

Evaluation of Sporting Success in Austria – An Institutional Economics Analysis

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Abstract: In analysis of Austrian elite sport, a distinction can be made between hierarchical and market organization. Following Williamson, the question of a superiority of governance form caused by the factor specificity of investments is being investigated.

The results from an applied logit-loglinear model on data from survey with Austrian ‘squad-athletes’ show that apparently there exists no such superiority. For sports with a low degree of site specificity and physical asset specificity it can be said that it does not seem to matter if the production process is organized in a hierarchical or market form – the “pre-conditions” seem not to allow an effective production anyway. For sports with a high degree of site specificity and/or physical asset specificity it could be seen that a more hierarchical form of organization seems to be (moderately) favorable for producing junior success. Interestingly enough, this is not true for elite level success, where a hierarchical form of production is no longer favorable.

Considering the (possible) additional costs on the collective as well as on the individual athlete’s level in case of a (more) hierarchical form of organizing the production of sporting success should question the observable efforts of further institutional centralization. In a hybrid form of organization like in Austria centralization might have exceeded the optimal extend and congruency of different products seem to be overemphasized.

Keywords: New institutional economics; Asset specificity; Factor specificity of investments; Sports promotion; Sport governance

JEL Classifications: D230, Z280, D730, H490

1. Introduction

Emrich, Klein, Pitsch, and Pierdzioch (2012, 2013), Flatau and Emrich (2013), and Pierdzioch and Emrich (2013) developed a model to measure national Olympic success by medal counts that applies to open societies only. Open societies are defined by the presence of a high degree of political and civil liberty rights.¹ The model developed explains (following Occam's Razor) as much as possible the cross-country variance of success at Olympic Games by using only a small number of explanatory variables. Emrich *et al.* (2012) have shown that population size and economic prosperity are the most important factors influencing medals totals.² Economic prosperity is shown to be more important for Winter Olympic Games; population size more important for Summer Olympic Games.

Although the variables used by Emrich *et al.* (2012) are not the only variables that help to explain sporting success, they can explain a substantial proportion of the cross-country variability of sporting success among open societies. The explanatory power of the regression equations used is higher for Summer Olympics (Adj._R² between .470 and .723) than for Winter Olympics (Adj._R² between .284 and .489; for Winter 1998 not calculable). Emrich *et al.* (2012) suggest that other (unobserved) factors are important for explaining sporting success in Winter Olympics (for example geographical conditions and climate). A second explanation they consider is that the strong influence of GDP per capita reflects a strong dependence on specific and costly sports facilities for Winter Games (Flatau and Emrich, 2013). However, a wide range of variance remains to be explained, and also why some nations over-fulfill the expectations of the model while others don't.

In general, open societies attempt to promote high performance sporting elites by using similar means and different institutional structures and promotional programs. Institutional structures of sports promotion can be located between an often decentralized laissez-faire system and an often centralized rigid system. The first one commonly develops in open, democratic societies, the second one often tends to be enforced by a rigid, dirigisme and centrally-planned system of sports promotion.³

From an economic perspective, the result of promoting elite sports can be measured via sporting success in the form of medals. The efficiency of organization is therefore the most important key factor to enhance sporting success. Here we apply the New Institutional Economics (NIE) to the analysis of the production of elite athletic success. NIE analyses institutions of governance suitable to optimize the efficiency of transactions (Williamson, 1991). We focus on a central concept from transaction cost economics, namely the dependency of the outcome of sport supporting systems upon the optimal governance structure.

¹ Countries were defined as open societies if they showed the two highest levels of civil liberties during a period of four years including an Olympic year (Emrich *et al.*, 2012).

² This result is confirmed for Summer Olympics by the study of Leeds and Leeds (2012).

