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Working Paper

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Diskussionsbeitrag, No. 345

Provided in Cooperation with:

School of Economics and Management, University of Hannover

Suggested Citation: Rebeggiani, Luca; Tondani, Davide (2006) : Organisational Forms in Professional Cycling: Efficiency Issues of the UCI Pro Tour, Diskussionsbeitrag, No. 345, Universität Hannover, Wirtschaftswissenschaftliche Fakultät, Hannover

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Organisational Forms in Professional Cycling – Efficiency Issues of the UCI Pro Tour

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DISCUSSION PAPER NO. 345

August 2006

ISSN: 0949-9962

ABSTRACT: This paper gives a first economic approach to pro cycling and analyses the changes induced by the newly introduced UCI Pro Tour on the racing teams' behaviour. We develop an oligopolistic model starting from the well known Bertrand and Cournot frameworks to analyse if the actual setting of the UCI Pro Tour leads to a partially unmeant behaviour of the racing teams. In particular, we show that the blamed regional concentration of their race participation depends on a lack of incentives stemming from the licence assignation procedure. Our theoretical results are supported by empirical data concerning the performance of the racing teams in 2005. As a recommendation for future improvements, we derive from the model the need for a relegation system for racing teams.

ZUSAMMENFASSUNG: Der Aufsatz stellt die erste ökonomische Analyse des professionellen Radsports dar. Er analysiert insbesondere die Anreizwirkungen der neuen UCI Pro Tour auf Teams und Fahrer. Ausgehend von den bekannten Bertrand- und Cournot-Ansätzen entwickeln wir ein einfaches Oligopol-Modell, um zu untersuchen, ob die derzeitige Pro Tour-Organisation zu einem unerwünschten Verhalten der Teilnehmer führt. Wir zeigen, dass insbesondere das Problem der geographischen Konzentration der Rennteilnahmen der Teams von den mangelnden Anreizen abhängt, die vom jetzigen Lizenzvergabesystem ausgehen. Unsere theoretischen Ergebnisse werden durch empirische Daten aus der Pro Tour 2005 gestützt. Als Empfehlung für zukünftige Entwicklungen leiten wir aus dem Modell die Notwendigkeit einer Öffnung der Pro Tour ab, mit Auf- und Abstiegsmöglichkeiten für Rennteams.

KEYWORDS: Sports economics, professional cycling, oligopolistic competition

JEL-CLASSIFICATION: L83, D43

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1. Introduction

Although cycling was one of the first sports to be practiced professionally, it has received until now almost no attention from sports economists.¹ This is somewhat surprising, especially if one takes into account the sharply increased popular success and the huge financial dimensions achieved by the main cycling events like the *Tour de France* or the *Giro d'Italia*.

Many institutional changes have occurred since in the late 19th century the first professional races have been organized across Europe. Essential has been, among others, the foundation of the international cycling association UCI in 1900, the establishment of a world ranking in 1984 and of the UCI World Cup in 1989. In 2005 the last two institutions have been replaced with the newly designed UCI Pro Tour, which aimed to create a sort of league of the best teams participating in the major one-day and stages races of the year, and to implement a unique top ranking system.

The target of this paper is to investigate the changes induced by this new organisational form using a theoretical model and empirical findings observed during the 2005 season. With a simple microeconomic approach, we study the behaviour of the racing teams before and after the introduction of the UCI Pro Tour. We develop an oligopolistic model starting from the well-known frameworks of Bertrand and Cournot to analyse if the actual setting of the UCI Pro Tour leads to a partially unmeant behaviour of the racing teams. In particular, we show that the blamed regional concentration of their race participation depends on a lack of incentives stemming from the licence assignation procedure. Our theoretical results are supported by empirical data concerning the performance of the racing teams in 2005. As a recommendation for future improvements, we derive from the model the need for a relegation system for racing teams. Like in team sports, the 'American' model of a close sport league seems inappropriate for the European socio-cultural environment.

This paper is one of the first academic approaches to professional cycling in economics. While sports economics in general has developed to a considerable branch of economic science (see Andreff 2006 for a recent overview), most of the effort is devoted to team sports. There is a large number of papers and books analyzing European professional football (e.g. Dobson and Goddard 2001 or the special issue of the *Journal of Sports Economics* in Febru-

¹ This paper was presented at the 8th IASE Conference in Bochum (D), 2006. We are grateful to seminar participants, especially to Wladimir Andreff and Joachim Prinz, for first helpful remarks. We also thank Tim Lohse and Fatma Ebcinoglu for their corrections on a first draft. Further comments are welcome.

ary 2006) as well as U.S. Major League sports (e.g. Fort 2003, Schmidt and Berri 2005). Often closely connected to professional team sports (except for the Olympic Games) is the analysis of the financing of sport infrastructure or sport mega events, which has also brought to a notable amount of works (see, among others, Siegfried and Zimbalist 2000, Baade 2003, Rebeggiani 2006). Among individual sports, professional golf is probably the best explored one (see Shmanske 2004 for a comprehensive survey), while a few papers study professional tennis (e.g. Magnus and Klaassen 1999), triathlon (Sowell and Mounts 2005) or road running (e.g. Lynch and Zax 2000). Very few attempts have been made to study cycling: Tondani (2005) provides a first assessment of the role of rankings in professional cycling, while Torgler (2005) and Prinz (2005) analyse the determinants of success at a specific race, the *Tour de France*.² Due to this lack of research in economics, one has partly to rely on other disciplines like sociology (Jutel 2002, Brewer 2002), history (Rabenstein 1996) and other non-scientific databases of media and race organizers (e.g. Schröder 2002, 2005; A.S.O. 2002-2006).

2. An economic spotlight on professional cycling

2.1. Historical overview

Cycling has been one of the first sports being practiced professionally. A few years after the primary bicycle had been patented in 1817,³ first races offering prize moneys were organized across Europe. One of the earliest official races with 1,000 Mark prize money was arranged by the *Münchener Bicycle-Club* in May 1886, with participants from Germany, England and France. During the first decades, road cycling was mainly run by full-time professionals employed by bicycle firms, which used the competitions as promotion events (Rabenstein 1996; Schröder 2002, 38-44). Beside prize moneys, riders received (not opulent) fixed salaries and technical equipment, while in exchange the sponsors' names were displayed on their jerseys. The first 'non-cyclistic' sponsors came up in 1953 (*Nivea*) and 1954 (*St-Raphael* – alcoholic beverages), causing many controversies (Brewer 2000, p. 282).

Beside road races, first indoor competitions were staged, and in 1896 even the Madison Square Garden in New York hosted a six days race. In the 1890s, technical innovations like the pneumatic tire allowed the establishment of first long distance competitions, like the

² In both, the importance of a low Body-Mass-Index (BMI) for succeeding in the Tour is pointed out. Prinz (2005) provides a detailed description of the physical peculiarities in road cycling. Similarly, a shorter paper by Dilger (2002) studies the dynamics of slipstreaming using physical equations. There are several other investigations about physical and medical topics in cycling. Some of them are cited and discussed in Prinz (2005).

³ The first bicycle was constructed by Baron Karl Drais in Mannheim and therefore called later *Draisine*. Alleged earlier drafts have proved as fakes. For a detailed description of the early years see Lessing (2003).

Paris-Bordeaux (577 km) in 1891. Among these, some of the still existing Pro Tour races like the *Liege-Bastogne-Liege* (1892), *Paris-Roubaix* (1896) or *Milano-Sanremo* (1907) came into existence. A predominant role in cycling sport is played by stage races, in particular by the three major three-week stage events: The *Tour de France* was firstly organized in 1903. Sixty cyclists took part in the six stages, competing for 6,075 Francs prize money. The first *Giro d'Italia* took place in 1909, offering 5,325 Lire prize money. Finally, the *Vuelta a España* was established in 1935.

