

Grove, Wayne A.; Jetter, Michael

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## The Superstar Quest: Does Youth Talent Predict Professional Success for Female and Male Tennis Players?

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# **The Superstar Quest: Does Youth Talent Predict Professional Success for Female and Male Tennis Players?**

**Wayne A. Grove**

*Le Moyne College*

**Michael Jetter**

*Universidad EAFIT  
and IZA*

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IZA

P.O. Box 7240  
53072 Bonn  
Germany

Phone: +49-228-3894-0

Fax: +49-228-3894-180

E-mail: [iza@iza.org](mailto:iza@iza.org)

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## ABSTRACT

### **The Superstar Quest: Does Youth Talent Predict Professional Success for Female and Male Tennis Players?\***

We estimate the relationship between international youth and professional tennis rankings. We find no difference between the predictiveness of rankings from age 14 & Under versus age 16 & Under competitions. The most persistent predictor of professional success is beating older top ranked juniors. Our results reveal stark gender differences. For example, ordinal junior rankings are more strongly associated with professional success for males than for females. In addition, future tennis stars are better signaled by U14 competition outcomes for females, but by U16 results for males.

JEL Classification: D82, D91, J16, J22, J24

Keywords: productivity measures, labor supply, career outcomes, tennis

Corresponding author:

Michael Jetter  
Department of Economics  
School of Economics and Finance  
Universidad EAFIT  
Carrera 49 7 Sur-50, Avenida Las Vegas  
Medellín  
Colombia  
E-mail: [mjetter7@gmail.com](mailto:mjetter7@gmail.com)

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# 1 Introduction

Among the most universal dilemmas faced by individuals and organizations is the uncertain link between the information used to make career choices or hiring decisions and individuals' future productivity. At least three major bodies of related scholarship have investigated the following relationships: (1) the predictive values of information about high school and college aged individuals and career outcomes, (2) professional sports teams' draft choices and personnel decisions, and (3) expertise studies. Collectively, these related research areas document the tremendous uncertainty about the predictive value of early life outcomes.

We contribute to these literatures by assembling a novel data set consisting of world rankings that simplifies the relationship between youth and adult outcomes to measure success, and doing so for tennis, an individual sport. Our question is whether and how being a female or male superstar at age 16 or younger predicts success as a professional tennis player. We investigate the role of ordinal junior rankings, being ranked in the U14 (age 14 & Under) and U16 (age 16 & Under) categories, age differences within these categories, and gender differences. We test the hypotheses put forward by prominent tennis coaches that performances at age 12 do not provide useful information for future success on the professional tour (Unierzyski, 2003, and MacCurdy, 2006). Also, we test the findings by Brouwers et al. (2012) that top ranked players younger than their competitors are *not* more likely to have successful professional careers (p. 417).

## 2 Data and Methodology

The most comprehensive sample of young potential tennis professionals are the players ranked in the U14 and U16 competitions of the Tennis Europe Junior Tour. We collect data for all female and male players born between 1977 and 1988, who were ranked at least once in the top 50 of these elite year-end rankings in the U14 or U16 categories. Our dataset contains 1,527 players (750 females). We match each player to their subsequent highest professional ranking achieved on the Women's Tennis Association (WTA) or the Association of Tennis Professionals (ATP) Tours.<sup>1</sup> With a birth year cut-off of 1988 at the end of the 2013 season, all sample players were

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<sup>1</sup>Data from <http://www.tenniseurope.org/page.aspx?id=16384>. For players, who never earned points on the professional tour, we set a career high ranking of 1600, which corresponds to less than one point on the professional tour. Excluding players who never earned professional points returns qualitatively identical results.

at least 25 years of age at the time of data collection.

We apply a logit regression framework, estimating the probability  $p$  of player  $i$  to achieve, say, a top 10 professional ranking:

$$\text{logit}(p)_i = \alpha_0 + \alpha_1 X_i + \alpha_2 Z_i + \alpha_3 \text{Controls}_i + \epsilon_i, \quad (1)$$

where  $X_i$  includes indicators for the player’s best youth ranking (reached the *top 3*, *top 4 to 10*, etc.). We also estimate this equation using the continuous variable of the player’s highest ranking in the U14 and U16 competitions and the respective squared terms to allow for nonlinearities.  $Z_i$  contains dummy variables for whether the player was younger than the age category in which they competed.  $\text{Controls}_i$  include a gender dummy and the birth year of the player.

### 3 Estimating Career Success from Youth Rankings

Panel A of Table 1 shows the likelihood of youth players reaching professional rankings of the top 10, 50, 100, and 200. While the U16 players are slightly more indicative of future success, the outcomes of the U14 players do not significantly differ. About 30 percent of each sample achieved a professional ranking among the top 200, 21 percent among the top 100, 14 percent in the top 50, and 4 percent in the top 10. Panels B and C investigate potential gender differences within the U14 and the U16 samples. Note that U14 rankings predict success significantly better for females than for males, other than the top 10; U16 junior male rankings are more strongly associated with becoming a top 10 professional.