³ Pierdzioch, Emrich, and Klein (2014) show the limited power of conventional determinants (population size and economic resources) in explaining medal counts since 1970 in the case of the German Democratic Republic. They argue that the socialist dictatorship undertook "massive investments in doping in elite sports to stabilize and promote citizens' loyalty in the wake of an accelerating economic depression" (Pierdzioch *et al.*, 2014, p. 23). After developing a model of an optimizing dictatorship they show that a rational dictatorship increases investments in elite sports and doping in such a way "that the marginal utility from such investments equals the marginal utility from spending economic resources [sic!] on political repression" (Pierdzioch *et al.*, 2014, p. 23). The empirical results are in line with the predictions of the model.

It is necessary to consider asset specificities for the production of sporting success in Austria. To analyze the effectiveness⁴ of the sports promotion system, depending on the different asset specificities of diverse sports, we compare the success of Austrian elite athletes in sports characterized by varying levels of different asset specificities.

The paper is structured as follows: First the NIE and its applications to economic research in sports are discussed (including theoretical considerations of both meaning and role of institutions and the concept of asset specificities with special reference to talent promotion and talent identification). Then the organizational nature of Austria’s sporting promotion system is described shortly.⁵ Thirdly a different sports are categorized by means of their asset specificities, and a description of the methods used in our empirical study is done. The results section follows next, with a subsequent discussion of these aforementioned results. The paper ends with our conclusions.

2. NIE and Its Application to Economic Research in Sports

According to Simon (1985, p.303) nothing is more fundamental in the field of economic research than “our view of the nature of the human beings whose behavior we are studying”. On the subject of economics of governance, cognition and self-interestedness are especially relevant (Williamson, 2005). The NIE cannot be described as a cohesive theory. It consists of several theoretical approaches. A distinction between the following three related and overlapping theoretical components can often be found: (1) property-rights theory, (2) transaction costs economics and (3) the principal-agent theory (Welge and Eulerich, 2014).

Although the usage of NIE’s theoretical approaches as frameworks for analyzing sports related questions is not a new approach (for early applications cf. Franck, 1995; Horch, 1990), it has not often been used in sports related research till today. Table 1 shows an overview of contributions illustrating the relevance of NIE-related research.

Table 1. Contributions of upcoming NIE-related research in sports economics

Author(s)	Topic	Geographical origin of data	Team sports industry/league [TL] or individual sports [IS]	Sports
Scully (1974)	Reserve Clause and its consequence for players	US	TL (Major League Baseball (MLB))	Baseball
Fernie and Metcalf (1999)	Shirking	Europe	IS (British Horse racing)	Horseracing (Jockeys)
Marburger (2002)	Property Rights and player transfer	US	TL (MLB)	Baseball
Maxcy, Fort, and Krautmann (2002)	Shirking	US	TL (MLB)	Baseball
Farrelly and Quester (2003)	Principal-agent relationship and sponsorship	Australia	TL (Australian Football League)	Football
Feess and Muehlheusser (2003)	Different transfer fee systems in European soccer	No data	TL (European professional soccer leagues)	Soccer

⁴ Although an analysis of efficiency (i.e., the consideration of public costs) would be desirable, the lack of appropriate data prohibit its realization.

⁵ The considerations of the third section are based on a comprehensive analysis of Barth (2015).