The history of cycling is also accompanied by the history of cycling organizations. The first national federations were founded in the late 19th century (e.g. the *Bund Deutscher Radfahrer* 1884 in Germany). In 1900 the federations of Belgium, France, Italy, Switzerland and the USA founded the *Union Cycliste Internationale* (UCI) in Paris, which was supposed to be the superordinate entity that should regulate, administrate and promote the sport. In 1965, the organization was split in an amateur branch (FIAC) and a professional one (FICP),⁴ mainly due to pressures of the Olympic Committee, worried about the amateur status of Olympic cyclists. After the admission of professional athletes to Olympic Games in 1990, FIAC and FICP were reunificated within the UCI in 1992.

Greater changes occurred in the Eighties. In 1984, a ranking system was implemented and a few years later, in 1989, the ten major one-day races were grouped together to form the World Cup.⁵ This introduction of rankings that had the aim to proxy ex-ante team and racers' performance represented a veritable revolution for cycling. Especially the fact that from then on the invitations to the single events were made according to the UCI ranking points induced major changes in racing behaviour and increased the overall competition level. Since collecting points was essential for participating in major events like the *Tour*, which were of high public interest and therefore important for the sponsors, teams began to abandon the traditional strategy with one captain surrounded by water-carriers, assuming a more aggressive race behaviour, with more team-members entitled to pursue own winning chances.⁶

⁴ FIAC = *Fédération Internationale Amateur de Cyclisme*; FICP = *Fédération Internationale de Cyclisme Professionnel*.

⁵ A World Cup for racing teams existed since 1986. There had been several previous attempts to establish such an event series, like the *Challenge Desgrange Colombo* (1948-1958) or the *Super Prestige Pernod Trophy* (1958-1988). The composition of the UCI World Cup varied over time and included even newly established, Non-European races (e.g. the *Japan Cup* 1996) in order to promote cycling outside its original countries (Schröder 2005, p. 404-405).

⁶ This aspect is extensively discussed in Brewer (2002), p. 290-296.

2.2. The UCI Pro Tour

In 2005, the UCI ranking and the World Cup were replaced by the new UCI Pro Tour. The Pro Tour is a race series including the 27 most important races of all kinds (stage races, one-day races, a team time trial and the World Championship). It is a unique ranking system where the cyclists collect points throughout the year. These are added together at the end, determining the season's best racer.⁷ While this establishing of an overall ranking is the major aim of the Pro Tour, other targets are:

- To force teams and cyclists to a more homogeneous race participation in a temporal and geographic sense. This serves to avoid the historical phenomenon that racers concentrate on competitions in their home countries (or in the sponsor's home country). In some cases, like for Lance Armstrong, there has also been a tendency to restrict one's season around one big event, reducing the competition time to two or three months. This trend has risen during the last years, probably due to the increased competition.
- To reduce the planning/financial uncertainty of the teams by guaranteeing participation to each major event. Before the Pro Tour, the three major three-week stage races had a substantial freedom in inviting a team to their competition or not. Especially being excluded from the *Tour de France* could cause controversies with the sponsor. With the actual setting, every Pro Tour team has a right to participate in every race of the series.

The teams must apply for a Pro Tour Licence, which is limited to 20 Teams and runs 4 years, costing EUR 100.000 (UCI 2006). Additional fees are to be paid for each race. Each Pro Tour Team has to participate in all Pro Tour races and has to employ 25 cyclists. Also race organizers have to apply for a Pro Tour licence, with a maximum of 30 events being licensed per year. The UCI system comprehends either two lower categories, the *Continental Pro Teams*, which can be invited to Pro Tour races, and *Continental UCI-Teams*. No promotions and relegations are allowed for.

2.3. Economic structure of professional cycling

An empirical assessment about the economics of professional cycling is hampered by the fact that there is almost no data available about cyclists' salaries or even team budgets. This is somewhat common in other fields of sports economics, but is particularly pronounced in professional cycling, where there aren't any corporations faced with disclosure requirements as in European professional football or in US major leagues. Prize moneys, which would be available from race organizers, do not play the same role as in tennis or golf as effort determinants

⁷ A list of the races included together with the distribution of points is reported in the appendix.

(Ehrenberg and Bognanno 1990), because they are equally distributed among all team members. Nevertheless, we will briefly review revenues and expenditures of a professional cycling team to illustrate the economic dimension of modern pro cycling.

The revenues derive first of all from sponsoring. This takes mainly the form of team sponsoring with the teams adopting their sponsors' names. The enterprises involved are of various kinds. There have been international corporations (*Motorola, Panasonic*) as well as small enterprises (*Mapei, Fassa Bortolo*) involved in professional cycling. In the last years, a growing interest from the financial sector is observable.⁸ Individual sponsoring contracts are often limited to equipment support, with a few exceptions for superstars like Lance Armstrong, whose sponsor revenues in 2005 were estimated to reach USD 10-12m (Whittle 2005), or Jan Ullrich, whose endorsements were likely to bring him EUR 4-6m in the same year.

Prize moneys are considerably lower than in other professional sports. Only the major events provide noticeable sums, whereas one has to sum up the finals prizes and those for single stages and several special rankings (e.g. best climber ranking, team ranking). In 2006, the *Giro d'Italia* offered in total EUR 1.4m prize money, while the *Tour* reached slightly more than EUR 2m. Thereof, EUR 450,000 were destined to the overall winner. The amounts decrease sharply in competitions of medium importance like the *deutschlandtour*, where the overall winner 2006 only got EUR 14,000.⁹ An old tradition claims prize moneys to be equally distributed among team members after each race. Doing so, the captain thanks his teammates for their assistance and teamwork.

Broadcasting revenues play a crucial role in financing modern sports. In professional European football, revenues from selling TV rights have become the most important source for the clubs (Deloitte 2006). Professional cycling has a long tradition as TV sport, although it suffers from its non-telegenic, long events and disadvantageous competition times in the afternoon. The broadcasting interest in traditional cycling countries like Italy, Spain, France and the Benelux is high and stable for the major events.¹⁰ This interest decreases dramatically for minor events and in other countries. Outside Western Europe pro cycling is often at the mar-

⁸ Several banks (*Banesto, Rabobank, Cofidis, Credit Agricole, Caisse d'Epargne*) as well as insurance companies (*Liberty Seguros, Ag2r*) have engaged as sponsors in professional cycling during the last decade.

⁹ For a detailed description of the prize moneys see A.S.O. (2006) [*Tour*], RCS Sport 2006 [*Giro*] and ARD 2006 [*deutschlandtour*].

¹⁰ For instance, the 2005 *Giro d'Italia* had an average share of 17.23% in Italian TV, with about 2m audience every day. The decisive mountain stage in Sestriere attracted up to 5m TV viewers (47.62% share). In Germany, a relatively new cycling country, there has been a growing interest since 1996, highly dependent on Jan Ullrich performance. The interest is mainly concentrated on the *Tour*: In 2005, the average TV-share was about 24% (2.8m audience). Other events like the *Giro* or the *deutschlandtour* attract on average 1-1.5m viewers. For comparison, the football European Championships 2004 averaged 12m in German TV (35% share). Top events like the semi-final between Germany and Italy during the World Championship 2006 attracted approximately 30m viewers (91% share) in Germany and 24m (98%) in Italy.

gin of public interest. In the USA, Lance Armstrong contributed with his particular biography and his outstanding success to gain some popularity, but it is a rather personal one, while cycling is still almost absent from major TV sport channels.¹¹

Unfortunately, no reliable data about broadcasting revenues are available. These revenues are usually not distributed among the teams (unlike in football and most other team sports), but are retained by the organizers. This is a highly controversial point, with many team managers hoping to establish a new sharing system, possibly with the help of the new Pro Tour.

