and the German Doktor.<sup>9</sup>

In the U.S., 97.8 percent of the top managers in our sample hold a higher education degree according to this definition. For France and Germany the corresponding rates are 97.3 and 95.1 percent. These figures are quite similar. The following numbers display remarkable differences, though: Whereas in the U.S. 5.6 percent of the CEO and in France 4.1 percent of the PDG in our sample hold a doctoral degree, in Germany no less than 58.5 percent of the VV do so. Only one American CEO and three German VV have spent part of their careers in the government administration. In France, on the other hand, 44.6 percent of the top managers in our sample have worked in the government administration prior to their actual employment.

Table 1. Educational paths of top managers

In order to assess and compare the distribution of degrees among schools, another peculiarity of German higher education had to be accounted for. In Germany it is common practice among students to change schools more than once until earning their first official degree. This practice alone may indicate a uniform quality level in the university system, since otherwise such 'tourism' would collapse due to significant transaction costs. Only those schools on the educational path of a top manager were considered that in fact awarded a degree, since only a filter that has been successfully passed may serve as a valid signal.

In hierarchical higher education systems the interest of high potentials should be concentrated on a small group of top-institutions, independent of how many institutions at the lower end of the reputational spectrum offer their services. Whether high potentials choose their alma mater in order to signal their talent should be observable right at the top of a

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<sup>9</sup>. A further differentiation of degrees into different subjects was not possible due to data limitations. In particular, a great number of French topmanagers only named the school they had attended and did not specify their subjects.

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hierarchical system. To get a first impression of a corresponding concentration of top managers at particular schools, we calculated the percentage of educated top managers who earned a degree at the school that was most frequently chosen by their peers.<sup>10</sup> It turns out that 21.6 percent of the CEO with a higher education degree in our sample possess a degree from Harvard University, 30.6 percent of the educated PDG in our sample earned a degree from the École Polytechnique, and 9 percent of the educated German VV in our sample graduated from the Ludwig-Maximilians-Universität (LMU) München. In the following steps we extended the group of schools by adding the school that finished next in every country as ‘producer’ of degrees for the top managers in our sample and asked how many top managers have earned a degree from at least one of these schools. The results for the five most frequented schools are depicted in table 2.

Table 2. Percentages of educated top managers holding a degree from the most frequented schools (cumulative)

Of course, these figures may be distorted by different institutional sizes and sizes of student populations in the respective countries. In order to approximate a school’s relative size we divided its number of graduates by the total number of graduates in its home country for the academic year 2000-2001.<sup>11</sup> In that year only 0.29 percent of the U.S.-American higher education graduates obtained their degree at Harvard University, but 21.6 percent of the CEO in our sample did so. Compared to the whole population of graduates this particular school is ‘over-represented’ among top managers by a factor of 73.8. In France the École Polytechnique accounted for 0.14 percent of the French graduates, but for 30.6 percent of the PDG in our sample. The corresponding ‘concentration factor’ is 218.8.

If we compare the German figures with those for France and the U.S., the concentration of German top managers on a small number of schools is markedly less strong. The most frequented school hosted about 2.3 percent of the German graduate population and 9.0 percent of the VV in our sample. This institution is thereby attended more often among top

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<sup>10</sup>. There exists some variation in how countries count schools, and which schools they count. In France and Germany universities almost exclusively are single institutions that exist in only one place. For the U.S. we treated universities as a single institution and included their branch campuses and graduate schools.

<sup>11</sup>. Graduation figures for the different schools are head counts and were obtained from the school’s statistical yearbooks. The total numbers of graduates for the three countries were retrieved from National Center For Education Statistics (2002, table 255), Ministère de l’Éducation Nationale (2003) and Statistisches Bundesamt (2003). This is a very rough procedure since present topmanagers graduated some time ago and school sizes as well as student populations have changed over time. We originally intended to use the graduation numbers for the year 1975, when the average age of the topmanagers in our sample was 22.3. However, not for all schools 1975 graduation figures were existent and available.

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managers in our sample by a factor of 2.3. The figures for the five most frequented schools are given in table 3.

Table 3. Concentration factors for the most frequented schools

The educational choices of the top managers in our sample are consistent with our expectations. In particular we find:

An outstanding importance of the doctoral degree for German top managers,  
a large fraction of French top managers that has spent part of their career within the state administration, and  
a strong preference of U.S.-American and French top managers for a few top- and elite schools respectively.