Journal of Contemporary Management, Vol. 7, No.2

Marburger (2003)	Assignment of Property Rights and shirking	US	TL (MLB)	Baseball
Mason and Slack (2003)	Principal-agent relationships in professional hockey	No information	TL (professional hockey, no further information)	Ice hockey
Easton and Rockerbie (2005)	Consequences of introducing a new rule	US	TL (National Hockey League)	Ice hockey
Sam, Batty, and Dean (2005)	Transaction costs and sport sponsorship	No data	No information	No information
Berri and Krautmann (2006)	Long-term contracts and shirking	US	TL (National Basketball League (NBA))	Basketball
Sanderson and Siegfried (2006)	Reconsideration of Rottenberg's famous article	No data	TL (MLB)	Baseball
Stiroh (2007)	Contract-related incentive effects on individual performance	US	TL (NBA)	Basketball
Dietl, Franck, Hasan, and Lang (2009)	Cooperative form of organization versus contractual governance	No data	TL (European professional soccer leagues)	Soccer
Krautmann and Donley (2009)	Shirking	US	TL (MLB)	Baseball
Flatau and Emrich (2011)	Organisation of sporting success	Europe	IS	Different sports
Frick (2011)	Shirking	Europe	TL (German Bundesliga)	Soccer
Dietl, Franck, Lang, and Rathke (2012)	Salary cap	No data	TL (European professional soccer leagues)	Soccer
Flatau and Emrich (2013)	Transaction costs and elite sports promotion	Europe	IS	Different sports
Lee (2014)	Optimal contract design for baseball players	No data	TL	Baseball
White and Sheldon (2014)	External and internal motivation theory and performance	US	TL (MLB, NBA)	Baseball, Basketball
Buraimo, Frick, Hickfang, and Simmons (2015)	Long-term contracts, shirking and selection effects	Europe	TL (German Bundesliga)	Soccer
Cadman and Cassar (2015)	Consequences of performance incentives	US	TL (National Collegiate Athletic Association)	Football (coaches)
Feess, Gerfin, and Muehlheusser (2015)	Contracts as rent-seeking devices	Europe	TL (German Bundesliga)	Soccer
Geeraert and Drieskens (2015)	EU control of FIFA and UEFA	No data	International Federations (FIFA, UEFA)	Soccer (governing bodies)

This review is clearly limited, nevertheless it shows some interesting insights:

- [1] The main part of the research is empirical (72%).
- [2] From this empirical research, 56% of studies are based on analyzing data from the US, 33% from Europe, one contribution is based on the examination of data from Australia and in one case it was not possible to clarify this question due to missing information.
- [3] The great majority (84%) of research is limited to the team sports industry, whereas data from the MLB are most commonly used.
- [4] With the exception of three studies, all deal with one sport only.
- [5] Looking at the investigated sports more closely, the conclusion can be drawn that baseball (8 times) and soccer (7 times) are the most frequently analyzed sports.
- [6] Baseball is restricted to the US market. In case of soccer, several contributions are (only) theoretical in their nature and refer to European professional soccer leagues. If the soccer studies are empirical, the data used originate from the European market.

Besides these original articles, Garner, Humphrey, and Simkins (2016) recently gave an overview to the compensation literature in finance and sports. Several of the articles analyzed in this review used one of the three approaches mentioned further above of NIE as theoretical framework. With the results of this short analysis it becomes apparent that there still exists a lack of studies using the valuable frameworks of NIE, especially when it comes to individual sports in European countries.

A closer look at the specific problem being addressed in this paper – the production/organization of sporting success – reveals that although the efforts in talent identification and talent promotion originate from the field, the question how to effectively organize the production of sporting success aroused much scientific interest in recent decades (Vaeyens, Güllich, Warr, and Philippaerts, 2009). Studies showed that in sports used instruments are not effective for the goal of reaching international sporting success at elite level (e.g., Barth, 2015; Emrich and Güllich, 2005). Consequently, several (new) models of talent development have been proposed (e.g., the differentiated model of giftedness and talent 2.0 by Gagné 2010). Furthermore, several reviews have been done on the topic of talent selection and talent promotion (see e.g., Faber, Bustin, Oosterveld, Elferink-Gremser, and Nijhuis-Van der Sanden, 2016; Vaeyens *et al.*, 2009). The fact, that a huge number of studies on the organization of sporting success exist, but many of them remain on a descriptive level appears to be problematic, because the question of effectiveness might be addressed, but the empirical proof/investigation of success is not part of these studies (e.g., Digel, Burk, and Fahrner, 2006).

Despite these great efforts economical approaches still appear to be underrepresented. Considering that the production of sporting success is done within a complex system – encompassing several principal-agent relations and sport governing bodies functioning as monopoly – by “using” sports differing not only in their requirement of resources or their necessity in investments but also being characterized by dissimilar transaction specificities, one can easily see the potential of analyzing the various existing problems by applying economical frameworks, especially those of the NIE. Concerning the above mentioned subject of this paper it has to be concluded that only two papers (Flatau and Emrich, 2011, 2013) addressed the issue of superiority of one governance form over another caused by the factor specificity of investments.