The teams' expenses consist in participating fees, operating costs, which are not negligible in pro cycling, and salaries. Racers are usually employed directly by the team manager (e.g. Olaf Ludwig for *Team T-Mobile* or Bjarne Riis for *Team CSC*), who sets up a company (e.g. the *Olaf Ludwig Cycling GmbH*) financed by the team sponsor and pays the racers' wages.¹² In Germany, drivers are usually self-employed, whereas in other countries (France, Italy, Spain), they have regular salaried positions with the teams.

Since salary data are not available from the teams, one has to rely on estimations to provide some empirical evidence. Up to the Eighties, only the team leaders were relatively well paid, while the *gregari* had often to rely on prize moneys to cover their living expenses. The sign of the first million-contract by Greg LeMond¹³ in 1985 induced a sharp rise in riders remuneration, which affected by and by even the water-carriers' wages. Today, a good sprinter like Oscar Freire, who is supposed to ensure his team some prestigious victories at one-day races during a season, earns around EUR 1m a year. Potential stage-race winners like Andreas Klöden, Ivan Basso or Roberto Heras range between EUR 1.2m (Klöden) and 2m (Heras). The wages can be even higher in the cases of top stars like Jan Ullrich or Lance Armstrong. Salaries for 'servants' (*gregari*) vary in Pro Tour teams between EUR 100,000 and 300,000, highly dependent on their previous experience and results, as well as on the team's budget. To protect lower categories riders and new professionals, the UCI has established a minimum wage to be paid (UCI 2006). This has to equal the minimum wage of the country of employment or be not less than EUR 30,000 a year (EUR 24,000 for a new pro).

All in all, a year team budget for a Pro Tour team varies from EUR 3.3m to EUR 18m. The team budgets for the 20 Pro Tour teams are reported in table 1. On the one hand we observe significant differences between rich (*T-Mobile*, *Rabobank*) and poor teams (*Liquigas*,

¹¹ Even the *Tour* has live coverage only by the cable station *Outdoor Life Network*.

¹² The team manager has also to employ the technical and medical staff. A Pro Tour racing squad requires 15-20 physiotherapists, mechanics, cooks and physicians. Altogether, a Pro Tour team is therefore made up of 40-45 members.

¹³ The later *Tour de France*-winner Greg LeMond signed a three-year contract with the French team *La Vie Claire*, totalling \$1m. A few years later, in 1989, he negotiated with the *Z-Team* the first contract endowed with more than \$1m per season (Brewer 2002).

Saunier Duval), on the other hand we notice a significant rise of the absolute budgets amount and of the gap between rich and poor from 2004 to 2005, coinciding with the introduction of the Pro Tour. However, one should not draw too far-reaching conclusions. For a substantiated assessment whether this growing financial basis is due to the changed institutional setting, we need further details about the teams' budget structures.

Teams*	Budget 2003 (Mill. EUR)	Budget 2004 (Mill. EUR)	Budget 2005 (Mill. EUR)	Change 04-05 in %
<i>Bouygues Telecom</i>		n.a	7	
<i>Cofidis</i>	6	8	8	0
<i>Crédit Agricole</i>	5	5.5	6	+9.1
<i>Team CSC</i>	4.5	6	6	0
<i>Davitamon-Lotto</i>	6	6	6	0
<i>Discovery Channel</i>	6.5	7	8.4	+20
<i>Domina Vacanze</i>	2.5	7	6	-14.3
<i>Euskaltel-Euskadi</i>	5	6	6	0
<i>Fassa Bortolo</i>	5.5	6	9	+50
<i>Francaise des Jeux</i>	6	5.5	6.5	+18.2
<i>Gerolsteiner</i>	6	8	12	+50
<i>Illes Balears</i>	6	5.5	6.5	+18.2
<i>Lampre-Caffita</i>		5	n.a.	
<i>Liberty Seguros</i>	6	6	8	+ 33.3
<i>Liquigas-Bianchi</i>			5	
<i>Phonak</i>	n.a.	7.7	10.5	+36.4
<i>Quick Step</i>	7.5	8	9.3	+16.3
<i>Rabobank</i>	6	9	15	+66.7
<i>Saunier Duval-Prodir</i>		3.5	3.3	-5.7
<i>T-Mobile Team</i>	9	12	18	+50

* In some cases, the main team sponsor changed over time (e.g. US Postal – Discovery Channel).

Table 1: Team Budgets 2004-2005

Data: A.S.O. 2002-2006, various media releases.

2.4. Peculiarities of professional cycling

Before starting a theoretical analysis of professional cycling, one has to bear in mind some peculiarities which distinguish this sport from others:

- The most distinctive feature, from a theoretical point of view, is the fact that cycling is an individual sport practiced in teams. It is neither a pure single sport, like golf, tennis or athletics, which can be analysed using tournament models, nor a classical team sport like football or basketball. The professional cyclist acts as a single racer, but is highly dependent on his team. This is obvious in special team contests like team time trials, but concerns every race situation, especially during a stage race. There are in a squad one or a few captains and a number of ‘servants’, called *domestiques* or *gregari*. The

single members of the squad have well specified duties: tactical ones like avoiding breakaways or starting sprints, but even very simple ones like delivering food and water to the captains. Without a strong team even superstars can hardly win a major event.¹⁴ This particular social organisation has characterised cycling from the beginning, creating the rather unique figure of the *gregari*: professional sportsmen, who spend their whole career not pursuing their own personal success, but helping their team leaders to win.¹⁵

- Cycling events are non-homogeneous, with significant differences between single races and types of races (stage and one-day races, time trials, mountain stages). These differences are much more pronounced than in other sports. A 100m runner does more or less the same his whole career long. In the case of golf and tennis, the surface respectively the shape of the course may change. In cycling, however, winning a stage race is something completely different than succeeding in a classic one-day event like the *Milano-San Remo*, and time trials require different skills than a mountain stage.¹⁶ A great *finisseur* like world-champion Tom Boonen does not have the ghost of a chance during mountain stages and ends such races often beyond the 100th position. Although they can specialize themselves on particular contests, during their careers cyclists have to compete in every kind of race. The search for the “overall best racer” is an old dispute among cycling fans and is one of the targets of the new UCI Pro Tour.
- Professional cycling is considered the physically hardest sport. Especially the three-week stage races require almost inhuman efforts from the riders. During a mountain stage a rider burns 8,000-10,000 calories (Prinz 2005) and repeats a similar effort the next day, for a total of 21 stages with only two days of rest. Athletes face also a high number of competition days, up to 100 in one season, unlike in other endurance sports as triathlon or marathon. During a year, a professional cyclist covers a distance of 35.000-40,000 km in training and competitions. These exertions have a positive exter-

¹⁴ A first econometric support for this (quite undoubted) thesis is provided by Torgler (2005, 21-23), who includes variables measuring the team effect in multiple regressions explaining riders performance in the 2004 *Tour de France*.

¹⁵ This need for teamwork is mainly determined by physical peculiarities of cycling: The major obstacle in cycling is wind resistance. By riding behind another rider, one can save up to 30% energy. Shading the captains from wind is therefore an essential tactical need, whereto much of the effort of the *gregari* is devoted, especially during flat stages (Brewer 2002, Prinz 2005).