Finally, we look at whether the distinction between Fachhochschulen and Universitäten plays a role in the educational paths of German VV. 7.7 percent of the educated German top managers hold a degree from a Fachhochschule as their highest degree. This small ratio cannot be explained by enrolment numbers alone. In the year 1975 Fachhochschulen accounted for 29.6 percent of the degrees awarded (Hochschul-Informationssystem GmbH 2002, p. 221). German top managers obviously preferred Universitäten. Signaling rents are one possible explanation for this choice.

*5. The future direction of the German doctorate as a signal for talent*

*5.1 Reforms in doctoral education*

The German chair-based model of doctoral education has increasingly come under debate in recent years. The German science advisory panel (Wissenschaftsrat) supports plans by the German Science Foundation (Deutsche Forschungsgemeinschaft) to increase the number of so called ‘Graduiertenkollegs’ throughout the German university sector (Ruschkowski 2002). Moreover, some German states (Bundesländer) have started to finance ‘Graduiertenzirkel’ at selected institutions and a number of universities have embarked on similar models of doctoral education by themselves. Finally, increasing efforts are currently made to harmonize doctoral education within the European Union, which may also limit the prospects of the traditional German chair-based model of doctoral education.<sup>12</sup>

Graduiertenkollegs and similar concepts intend to duplicate the practice of doctoral education at U.S. research universities (Kupfer and Moes 2003; Nerad 2002). At these institutions doctoral education is a highly structured third part of university studies following a predefined sequence of course work, research training and writing of the doctoral thesis. Coaching and teaching responsibilities in doctoral education are shared among the professors within a department. In general doctoral students are financed through grants, a fact which makes a substantial difference to the current employee status of German chair-assistants.

In the chair-based model doctoral candidates carry out a number of tasks that are only remotely related to their research projects. Administrative and teaching duties reduce the time candidates are able to spend on their own research. Moreover, the degree and quality of mentoring and coaching activities vary with the identity of the supervisor. In contrast to this, formal doctoral programs may reduce the power and discretion of individual professors, promote the emergence of general standards in doctoral education and allow doctoral students to devote more time to their own research. Thus the envisaged reforms in German doctoral education are expected to increase research output and quality.

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<sup>12</sup>. C.f. Reichert and Tauch (2003). In the U.S., on the other hand, contemporary doctoral education is not undisputed (Nerad 2002). Central criticism, though, addresses the content and objective and not the organisation of doctoral education.

5.2 *The price of research orientation*

As we have argued above, German professors' incentives to engage in a careful selection of the most productive individuals and to further invest in their human capital crucially depend on the institutionalized and largely unrestricted access to their assistants' work power. Remember that all professors, those oriented towards research and those oriented towards consulting and project work, currently have these incentives because they all individually profit from talent.

In this context the introduction of formal doctoral programs has the obvious effect to limit the access of professors to the working capacity of the new generation of doctoral students. These students do not contribute to the utility of the individual professor in a comparable way as the traditional chair assistants did. Why then should the individual professor continue to invest in the selection and monitoring of these students? And why should employers continue to assume that graduates with a doctoral degree are better suited for a management career if they know that professors do not profit anymore from economizing on their insider information on talent?

There are two relevant objections to this line of argument. First, it presupposes that the German higher education system remains an egalitarian bureaucracy, where the quality of doctoral education depends solely on the incentives of professors to maximize their own reputation. In contrast to the German case, in hierarchical education markets the individual well being of faculty members is strongly connected to the success of their school. To the extent that doctoral programs contribute to this success, professors profit from investing time and energy in these programs, even without having individual access to the working power of doctoral candidates. If the German system of higher education would 'americanize' and transform into a hierarchical market in the long run, incentive mechanisms tied to the success of the school would automatically evolve. However, in this scenario the demand for doctorates as career accelerators would fade away anyway. In a hierarchical market high potentials have the option to signal talent by graduating from a few top schools.

Second, one could argue that the scientific community has developed quite universal screening and monitoring procedures through the system of refereed publications and conferences.<sup>13</sup> By using the evaluation procedures of the scientific community even in a Ger-

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<sup>13</sup>. Frey (2004) gives a rather critical assessment of the current system of refereed publications.

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man department, where professors have only limited incentives to invest in the department's reputation, a 'good' formal doctoral program may be implemented without requiring too much professorial effort. Doctoral students basically are 'selected', 'coached' and 'monitored' by the scientific community if they are required to submit and present their papers at conferences and publish in refereed journals before they may defend their thesis. Moreover, to the extent that the department rules allow for co-authored papers in doctoral education, the logic of individual reputation management is at least partially back in the game. In this case research-oriented professors may have incentives to coach doctoral students because they individually profit from joint publications. But even if this combination of 'external' and 'specific internal' monitoring works well, it is restricted to the evaluation of research by its very nature (Paul and Rubin 1984).