Therefore, this article places the transaction costs economics at the center of interest. Due to that fact the question immediately arises as to what characteristic features transactions can be

differentiated. For Williamson (1979, p.239) “the three critical dimensions for characterizing transactions are (1) uncertainty, (2) the frequency with which transactions recur, and (3) the degree to which durable transaction-specific investments are incurred.” “Uncertainty is the source of disturbances to which adaptation is required” (Williamson, 2005, p.7) and the second mentioned quality concerns on one hand setup costs on the other hand reputation effects. The third can be used to compare the two generic forms of organization – market and hierarchy – with regard to their transaction costs. In principle, it can be said that the utility of vertical integration for ongoing transaction rises with the (increasing) factor specificities of investment (see basically i.e., Williamson 1979, 2005). This factor specificities of investments are the higher the lesser degrees of freedom concerning certain factors of production are. Those are as follows: the location of production, the factual and human capital used, the numbers of customers and their extent of purchase as well as the reputation (Flatau and Emrich, 2011). Putting these considerations in the context of the production of sporting success, the question arises whether the proportion of efficiency of different institutional arrangements (and therefore forms of organization) are influenced by the above mentioned factors.

3. The High Performance Sport Supporting System in Austria and the Question of “Good Governance”

The organization of the Austrian high performance sport system can be described as a production network (Barth, 2015) with an (assumed) long-lasting process of product preparation in sports clubs and submit to a high amount of uncertainty. The organization of the production network leads to two main propositions. Firstly, our methodological foundation is based on the methodological individualism⁶ and we theoretically do not conceive the production network as being a single actor. Secondly, Austria’s sport system is characterized by a high amount of autonomy within the national sport governing bodies, in the context of how decisions about the way in which sports promotion should be carried out are made.⁷ Being responsible for developing their sports, the different national sport governing bodies (NSGBs) can be seen as the central organization for all questions concerning the promotion of their specific sport(s). Such a production network composed of at least partially independent subunits (Barth, 2015) requires a high level of coordinating mechanisms. The subsidies to pay the sports promotion mostly come from the government, thereby limiting autonomy.⁸ Principally the sports promotion system could be organized in different forms which should lie anywhere in between market and hierarchy.

In the light of Williamson’s third attribute characterizing a transaction – the incurrence of durable transaction-specific investments – the question of a superiority of one governance form over another (here: market vs. hierarchy) caused by the factor specificity of investments will be investigated. Comparing the two forms of organization it is expected that results will show the hierarchical form to be more (relatively) favorable in the case of sports with a high degree of dependency upon the location of production/high degree of site specificity and/or a high degree of dependency upon the factual capital/physical asset specificity (Sports_{high}) in comparison to sports

⁶ This does not mean that we refuse sociostructurally explanations to purposes of actions (Tacke, 2006).

⁷ This seems to be true not only in comparison to nations with less liberal political systems, but also for politically comparable nations like Germany.

⁸ Since 2009 the federal minister of the responsible ministry has changed three times, every one of them emphasizing the need to reform the promotion system.

which are determined by only a low degree of dependency upon the location of production and the factual capital ($Sports_{low}$).

In using this theoretical approach for analysis the following restrictions have to be made: Firstly, although the analysis of efficiency, meaning the relationship between caused public costs and success (i.e., Olympic medals) would be desirable, the lack of appropriate data prohibit its realization. The question to investigate is under which conditions a more hierarchical form of production is more or less effective. Addressing effectiveness, but not efficiency, seems to be justified if the annotations that transaction costs mainly occur in the form of mal-adaptation are considered (Williamson, 2005). Secondly, factor specificity of investment is limited in this article to the above mentioned variables.