¹⁶ Top climbers are normally lightweights, like the legendary 56kg-rider Marco Pantani, while time trial specialists are muscular athletes (e.g. Michael Rich or Serhiy Honchar), being able to generate more than 500 watts. This aspect is indirectly confirmed by Torgler's analysis of the 2004 *Tour*, in which the BMI doesn't matter for time trial, but is highly significant as effort determinant in mountain stages (Torgler 2005, 19-21).

nality in generating high incentives for technical and medical research. There is nevertheless also a negative externality in form of high incentives for doping.¹⁷

- While in most team sports the major aim of the participants is to win the whole series (e.g. a *Bundesliga* season or the *FIFA World Championship* in football), the newly established Pro Tour does not have a similar importance. Prevailing in the overall Pro Tour does still not constitute the main goal of the teams and cyclists, but winning the single races, especially the big three-week stage races.
- An empirical/financial peculiarity is the fact that road cycling is an outdoor sport practiced on public ground. This implies that no gate revenues can be taken into account for organizers to finance themselves and distribute them among the racing teams. Although mega-events like the *Tour de France* attract millions of spectators along the streets every year, this does not lead to any revenues for the organizers.¹⁸ They take in revenues from selling broadcasting rights, merchandising activities and direct sponsoring.¹⁹ The major stage races demand furthermore a fee from cities willing to host a stage. London, for example, paid £ 3.6m to host the 2007 prologue of the *Tour*.

Starting from these preliminary observations, our leading question will be: Is the newly introduced UCI Pro Tour the best organisational setting, ensuring optimal incentives for cyclists and teams or does it need to be reformed?

3. The new UCI Pro Tour – A Theoretical analysis

3.1. General considerations

We can depict the UCI Pro Tour challenge as an oligopoly: In the market of top professional cycling, the best teams compete in the best one-day and stage races, offering the “show” performed by their cyclists as “good”.

In this framework, the UCI acts as a regulatory agency that owns the monopoly of the licenses. It is necessary to explain, why a regulatory agency usually aiming at creating condi-

¹⁷ The doping problem has been studied extensively in the last years in sports economics. See among others, Berentsen (2002), Dilger and Tonsdorf (2004), Haugen (2004) and Maennig (2002). Some studies even postulate a liberalisation of doping in professional sports (Savulescu et al. 2004). Actually, cycling is experiencing again a doping scandal of huge proportions after the revelations of the so called *Operacion Puerto* in Spain, which led to the exclusion of some of the favourites from the 2006 *Tour the France*, like Jan Ullrich and Ivan Basso. At the end of the *Tour*, the overall winner Floyd Landis was also tested positive.

¹⁸ A first attempt to modify this peculiarity will be undertaken during the 2006 World Championships in Salzburg, when the organisers will set up two video screen-equipped “visitor centres” along the track as well as 1800 VIP and 500 “Guest”-seats in the start and finish-area. The “visitor centres” will offer 20,000 seats. The aim of the organizers is to generate 10% of the expected total revenues (Hohenauer 2006).

¹⁹ The French bank *Credit Lyonnais* pays 4.5m a year for its logo to be displayed on the famous yellow dress, worn by the *Tour de France*-leader (Whittle 2006).

tions for competition, chooses to set an oligopoly. Two main topics justify the choice. The first concerns congestion: the number of teams in a race cannot be infinite as should be the number of firms in a theoretical perfectly competitive market. Of course, the number of teams could be increased, lowering the number of teammates. But since the production function incorporates a strong labour division inside the teams, it is quite hard to follow this option.²⁰

The second justification concerns the homogeneity of the product offered on the market. As in other sports, the competitors produce an indivisible joint product (Neale, 1964). Introducing more teams that are not able to supply a good of a level adequate to the expected standards leads to a decrease in the quality of the good produced. In other words, in professional cycling it is hard to say that every team supplies a good qualitatively equal to that supplied by all the other teams. Presumably, the best teams will present higher qualitative level, while other teams present lower performance. Hence, the goods produced are not homogenous and one of the main assumptions of competitive markets fails.

In order to describe the current settings of the UCI Pro Tour, we focus on a static oligopolistic model, in which:

1. There is only one period of competitive interaction.
2. Teams perform their actions simultaneously.
3. Competition is limited to the case of only two teams.
4. Exogenous factors, like the weather or other circumstances not under the control of the teams, do not affect the final outcome.

In particular, we are interested to know the outcome produced by an oligopolistic setting as that introduced by the UCI and to propose eventual corrections. The oligopoly theory²¹ provides different results. We take into exam some of the standard approaches.

3.2. A Bertrand-style model

The well-known Bertrand-model (Bertrand 1883) predicts that a competitive outcome can be obtained even in the case of a two-firm market.

In this framework, here adapted for professional cycling, there are two teams, A and B. Both are aimed at maximising their performance, measured by the number of points q obtainable in a Pro Tour race. The points are allocated according to the function $q(\varepsilon)$, where ε is the cost of the effort afforded by the team in getting a point competing in Pro Tour. We assume

²⁰ In 2005, the UCI rules set at 9 the number of cyclists per team in stage-races and 8 in one-day races. All in all, the total number of cyclists cannot exceed 200, including teams not included in Pro Tour but invited by local organizers.

²¹ For a survey see e.g. Mas-Colell et al. (1995), pp. 383-398.

that the larger the effort is, the higher the number of points achieved by the team will be. The function $q(\varepsilon)$ is continuous and has a positive slope such that $q'(\varepsilon) > 0$ and there exists an $\varepsilon^* < \infty$ such that $q(\varepsilon) = \max$ for all $\varepsilon \geq \varepsilon^*$.

The teams have the same revenue $r > 0$ for every level of q . The difference between r and ε represents a non-monetary extra-profit for the team. The non-monetary extra-profit consists in all the indirect gains earned by the team and the sponsorship by competing and getting points in Pro-Tour races, such as visibility on the media, popularity of its cyclists, improvement of the reputation of the team management, etc.

The two teams choose their effort level ε simultaneously and before the start of the race. Hence, team A's points at the end are:

$$q_A(\varepsilon_A, \varepsilon_B) = \begin{cases} q(\varepsilon_A) & \text{if } \varepsilon_A > \varepsilon_B \\ 1/2q(\varepsilon_A) & \text{if } \varepsilon_A = \varepsilon_B \\ 0 & \text{if } \varepsilon_A < \varepsilon_B \end{cases} \quad (1)$$

Given ε_A and ε_B , team A will realise a surplus equal to

$$[r - \varepsilon_A] \cdot q_A(\varepsilon_A, \varepsilon_B) \quad (2)$$

The Bertrand duopoly model proves that in this framework exists only an equilibrium, in which both teams set their effort level equal to revenues: $\varepsilon_A = \varepsilon_B = r$. Hence, no extra-profit is earned by the team and Pro-Tour works as a perfect competitive market.

Adopting this model, we assume that the distortion arising from an oligopolistic market power can be reduced to zero: once a number of qualitatively homogeneous teams is selected, and then able to compete with equal opportunities, there is no need for further regulations, incentives or exclusions.

The current structure of UCI Pro Tour is consistent with the results of this model. The UCI used as a proxy of qualitative homogeneity the adequateness of the financial and budget profile of the teams: imposing strict economic requirements for the enrolment, the regulator selected twenty teams able to hire the best cyclists and to organize competitive equips, without the necessity of setting retrogradings.

In the next two sections we prove that the competitive outcome arisen from this model does not hold when taking into account the disutilities that can affect effort (section 3.2) or by supposing a different strategic behaviour of the teams (section 3.3).

3.3. Disutility and differentiation

Up until now it was not necessary to provide a precise definition of the effort level ε . If we introduce a more precise definition of it, we are able to prove that also the Bertrand-style

model is not able to provide a competitive outcome. In particular, we include additionally to the assumptions 1.-4. of section 3.1 a fifth assumption:

5. The teams have different effort evaluations.

We can assume that for reasons like the nationality of the greatest part of the cyclists hired or to the main market on which the sponsors operate, or the prestige of the race perceived in the home country, teams face a certain disutility that affect their specific effort.

Hence, we assume that the net effort of each team is affected by the distance from the team's home country and the race country, a good proxy of the disutility depicted above. We can formalize this by defining the net effort as $\varepsilon_A - td$, where $t > 0$ is a parameter that measures the disutility per unit of distance d between the race location and the centre of business of the team.

The presence of the disutility introduces a differentiation between the behaviour of two teams because they may now strictly prefer getting more point in a race than in another even if the sport effort requested is the same.