Formal doctoral programs therefore are likely to produce a different kind of candidate. A doctoral degree earned in a 'good' formal doctoral program proves that the candidate has superior research abilities in a specific area of science.<sup>14</sup> However, this is not what the majority of the candidates that embarked on the traditional German doctorate had in mind. According to an empirical study conducted in 1993, 82 percent of doctoral students in the fields of business and economics in Germany planned a private business career (Enders and Teichler 1994, pp. 34-35). They obviously intended to produce a signal for superior talent by earning the doctoral degree that would enable them to accelerate their career outside academia.

### 5.3 *Future signaling options for high potentials*

There are clear signs that state governments are willing to give institutions of higher education more flexibility in many aspects, including the selection of student-input and the internal allocation of their funds. In which direction German higher education ultimately will move, though, is not yet clear.

Some Länder have recently started to allocate fractions of their funds according to indicator-based schemes (Leszcensky 2004). If such funding formulas would be consequently applied over longer periods of time and universities had to compete for public and private funds, German higher education could gradually move towards a hierarchically segmented

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<sup>14</sup>. Experiences with the Graduiertenkollegs provide some evidence for this notion. Doctoral education tends to be focused on research and future academics are increasingly recruited from these programs.

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market. In this scenario, high potentials without ambitions in science will presumably stay away from doctoral education. Instead, they will select themselves into to the few high class institutions at the top of the system and graduate there in order to signal their talent.

Other Länder plan to endow selected institutions with outstanding financial resources in order to establish a segment of elite education by fiat. If such a bureaucratic creation of elite schools would work, high potentials with a business career in mind would migrate to these schools. However, the creation of elite schools by fiat presupposes more than just a superior financial endowment. As the French case shows, a successful validation of predefined quality differences goes hand in hand with a consistent state employment policy. This requirement, though, has received little attention in the scientific as well as the political discussion so far.

In a third scenario, elite education in the German public higher education sector will not take place, either because remaining state regulation prevents a market driven hierarchization or because state authorities do not engage in a consequent implementation and validation of an elite segment. In this scenario, formal programs in doctoral education have two effects for high potentials heading for a management career. First, they devalue the doctorate for them by changing its signaling content. Instead of certifying a more general form of human capital, the doctorate proves that the candidate has a specialized scientific education. Second, the investment in this specialized scientific education may raise the costs of doctoral education for the future managers. Although formal doctoral programs are likely to meet the demand of high potentials to a lesser degree, some of them may still take part. Others will look for feasible alternatives and migrate into the hierarchically differentiated systems of higher education abroad or will be attracted by private schools. With an increased number of highly talented applicants these private institutions may augment their output-quality by being more selective, gain size or increase in number. The prosperity of private management schools in Germany's higher education could be linked to the signaling opportunities given to high potentials in the public university sector.

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Table 1: Educational paths of top managers

	<b>USA</b>	<b>France</b>	<b>Germany</b>
higher education degree <sup>a</sup>	97.8	97.3	95.1
doctoral degree <sup>b</sup>	5.6	4.1	58.5
state service <sup>c</sup>	1.1	44.6	2.4

Notes: The number of observations is 90 for the USA, 74 for France, and 82 for Germany. <sup>a</sup> Bachelor's and Master's degree; Diplôme universitaire de technologie, License, Maîtrise and Diplôme d'ingénieur; Diplom, Magister and Staatsexamen (in percent of top managers). <sup>b</sup> PhD; Doctorat; Doktor (in percent of top managers). <sup>c</sup> Percentage of top managers who have worked in government administration.

Table 2: Percentages of educated top managers holding a degree from the most frequented schools (cumulative)

<b>Number of schools</b>	<b>USA</b>	<b>France</b>	<b>Germany</b>
1	21.6	30.6	9.0
2	27.3	55.6	16.7
3	31.8	63.9	23.1
4	36.4	69.4	29.5
5	40.9	72.2	35.9

Table 3: Concentration factors for the most frequented schools

<b>Number of schools</b>	<b>USA</b>	<b>France</b>	<b>Germany</b>
1	73.8	211.8	2.3
2	51.0	157.8	4.8
3	34.1	119.5	5.0
4	31.6	86.3	4.7
5	28.0	77.0	5.3

Notes: Numbers are calculated by dividing the percentages of top managers with a degree from the most frequented schools by the percentage of graduates of these schools of the total graduate population for the academic year 2000-2001 (cumulated).