To make a comparison regarding the effectiveness of the two generic forms of organization, a third restriction has to be introduced: The analysis will be done only for a certain form of governmental-hierarchical promotion of sporting success – the elite schools of sports (ESS) in Austria. These schools should make a positive contribution to the development of sporting talents, meaning that athletes who attend an ESS should be more successful than athletes who do not attend such a school.

Fourthly, only two forms of governance (market: production via sports clubs without athletes' attendance to an ESS; hierarchy: production with athletes attending an ESS) are considered.

The main goal of the production network of sporting success is the maximization of a nation's sporting success in elite classes within international competitions (i.e., by an increasing number of Olympic medals). So the ESS should contribute to this main goal. Sporting success is measured on the collective level, whereas the examination will be done on the individual level by analyzing the extent to which pupils of ESS are more successful in sports than athletes who are not pupils of ESS. This possibly might not be a valid equalization of (probably) two different forms of rationality (Barth, 2015; Emrich and Güllich, 2005).

Up until today early success in age restricted competition classes is used in institutionalized regulatory instruments of different institutions in (Austria's) (high performance) sports system as a criterion for supporting athletes by the promoting system and are often considered as valid prognostic variables for future sporting success (Barth 2015), in spite of the fact that several empirical contributions speak against its prognostic validity.

From the above the following two hypotheses can be deduced:

- H1:** The positive correlation between the attendance to an ESS and the sporting success in the competition age class "elite" is higher in $Sports_{high}$ compared to $Sports_{low}$
- H2:** The positive correlation between the attendance to an ESS and the sporting success in the competition age class "junior" is higher in $Sports_{high}$ compared to $Sports_{low}$.

4. Methods

We provided a questionnaire covering more than 100 questions in which Austrian 'squad-athletes' were questioned (among other things) on their 'sportive life course' and socio-demographic characteristics. 31 out of the sample of 33 NSGB – each of them part of the Olympic program – declared their support for this study⁹, but the posting observing data protection had to be

⁹ Not included in the study: 'Österreichischer Eisschnelllauf Verband' and 'Austrian Sportschützen Fachverband'.

made, with one exception, via the NSGBs. The period of survey was between August and September 2008. The response rate was about 20% and after quality control, 340 questionnaires could be analyzed.¹⁰ The sample was constrained to athletes who had already reached the age limit of juniors according to the international competition rules of their sports (n = 291). Another introduced restriction was that only athletes of individual sports were included in the sample to be analyzed (n = 201) (compare Flatau and Emrich, 2011).

We wanted to test for representativeness of the sample concerning the two variables level of squad and sports-groups.¹¹ But since the determination of the number of athletes in every squad had to be done via a third person, with missing lists of squads and the forwarding of the questionnaire via the NSGBs in most of the cases, it was not possible to determine the basic population on the level of differentiation that we needed.¹² Detailed information on the sample's composition concerning the degree of dependency upon physical asset specificity and upon site specificity is available upon request.

For the final classification of sports, we used a dichotomy dummy. Sports_{high} are those sports which are classified as being highly dependent on physical asset specificity and/or site specificity. Sports_{low} are those sports assessed as having a low degree of dependency upon physical asset specificity and upon site specificity.

To test the above mentioned hypothesis we have to statistically test for interdependence between three variables – for H1 between ESS attendance (dichotomy), sports classification (dichotomy) and success at international competitions on elite level (dichotomy), for H2 between ESS attendance (dichotomy), sports classification (dichotomy) and success at international competitions on junior level (dichotomy).

If an athlete is to be classified as successful (on junior and/or elite level) or not was judged on behalf of the following criteria in Table 2:¹³

Table 2. Success assessment

Competition classes	Operationalization of international success
Juniors	<i>Medals at Junior European Championships or World Championships</i>
Tops	<i>Medals at European Championships, at World Championships, at Olympic Games</i>

To test for the hypothesis, we used a saturated logit-loglinear model. Furthermore, χ^2 -tests (including Yates-correction for $n < 60$), Cramer's-V, and, because of not given normal distribution in the sub-samples (KS-test: $p < .05$), Mann-Whitney-U-Test was applied.