Imaging the races and teams on a market depicted as a linear segment, with the teams lying at the two extremes and the race located at the point x . Points available will be won by team A if at its location holds: $\varepsilon_A - tx > \varepsilon_B - t(1 - x)$.

The location of the race for which the two teams present the same level of net effort is the point x^* , where $\varepsilon_A - tx^* = \varepsilon_B - t(1 - x^*)$ or:

$$x^* = \frac{t - \varepsilon_B + \varepsilon_A}{2t} \quad (3)$$

Team A's points at the end of the race will be:

$$q_A(\varepsilon_A, \varepsilon_B) = \begin{cases} q(\varepsilon_A) & \text{if } \varepsilon_A > \varepsilon_B - t \\ (t - \varepsilon_B + \varepsilon_A)q / 2t & \text{if } \varepsilon_A \in [\varepsilon_B - t, \varepsilon_B + t] \\ 0 & \text{if } \varepsilon_A < \varepsilon_B - t \end{cases} \quad (4)$$

Since each team searches for its best response to any effort choice of the other team, team A restricts its effort to the range $[\varepsilon_B - t; \varepsilon_B + t]$ because any effort $\varepsilon_A > \varepsilon_B + t$ yields the same number of points as setting $\varepsilon_A = \varepsilon_B + t$ and any effort $\varepsilon_A < \varepsilon_B - t$ yields zero. Thus, if the second equation of (4) is the stable solution, team A's best response solves

$$\underset{\varepsilon_A}{\text{Max}} (r - \varepsilon_A)(t - \varepsilon_A + \bar{\varepsilon}_B) \cdot \frac{q}{2t} \quad \text{s.t.} \quad \varepsilon_A \in [\bar{\varepsilon}_B - t; \bar{\varepsilon}_B + t] \quad (5)$$

Omitting the proofs, the equilibrium that arises is then $\varepsilon_A + t = \varepsilon_B + t = r$.

In this equilibrium, if the disutility tends to zero, the outcome tends to that of the Bertrand-style model, while in the other direction, when disutility increases, it is observable a departure from the competitive outcome. The final result of the introduction of a disutility from distance is that teams spend more (net) effort in some races than in others.

3.4. A Cournot-style model

The Bertrand-style framework just depicted could fall down making the hypothesis that competition takes a different form. As made by Cournot (1838), we make the hypothesis that the two teams decide before the race how many points to get instead of the effort level, according to the aim of the sponsorship, and therefore choose cyclists with skills consistent with the race. Given the choices of points, ε adjusts to the level that ensures to get q wanted by the team.

Under this new assumption, team A's maximization problem given team B's points q_B^* will be:

$$\underset{q_A \geq 0}{\text{Max}} \quad r q_A - \varepsilon(q_A + q_B^*) q_A \quad (6)$$

assuming $q_A > 0$, the first order condition will be

$$r = \varepsilon'(q_A + q_B^*) q_A + \varepsilon(q_A + q_B^*) \quad (7)$$

In equilibrium, the best-response correspondence of the two teams will be

$$\begin{aligned} r &= \varepsilon'(q_A^* + q_B^*) \cdot q_A^* + \varepsilon(q_A^* + q_B^*) \\ r &= \varepsilon'(q_A^* + q_B^*) \cdot q_B^* + \varepsilon(q_A^* + q_B^*) \end{aligned} \quad (8)$$

In the general hypothesis of n teams, defining Q as the total number of points available in a race, we then get:

$$r = \varepsilon'(Q_n^*) \cdot \left(\frac{Q_n^*}{n} \right) + \varepsilon(Q_n^*) \quad (9)$$

In the case of $n=1$, we get a monopolistic outcome:

$$r = \varepsilon'(q) \cdot (q) + \varepsilon(q) \quad (10)$$

On the other side, r tends to ε when the number of competing teams tends to infinity. In contrast to the Bertrand-style model, in this new framework, that follows the Cournot duopoly, the presence of two firms is not able to ensure a competitive outcome, but a gradual reduction of market power is observable when the number of teams increases. In the case of a reduced number of teams, the non-monetary revenue r is greater than effort ε .

The Cournot duopoly model can provide an alternative interpretation of the UCI Pro Tour: opposing to the prediction of Bertrand model, in this framework it is impossible to get a competitive outcome, since the teams do not compete on effort but adjust it according to a pre-determined level of points.

3.5. Suggestions for improvement

The findings of the previous section can be summed up in the conclusion that the current structure of UCI Pro Tour suffers from the typical competitive problem of the oligopolistic market. Hence a way to make the market better off has to be found. We already know that the most immediate solution would be to increase the number of teams in the league, but this cannot be implemented for the already mentioned problems of congestion and qualitative level of the collective good produced.

A second-best strategy to avoid behaviour as that depicted above, and then to reduce the non monetary extra-profits, increasing competitiveness of the Pro-Tour, could be the introduction of some penalties.

In particular, we propose that at the end of the season, teams with a number of point smaller than q^{\wedge} must be dropped by the competition and substituted in by an equal number of incumbent teams that will compete in the new season.

We formalize this proposal in the Cournot framework. In every race, the teams will maximise an objective function that includes an evaluation of the outcome of the second period. That is, a team will maximise its non-monetary profits of the race in season 1 taking into account the probability β that the team could be dropped in season 2 because of the low score in the previous period. β depends negatively on point q , hence, $\beta' < 0$. The maximization problem will be:

$$\text{Max}_{q_{A,1} \geq 0} \quad r q_{A,1} - \varepsilon(q_{A,1} + q_{B,1}^*) q_{A,1} - \beta(q_{A,1}) \pi_{A,2} \quad (11)$$

where $\pi_{A,2}$ is the actual value of the non-monetary profits that team A expect by participating to Pro Tour in period 2. If the team is planning to give up the Pro Tour in the season 2, then $\pi_{A,2}$ will be zero and it will follow the same maximization problem analysed in section 3.3. Otherwise, if $\pi_{A,2}$ is positive, it will affect the team's decision. The larger $\pi_{A,2}$ is, the higher will be the loss induced by a further retrograding. The third term modifies the maximization problem because a low number of points causes an increase of the probability β . The first order condition for team A will be

$$r = \varepsilon'(q_{A,1} + q_{B,1}^*) q_{A,1} + \beta'(q_{A,1}) \pi_{A,2} \quad (12)$$

Generalizing for n teams, we get:

$$r = \varepsilon'(Q_n^*) \cdot \left(\frac{Q_n^*}{n} \right) + \varepsilon(Q_n^*) + \beta'(Q_n^*) \pi_{n,2} \quad (13)$$

Hence, we can observe that the marginal increase of β reduces the revenue per point in period 1. On the other side, for $\beta=0$, makes the revenue equal to the previous situation.

4. Empirical verification

4.1. Teams' effort measured by points

In section 3 we proved that even in the case of the UCI Pro Tour, an oligopoly does not provide a competitive market outcome. In particular, introducing disutility in getting point in the most far race, the equality between non monetary revenues and effort, predicted by a Bertrand shaped model, does not hold. Assuming that teams do not compete on effort, as in the Cournot-style model, we found that a competitive outcome can be achieved only with a very high number of teams. In this section we show an empirical investigation aimed at validating the theoretical model presented. A confirmation of the oligopolistic behaviour of the Pro Tour teams can be found by analyzing the ranking of the first edition of the UCI Pro Tour in 2005. The points scale for 2005 is reported in Appendix 1.

We examine the points got by every cyclist in every race. Then, in every race we aggregated the individual points by team. The races are aggregated by nation (with the exclusion of the *Tour de France* from French races), and in some cases, also by kind of events (for instance, we aggregated all the “Northern Classics”²² independently on the nation). Points have been normalized such that the figures in every box represent the percentage of the total point got by the team achieved in that specific country.