¹⁰ For a detailed description of the methods, see Barth (2015).

¹¹ The arrangement of groups was done according to Güllich (2007). For the exact allocation of sports to the groups see Barth (2015).

¹² Another problem was that in Austria every NSGB dispenses its own cadre system with the consequence that in contrast to the situations in other nations like Germany, the squads of different sports are hardly comparable.

¹³ The formulation and calculation of the success parameters was made according to Güllich (2007), which would allow to treat the success variables as metric. On behalf of the relative low numbers of athletes, although the study was done as a comprehensive survey, we decided to use dichotomy success variables.

All tests carried out were two-sided, with a 0.05 level of statistical significance. The software used was IBM SPSS Statistics 23.

5. Results

The descriptive results of testing for H1 are shown in Table 3 and Table 4.

Table 3. Distribution of elite success

	<i>ESS attendance</i>	<i>Successful</i>	<i>Not successful</i>	<i>Relative success</i>	<i>Proportion of relative success</i>
<i>Sports_{high}</i>	<i>Yes</i>	31	35	47 %	1.1
	<i>No</i>	39	50	44 %	
<i>Sports_{low}</i>	<i>Yes</i>	0	20	0 %	1.0
	<i>No</i>	0	24	0 %	

Interestingly there is no single athlete practicing *Sports_{low}* who can be classified as successful at elite level. The descriptive results show that the proportion of relative success both lie near one. This not only means that H1 cannot be rejected ($\lambda = .0127$ (7380.887), $z = .000$, $p = 1.000$, $n = 199$), but also shows that neither for *Sports_{high}* ($\chi^2 = .152$, $df = 1$, $p = .697$, $n = 155$) nor *Sports_{low}* a superiority of one governance form over another seem to exist. The same seems to be true for success at junior level ($\lambda = 1.227$ (1.546), $z = .794$, $p = .427$, $n = 145$).

Table 4. Distribution of junior success

	<i>ESS attendance</i>	<i>Successful</i>	<i>Not successful</i>	<i>Relative success</i>	<i>Proportion of relative success</i>
<i>Sports_{high}</i>	<i>Yes</i>	24	27	47 %	3.8
	<i>No</i>	8	58	12 %	
<i>Sports_{low}</i>	<i>Yes</i>	1	9	10 %	1.8
	<i>No</i>	1	17	6 %	

Again there exists the problem that only a very small number ($n = 2$) of athletes practicing *Sports_{low}* can be classified as successful. If the χ^2 -analysis is again restricted to *Sports_{high}* the hypothesis of independence has to be rejected ($\chi^2 = 17.673$, $df = 1$, $p = .000$, $n = 117$). The results show that athletes of ESS are relatively more successful at junior level than those athletes not attending such a school, but this “advance” seems to diminish for success at elite level (at collective level). The correlation found can be described as moderately (Cramer’s-V = .389).

Table 5. Correlation of success in *sports_{high}*

		<i>Elite level</i>		
		<i>Successful</i>	<i>Not successful</i>	<i>Total</i>
<i>Junior level</i>	<i>Successful</i>	24	8	32
	<i>Not successful</i>	38	48	86
<i>Total</i>		62	56	118

Interestingly the results in Table 5 show that there seems to exist a positive correlation between success at junior and elite level, meaning that athletes being successful at junior level are more likely to become a successful elite athlete ($\chi^2 = .881$, $df = 1$, $p = .003$, $n = 118$).

However, it has to be mentioned that the found correlation has to be described as weak to moderately (Cramer's-V = .274). This means that for Sports_{high} ESS attendance increases moderately the probability to reach success at junior level and this success is weakly to moderately positive correlated with elite success, but the latter is not correlated with ESS attendance.

The data of the group of elite successful athletes were further analyzed, bringing forward interesting results. Table 6 shows that more than half of elite level international successful athletes in Sports_{high} who attended an ESS were successful at junior level. On the contrary, only 19% of such successful athletes in Sports_{high} not attending an ESS were successful at junior level.