The results are summed up in table 2. The third column shows the percentage of the total points got by every team, while the fourth shows the Gini-Index of the concentration of the points got by every team in the nations. The normalized points are represented from the fifth column onwards.

We can observe from the table that 9 teams out of 18 achieved the relative majority of their points in the race made in the country where the team is affiliated (team in bold type). Other 4 teams achieved in the home country the second highest number of points (italics). Moreover it is observable a concentration of effort on some particular events (underlined).

²² As Northern Classics cycling fans indicate the traditional Belgian, Dutch and Northern-French races, which take place in spring.

This first analysis confirms the supposition that the oligopolistic framework of the Pro Tour encourages behaviours far from pure competition. In particular, teams put a larger effort on races organized in their home countries. It is possible to argue that the different effort can be explained by the different kind of races. For instance, one-day races organized in Belgium and the Netherlands require different skills than those required to be competitive in the *Vuelta a España*. Such an argument can be true but the high number of teams with good performance in the home-races confirms the robustness of our findings.

Moreover, the non-competitive behaviour is stronger for the worst teams. The scatter plot in figure 1 illustrates how these worst teams concentrate their effort in few races. The x-axis represents the percentage of the points achievable in the Pro Tour got by every team. The y-axis represents a Gini index that measures how much the points effectively got by every team are concentrated in only a few or in many races. It is observable that those teams which achieved more points relatively to the total show a smaller concentration index concerning their race participation. The correlation index (equal to 0.73) confirms the goodness of the relationship between the two variables.

Aggregating the twenty teams by nationality (table 3), we can observe that in 5 nations out of the 7 that host at least one Pro-Tour race, the local teams, in aggregate, achieved the relative majority of their points in local races (bold type). Again, it is observable a concentration of effort on some particular events (italics).

Several limits can be attributed to this analysis. First of all the analysis of points, even if they are the best and most available proxy of effort, does not consider the uncertainty of all the sport competition and in particular of cycling, like mechanic accidents, cyclists performance variability, and so on. Moreover, possibility of collusion, a typical element of oligopoly and a fundamental variable in cycling (Caruso 2005), both in the weak form of the “tacit alliance” and in the strong form of money compensation, is not considered here. Neither the effects of doping, a factor that can strongly affect the outcome of sport events, is taken into account. Finally, cyclists coming from different cycling traditions have different propensities for the various races. For instance, cyclists from some countries have a better performance in one-day races rather than in stage-races. When they, as in the current setting, are grouped in teams homogeneous in nationality, this factor matters. Moreover, we do not take into account that because of cycling tradition, a certain difference in effort due to preference for national races should be considered and tolerated.

Nevertheless, we think that the empirical investigation provides robust and clear findings showing the need of corrections of the current settings of the UCI Pro Tour, in order to

achieve larger degree of efficiency without offsetting the peculiarities of the professional cycling.

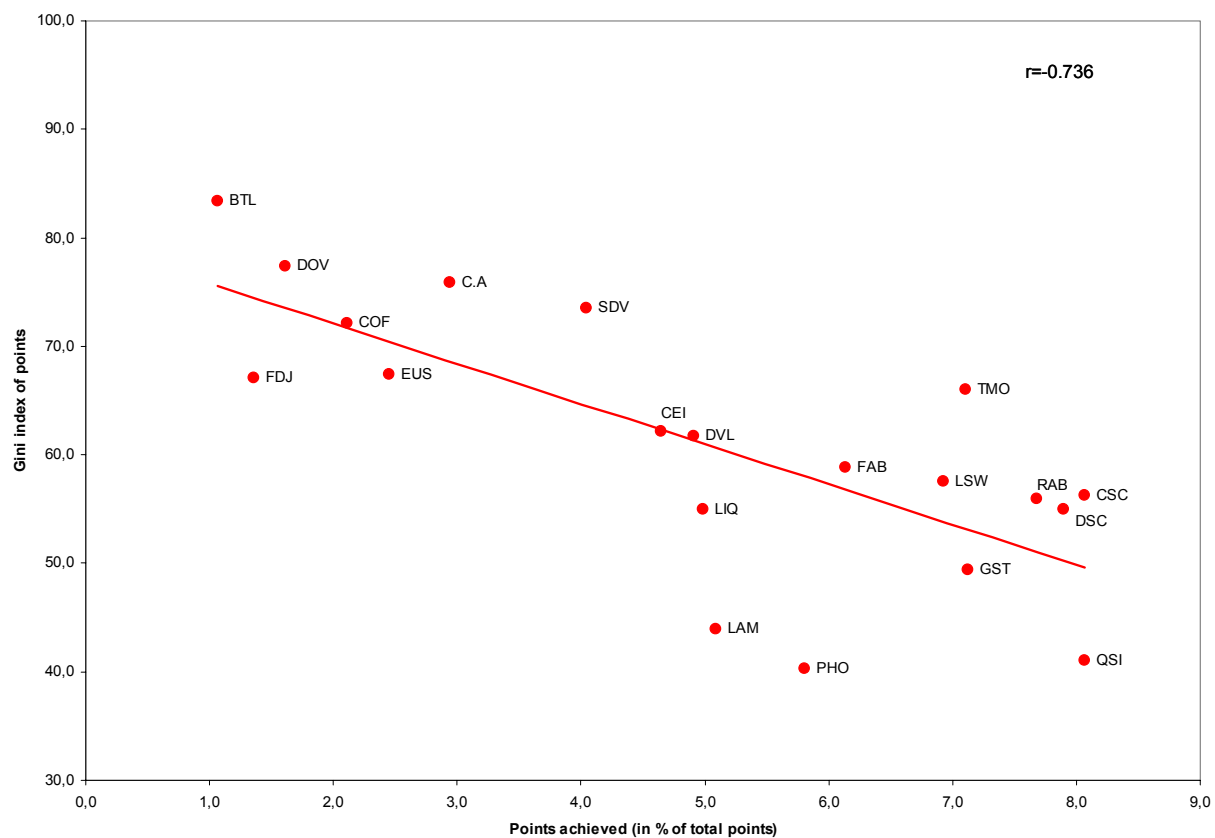


Figure 1: Concentration of the teams' participation 2005

TEAMS	% OF TOTAL POINTS	GINI INDEX	ITALY	FRANCE (NO TOUR)	SWITZERLAND	POLAND	SPAIN	GERMANY	BE.NE.LUX	WORLD CHAMPIONSHIP	TOUR DE FRANCE	GIRO D'ITALIA	VUELTA A ESPANA	NORTHERN CLASSICS
B <u>QUICK STEP</u>	8.06	41.03	12.79	12.21	7.63	0.00	17.37	13.55	25.38	9.54	1.53	1.15	4.01	22.52
DK TEAM CSC	8.06	56.25	9.54	23.66	5.73	0.00	15.46	0.95	28.44	0.00	16.22	2.67	10.69	4.96
US <u>DISCOVERY CHANNEL PRO CYCLING TEAM</u>	7.89	54.97	21.44	21.83	1.95	5.07	10.53	0.00	12.09	0.00	27.10	17.54	0.78	10.72
N <u>RABOBANK</u>	7.68	55.91	15.63	0.20	7.01	19.44	18.04	0.00	30.26	0.00	9.42	0.00	14.83	9.22
D <i>GEROLSTEINER</i>	7.12	49.41	23.11	19.87	1.51	0.22	9.50	21.81	13.17	0.00	10.80	3.24	0.86	9.94
D <u>T-MOBILE TEAM</u>	7.11	66.07	1.08	14.29	2.38	0.00	8.44	8.87	36.58	0.00	28.35	0.87	8.44	16.88
E <u>LIBERTY SEGUROS - WÜRTH TEAM</u>	6.92	57.56	11.56	11.33	6.89	0.00	36.00	12.22	20.22	0.00	1.78	1.33	28.00	8.00
I <i>FASSA BORTOLO</i>	6.14	58.83	19.05	17.79	6.27	12.78	0.25	8.52	34.59	0.00	0.75	6.52	0.25	41.60
S <u>PHONAK HEARING SYSTEMS</u>	5.80	40.25	14.85	14.85	23.34	0.00	12.73	8.49	9.28	0.00	16.45	2.65	2.12	3.98
I <u>LAMPRE - CAFFITA</u>	5.09	43.88	35.65	12.69	12.39	9.06	9.06	8.16	8.16	0.00	4.83	22.96	0.00	6.04
I <u>LIQUIGAS-BIANCHI</u>	4.99	54.94	22.22	15.43	6.48	7.72	22.53	0.00	25.00	0.00	0.62	20.68	0.31	33.95
B <u>DAVITAMON-LOTTO</u>	4.91	61.76	20.38	15.36	0.00	0.00	19.44	0.00	32.92	0.00	11.91	20.38	11.60	39.18
E <u>ILLES BALEARS - CAISSE D'EPARGNE</u>	4.65	62.17	13.25	14.24	0.00	0.00	37.09	0.00	1.99	13.25	20.20	13.25	18.21	1.66
E <u>SAUNIER DUVAL - PRODIR</u>	4.05	73.48	16.35	20.91	0.00	0.00	47.15	5.70	9.89	0.00	0.00	15.97	0.76	0.00
F <u>CREDIT AGRICOLE</u>	2.94	75.92	45.03	32.46	0.00	0.52	2.62	2.62	3.66	0.00	13.09	18.85	0.00	0.00
E <i>EUSKALTEL - EUSKADI</i>	2.45	67.45	2.52	31.45	9.43	0.00	20.13	0.00	32.08	0.00	4.40	2.52	15.72	0.00
F <u>COFIDIS, LE CREDIT PAR TELEPHONE</u>	2.11	72.08	31.39	0.73	11.68	0.00	10.95	0.00	40.15	0.00	5.11	8.76	8.76	26.28
I <i>DOMINA VACANZE</i>	1.62	77.38	34.29	0.00	26.67	0.00	0.00	0.95	38.10	0.00	0.00	34.29	0.00	28.57
F FRANÇAISE DES JEUX	1.35	67.05	22.73	0.00	5.68	35.23	3.41	0.00	26.14	0.00	6.82	0.00	3.41	12.50
F BOUYGUES TELECOM	1.06	83.33	36.23	0.00	0.00	0.00	8.70	0.00	4.35	50.72	0.00	0.00	0.00	4.35
	100													

Table 2: Points per team in the 2005 UCI Pro Tour

	% OF TOTAL POINTS	GINI INDEX	ITALY	FRANCE (NO TOUR)	SWITZERLAND	POLAND	SPAIN	GERMANY	BE.NE.LUX	WORLD CHAM- PIONSHIP	TOUR DE FRANCE	GIRO D'ITALIA	VUELTA A ESPANA	NORTHERN CLASSICS
BELGIUM	12.97	45.25	15.66	13.40	4.74	0.00	18.15	8.42	28.23	5.93	5.46	8.42	6.88	28.83
DANMARK	8.06	56.25	9.54	23.66	5.73	0.00	15.46	0.95	28.44	0.00	16.22	2.67	10.69	12.79
FRANCE	7.46	49.02	35.88	12.99	4.33	6.60	5.98	1.03	18.14	7.22	7.84	9.90	3.09	14.43
GERMANY	14.23	48.62	12.11	17.08	1.95	0.11	8.97	15.35	24.86	0.00	19.57	2.05	4.65	18.81
ITALY	17.83	47.80	26.06	14.06	9.92	9.15	8.97	5.35	24.68	0.00	1.81	17.69	0.17	29.42
THE NETHERLANDS	7.68	55.91	15.63	0.20	7.01	19.44	18.04	0.00	30.26	0.00	9.42	0.00	14.83	16.23
SPAIN	18.06	53.70	11.84	16.95	3.92	0.00	36.63	5.96	14.82	3.41	6.47	7.84	17.72	5.20
SWITZERLAND	5.80	40.25	14.85	14.85	23.34	0.00	12.73	8.49	9.28	0.00	16.45	2.65	2.12	7.96
<i>UNITED STATES</i>	7.89	54.97	21.44	21.83	1.95	5.07	10.53	0.00	12.09	0.00	27.10	17.54	0.78	10.72
	100													

Table 3: Points per nation in the 2005 UCI Pro Tour

5. Efficiency improvements

Following the message arisen from the theoretical analysis and confirmed by the empirical investigation, in this section we make some proposals for improving the efficiency of the UCI Pro Tour.

Having already argued about the impossibility of increasing the number of teams because of the problem of attractiveness and congestion, our alternative proposal, derived from the theoretical attempt of improvement, is the following: The UCI Pro Tour must maintain the oligopolistic form of the “closed league”, but should introduce a mechanism of exclusion and substitution of the worst teams at the end of every season.

From an operative point of view, three main ways can be used to implement this proposal. The first way could be the retrograding of all the teams with a number of points smaller than a certain threshold q^* . However, this solution implies that the number of teams retrograded would depend on a discretionary decision of the regulator (normally the UCI) rather than on the effort spent by the teams.

Hence the option of retrograding all the teams with a number of points lower than 30% of the average number of points achieved by all teams (a sort of “competition line” similar to that used in the study of poverty) could prove as better. The “competition line” could change every year: the number of points got by the Pro Tour teams is not fixed, since the other teams invited to the races but outside the Pro Tour league could get points that usually are not taken in consideration for the ranking. Hence, the higher the points got by the invited team, the lower will be the competition line. This factor could lead, in theory, to a collusion between the invited teams and the worst Pro Tour teams in order to allow the “outsiders” to get more points and to lower the probability of being retrograded for the “insiders”.

This problem opens the space for another solution, probably be the most popular one: the relegation at the end of the season of a certain number of teams, like in European professional football. Since nowadays 20 teams make the Pro Tour, an adequate number of relegations could be three or four teams.

The proposal could be correlated by a rule that imposes to drop from the computation the n best results of the team, in order to set an incentive to smooth the seasonal effort in a larger number of races, instead of getting a large number of points in few races and spending little energy after having reached the calculational security of not being retrograded.

6. Conclusion

This paper has given a first economic analysis of professional cycling and has then examined the effects of the newly introduced UCI Pro Tour on teams' and racers' behaviour. We derived the need for some changes, especially the opening of the Pro Tour "closed league" by introducing a relegation system.

Since it is one of the first academic approaches to the topic, much work remains to do. On the theoretical side, more complex models should be developed, starting from the peculiarities of professional cycling listed in chapter 2.4. One could study alternative organisational forms, or even the behaviour of cyclists in contests, using perhaps game-theoretic models. Another interesting field could be an application of the existing studies on doping to the particular case of pro cycling.

For what concerns empirical research, cycling offers good possibilities for effort/success studies (like Torgler 2005 and Prinz 2005), as the competitions' results are well documented since decades, while there is almost no basis for financial and organisational analysis. Such an investigation of pro cycling requires at least some financial data to start from. While salary data will probably remain difficult to access to, at least the publication of detailed budget data of racing teams and race organizers should be possible, as it is the case in other professional sports like football. Here the transparency induced by the academic attention has contributed, in our opinion, to a greater financial discipline of the football clubs during the last years. Similar positive externalities could result from cycling studies, so the UCI should enhance the publication of financial data as well as other economic and organizational information.

Current developments indicate that the actual setting of the Pro Tour is in fact perceived as not satisfying by teams and race organizers (e.g. RSN 2006). Those of the three major stage races have threatened many times to abandon the Pro Tour, mainly because they fear losing control on their own event, and in particular on the related TV rights. The closed-league shape was moreover blamed as fatal for excluded teams and race events.