Table 6. Distribution of elite level international successful athletes in sports_{high}

		<i>Elite level</i>		<i>Total</i>
		<i>Successful</i>	<i>Not successful</i>	
<i>Junior level</i>	<i>Successful</i>	18	6	24
	<i>Not successful</i>	12	25	37
<i>Total</i>		30	31	61

This means that internationally successful athletes at elite level competitions in Sports_{high} seem to use two different pathways. First the “early career athletes” who are attending an ESS and having international success at junior level, the latter not significantly but at least by trend differentiating them from the less successful elite athletes (χ^2 (Yates corrected) = 3.717, $df = 1$, $p = .054$, $n = 51$; 60% successful at junior level). Second the “later career athletes”, without attendance to ESS and no junior level success, the latter not differentiating them from their less successful elite counterparts ($\chi^2 = 2.872$, $df = 1$, $p = .09$, $n = 66$; 19% successful at junior level). The labelling was chosen because the two groups sig. differ in the athletes’ age when starting training in their sports in sports clubs (Mdn_{ESS} = 9.2 (7.1) years; Mdn_{no ESS} = 13.2 (15.4) years, $U(30/39) = 269$, $p = .000$).

6. Discussion

In the light of Williamson’s third attribute characterizing a transaction – the incurrence of durable transaction-specific investments – the question whether a superiority of one governance form over another (as caused by the factor specificity of investments) exists was investigated. In this instance a relative advantageousness of hierarchical over a market form of organization in case of Sports_{high} compared to Sports_{low} was expected.

Both hypothesis could not be rejected, meaning that there does not seem to exist a superiority of one governance form over another (as caused by the factor specificity of investments for the production of sporting success at both levels). These results seem to be contradictory to those of Flatau and Emrich (2011, 2013). However, when inspecting the results in more detail it can be seen that they appear to be caused by “pre-conditions” related to producing sporting success in Austria and therefore the results are not directly comparable to those of the mentioned authors.

As mentioned above Emrich *et al.* (2012), and Flatau and Emrich (2013) suggest that factors like geographical conditions (= site specificity) and the strong influence of GDP per capita reflecting a strong dependence of specific and costly sports facilities might explain why the explanatory power of the regression equations used is lower for Winter Olympics compared to those

of Summer Olympics. Considering that Austria has on one hand a relatively high GDP per capita as well as “good” climate and geographical conditions for winter sports (belonging to Sports_{high}) but on the other hand a very low population, Austria’s “pre-conditions” seem to be relatively in favor of producing sporting success in Sports_{high} rather than in Sports_{low}.¹⁴ In fact, none of the athletes was classified as successful at elite level and only two athletes were classified as successful at junior level in Sports_{low}. However, if the “pre-conditions” do not allow the production of success in Sports_{low} a relative comparison becomes senseless. In other words: for Sports_{low} it can be said that apparently it does not matter if the production process is organized in a hierarchical or market form – the “pre-conditions” seem not to allow an effective production anyway.

Therefore, all further analysis were concentrated on Sports_{high}, were it could be seen that a more hierarchical form of organization seems to be (moderately) favorable for producing junior success. Interestingly enough, this is not true for elite level success, where a hierarchical form of production is no longer favorable. The further investigations of the data showed that there seem to exist two career paths to reach international success at elite level: First, what was called “early career athletes” – these athletes are characterized by an early start of training in sports clubs, an attendance to an ESS as well as by a successful participation at international competitions at junior level. Second, the “late career athletes”, starting their career sig. later compared to the first group, without ESS attendance and without success at junior level.