Several changes are therefore expected to take place in the next years. This represents a great research fields for sports economists, which should not be neglected.

References

ANDREFF, W. (2006): New perspectives in Sports Economics: A European View, Paper presented at the 8th IASE Conference, Bochum.

ARD (2006): tour.ard.de: Reglement, <http://tour.ard.de/dtour/reglement/beitraege/wertungen.htm>, 20.8.2006.

A.S.O. – Amaury Sport Organisation (2002-2006): *Offizielles Programm. Tour de France 2006*; German edition by ARD/ZDF/SR, Saarbrücken. [Various volumes]

BAADE, R. (2003): Evaluating Subsidies for Professional Sports in the United States and Europe: A Public-Sector Primer, in: *Oxford Review of Economic Policy* 19 (4), 585-597.

BERENTSEN, A. (2002): The Economics of Doping, in: *European Journal of Political Economy* 18, 109-127.

BERTRAND, J. (1883): Théorie mathématique de la richesse sociale, in: *Journal des Savants*, 67, 499-508.

BREWER, B.D. (2002): Commercialization in Professional Cycling, in: *Sociology of Sport Journal* 19, 276-301.

CARUSO, R. (2005): Asimmetrie negli incentivi, equilibrio competitivo e impegno agonistico: distorsioni in presenza di doping e combine, in: *Rivista di diritto ed economia dello sport* 1 (3), 13-38.

COURNOT, A. (1838): *Recherches sur les Principes Mathématiques de la Théorie des Richesses*. [English edition: *Researches into the Mathematical principles of the Theory of Wealth*, London, MacMillan, 1897]

DELOITTE (2006): *Annual Report*, Manchester.

DILGER, A. (2002): Zur Dynamik im Finale von Radrennen: Analyse des Windschattenfahrens, in: Heinz-Dieter Horch/Jörg Heydel/Axel Sierau (Hg.): *Finanzierung des Sports: Beiträge des 2. Kölner Sportökonomie-Kongresses*, Aachen, 214-223.

DILGER, A./TONSDORF, F. (2004): Wettbewerbsintensität und Doping: Eine theoretische und empirische Untersuchung, Working Paper No. 131, Universität Witten/Herdecke.

DOBSON, S./GODDARD, J. (2001): *The Economics of Football*, Cambridge.

FORT, R.D. (2003): *Sports Economics*, Upper Saddle River/NJ.

HAUGEN, K.K. (2004): The Performance-Enhancing Drug Game, in: *Journal of Sports Economics* 5 (1), 67-86.

HOHENAUER, R. (2006) „Gerüchte warfen uns drei Monate zurück!“, in: *Sponsors* 5/2006, 22.

- JUTEL, A. (2002): Olympic Road Cycling and National Identity: Where Is Germany?, in: *Journal of Sport and Social Issues* 26 (2), 195-208.
- LESSING, H. E. (2003): *Automobilität - Karl Drais und die unglaublichen Anfänge*, Leipzig.
- LYNCH, J.G./ZAX, J.S. (2000): The Rewards to Running. Prize Structure and Performance in Professional Road Racing, in: *Journal of Sports Economics* 1 (4), 323–340.
- MAENNIG, W. (2002): On the Economics of Doping and Corruption in International Sport, in: *Journal of Sport Economics* 3 (1), 61-89.
- MAS-COLELL, A./WHINSTON, M.D./GREEN, J.D. (1995): *Microeconomic Theory*, New York.
- NEALE, W.C. (1964): The Peculiar Economics of Professional Sport. A Contribution to the Theory of the Firm in Sporting Competition and in Market Competition, in: *Quarterly Journal of Economics* 78 (1), 1-14.
- PRINZ, J. (2005): Every Second Counts: The Influence of Money and Body Weight in Professional Road Racing - Empirical Evidence from the Tour de France, Working Paper, Universität Witten/Herdecke.
- RABENSTEIN, R. (1996): *Radspport und Gesellschaft: ihre sozialgeschichtlichen Zusammenhänge in der Zeit von 1867 bis 1914*, 2. ed., Hildesheim.
- REBEGGIANI, L. (2006): Public vs. Private Spending for Sports Facilities – The Case of Germany 2006, in: *Public Finance and Management* 6 (3), 395-435.
- RCS SPORT (2006): Giro d'Italia 2006: Regolamento, <http://www.gazzetta.it/Speciali/Giroditalia/2006/it/>, 20.08.2006.
- RSN – RADSPORTNEWS (2006): Große Radspportnationen sehen ProTour gescheitert, www.radsport-news.com, 23.07.06.
- SAVULESCU, J./FODDY, B./CLAYTON, M. (2004): Why we should allow performance enhancing drugs in sport, in: *British Journal of Sports Medicine* 38, 666-670.
- SCHRÖDER, R. (2002): *Radspport: Geschichte – Kultur – Praxis*, Göttingen.
- SCHRÖDER, R. (2005): *Lexikon Radspport*, Göttingen.
- SCHMIDT, M.B./BERRI, D.J. (2005): Concentration of Playing Talent: Evolution in Major League Baseball, in: *Journal of Sports Economics* 6 (4), 412-419.
- SHMANSKE, S. (2004): *Golfonomics*, New Jersey/NJ.
- SIEGFRIED, J./ZIMBALIST, A. (2000): The Economics of Sport Facilities and Their Communities; in: *Journal of Economic Perspectives* 14 (3), 95-114.
- SOWELL, C.B./MOUNTS, W.S. (2005): Ability, Age, and Performance - Conclusions from the Ironman Triathlon World Championship, in: *Journal of Sports Economics* 6 (1), 78-97.

TONDANI, D. (2005): I ranking internazionali come rimedio alle asimmetrie informative negli sport individuali: il caso del ciclismo professionistico, in: *Rivista di diritto ed economia dello sport* 1 (2), 93-117.

TORGLER, B. (2005): 'La Grande Boucle': Determinants of Success at the Tour de France, CREMA Working Paper No. 22 (revised version).

UCI (2006): *UCI cycling regulations*; Version on 30.03.2006, Part 2: road races, www.uci.ch.

WHITTLE, J. (2006): Geldmaschine Tour de France, in: A.S.O. (2006): *Offizielles Programm. Tour de France 2006*, German edition by ARD/ZDF/SR, Saarbrücken, 32-33.

Appendix

Pro Tour 2005: Points scale for individual rankings

	<i>Tour de France</i>	<i>Vuelta a España, Giro d'Italia</i>	<i>Paris-Nice, Tirreno-Adriatico, Milano-Sanremo, Ronde van Vlaanderen, Vuelta Ciclista al País Vasco, Paris-Roubaix, Liège-Bastogne-Liège, Tour de Romandie, Volta Ciclista a Catalunya, Critérium du Dauphiné Libéré, Tour de Suisse, Deutschland Tour, Eneco Tour, Tour de Pologne, Giro di Lombardia</i>	<i>Gent-Wevelgem, Amstel Gold Race, La Flèche Wallonne, Vattenfall Cyclassics, Clasica Ciclista San Sebastian, GP Ouest France-Plouay, Züri Metzgete, Paris-Tours</i>
Final classification of the races				
1	100	85	50	40
2	75	65	40	30
3	60	55	35	25
4	55	45	30	20
5	50	40	25	15
6	45	35	20	11
7	40	30	15	7
8	35	26	10	5
9	30	22	5	3
10	25	19	2	1
11	20	16		
12	15	13		
13	12	11		
14	10	9		
15	8	7		
16	6	5		
17	5	4		
18	4	3		
19	3	2		
20	2	1		
Stages and Prologues				
1	10	8	1	
2	5	4		
3	3	2		

Riders belonging to an UCI Professional Continental Team do not score any points. The points corresponding to the place obtained are not awarded. The team time-trial does not award points to riders.