In the first group of 31 athletes 18 (58%) have gone this way (12 without junior success, one missing data), in the second group from 39 athletes 25 (64%) have used this path (six with junior success, eight missing data). This means that in Sports_{high} the collective of successful elite athletes seems to consist of both – of athletes emerging from repeated procedures of selection and deselection (collectivistic approach) as well as of athletes early selected and running through a talent development process (individualistic approach). The finding of the second group of athletes is contrary to the overall findings of Güllich and Emrich (2012) and Güllich (2014). This might be caused by the fact that Austria is a smaller country geographically speaking compared to Germany or by the factor specificity of investments (dependency upon physical asset specificity and/or upon site specificity). Last but not least the difference in findings might originate in the Austrian sport system itself. A concentration of athletes in centralized performance centers might limit alternative opportunities for involvement in high-performance sports outside this socially constructed limits. Although the finding that athletes can become successful elite athletes outside the system speaks against this threat of social closing, it should be emphasized, that Sports_{high} consists of several sports – probably the social closer already exists for some of those.

The finding that international success at junior and elite level significantly but in its magnitude only weakly to moderately correlate seems to be in line with the existing evidence. Therefore, international success at junior level should not be regarded as a necessary precondition or a guarantee for success in international competitions at elite level (e.g., Barth, 2015; Brouwers, De Bosscher, and Sotiriadou, 2012; Emrich and Güllich, 2005). Schumacher, Mroz, Mueller, Schmid, and Ruecker (2006) showed seemingly contradictory results, but their study’s data stem from cycling (part of Sports_{low}). The problem of using different sports in the studies is becoming apparent.

There are several limitations of this study that need to be acknowledged. Apart from the five restrictions mentioned above (that the article addresses effectiveness not efficiency; that only two of

¹⁴ Compare on this e.g., Pitsch and Emrich (2008).

Williamson's five variables describing the factor specificity of investment, and by itself only one of three dimensions describing a transaction were used; analyses were only carried out for two forms of governance (market and hierarchy) and only for a certain form of governmental-hierarchical promotion of sporting success – the ESS; the equalization of two forms of rationality is probably invalid), it has to be kept in mind that the data originates from a retrospective cross-sectional study.

Furthermore, there is a clear limitation in how athletes were classified as successful. In this context we do not want to stress the often brought forward argument– if only medals should count and should be used to determine success – but want to introduce another thought. Athletes are classified as successful as soon as they win a medal. The medal tables do not only count the athletes themselves once but every single medal they win. Therefore, the number of medals a single athlete wins should be considered more thoroughly in future works. Probably the two shown pathways of successful athletes lead to a different “probability of survival” at elite level which gives athletes the chance to win more medals than just one.

Above all, the apparent preference in sports to further strengthen a hierarchical approach when it comes to the production of sporting success should be questioned. More precisely, the efforts of centralized institutions (i.e., in the case of Austria the so called ‘Olympiastützpunkte’ (Olympic Trainings Centers)), as well as their positive and negative impacts on elite and adult athletes, should be evaluated and observed carefully. In a first step an analysis of the distribution of property rights as well as a consideration of possible motivational problems on the basis of the principal-agent theory seem to be valuable and again underline the value of NIE in sport economics analysis. Furthermore, the found “loss of advance” at collective level from junior to elite level as well as the above mentioned problem of social closure should be investigated.

From a methodological point of view, qualitative parameters like variables intended to catch a “nation’s sportive culture” should be incorporated, which further supports a need for more international studies.

7. Conclusion

On behalf of our results it can be said, that for countries like Austria it seems to be necessary to concentrate their efforts in the production of sporting success on Sports_{high}. This bears two consequences: First, the applied classification seems to be useful in the context of sports promotion and second, “pre-conditions” influencing the production of international elite level sporting success have to be considered, when trying to evaluate the relative effectiveness and efficiency of a nation’s national sport governing bodies.

Furthermore, it could be shown (even) for Sports_{high} that concerning their effectiveness, that apparently there exists no superiority of one form of organization over the other. Considering the (possible) additional costs on the collective as well as on the individual athlete’s level in case of a (more) hierarchical form of organizing the production of sporting success should question the observable efforts of further institutional centralization. It has to be concluded that in a hybrid form of organization like in Austria where the centralization might have exceeded the optimal extend, the congruency of different products is overemphasized. Therefore, new forms of decentralized cooperation have to be found, which should not at least be based on the idea of an absent congruence of individual aims of members being part of the production network.

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