Table 2 displays the results from estimating equation 1. First, we note the importance of ordinal rankings. For example, a top 3 U14 player has a 6.8 percent chance of reaching the top 10 on the professional circuit, relative to those ranked between 4 and 50 in that youth category. This coefficient then gradually increases when estimating the probabilities to reach the top 50, 100, and 200. We observe a similar pattern for players ranked 4 to 10 in the U14 category. In the U14 sample the coefficients of *top 3* and *top 4 to 10* are not statistically different from each other at the 10 percent level for any of the definitions of professional success. After that, we see a drop in magnitudes for players ranked 11 to 20, however their chances are still significantly increased, compared to players ranked 21 to 50. These relationships are roughly comparable for

**Table 1:** Percentage of Sample Players Reaching the Top 10, 50, 100, and 200

	(1) top10	(2) top50	(3) top100	(4) top200
<i>Panel A</i>				
U14 Sample	0.042*** (0.006)	0.137*** (0.011)	0.206*** (0.013)	0.292*** (0.015)
U16 Sample	0.045*** (0.007)	0.143*** (0.011)	0.208*** (0.013)	0.316*** (0.015)
difference	-0.003 (0.009)	-0.007 (0.016)	-0.002 (0.018)	-0.024 (0.021)
<i>N</i>	1,952	1,952	1,952	1,952
<i>Panel B</i>				
Males U14	0.047*** (0.009)	0.106*** (0.013)	0.169*** (0.016)	0.242*** (0.019)
Females U14	0.036*** (0.009)	0.172*** (0.018)	0.248*** (0.020)	0.350*** (0.023)
difference	0.011 (0.013)	-0.065*** (0.022)	-0.079*** (0.026)	-0.108*** (0.029)
<i>N</i>	952	952	952	952
<i>Panel C</i>				
Males U16	0.060*** (0.011)	0.137*** (0.015)	0.198*** (0.018)	0.294*** (0.020)
Females U16	0.029*** (0.008)	0.149*** (0.016)	0.218*** (0.019)	0.338*** (0.022)
difference	0.031** (0.013)	-0.012 (0.022)	-0.020 (0.026)	-0.044 (0.030)
<i>N</i>	978	978	978	978

Standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

the U16 rankings.

**Table 2:** Logit Estimates of the Relationship between Junior Youth Rankings and Success on the Professional Tennis Tour (Marginal Effects Displayed)

	14 & Under				16 & Under			
	(1) top10	(2) top50	(3) top100	(4) top200	(5) top10	(6) top50	(7) top100	(8) top200
top 3	0.068*** (0.018)	0.171*** (0.033)	0.198*** (0.042)	0.267*** (0.050)	0.008 (0.022)	0.122*** (0.035)	0.175*** (0.041)	0.248*** (0.049)
top 4 to 10	0.048*** (0.017)	0.125*** (0.027)	0.169*** (0.030)	0.224*** (0.034)	0.050*** (0.017)	0.088*** (0.029)	0.161*** (0.032)	0.196*** (0.036)
top 11 to 20	0.034* (0.019)	0.071*** (0.027)	0.038 (0.032)	0.105*** (0.034)	0.017 (0.018)	0.070** (0.028)	0.084*** (0.032)	0.143*** (0.035)
1 yr younger	0.029* (0.015)	0.073*** (0.024)	0.092*** (0.030)	0.126*** (0.033)	0.016 (0.015)	0.032 (0.023)	0.025 (0.026)	0.002 (0.030)
2 or more yrs younger	0.056** (0.024)	0.160** (0.073)	0.261** (0.107)	0.295** (0.144)	0.082*** (0.023)	0.144*** (0.035)	0.162*** (0.042)	0.233*** (0.053)
<i>N</i>	952	952	952	952	978	978	978	978

Standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

All regressions include a variable indicating the player's birth year and a gender dummy.

The second major conclusion from Table 2 is that beating top-ranked, older players is a particularly strong predictor of future professional success. Note that being one year younger than the age category in which they compete increases the odds of better professional outcomes for 13 year old players in the U14s, but not for 15 year old players in the U16s. The inflated standard errors for U14 players two or more years younger reflect the low number of observations (17 players), all of whom are female.



## 4 Gender Differences

Next, rather than pooling our data, we analyze it by gender. Table 3 displays results from including the highest achieved youth rankings in the U14 sample (*highestu14*) and its squared term to better allow for nonlinearities. We continue to find that ordinal youth rankings matter substantially more for males than for females, whereas age matters for both. In fact, the highest achieved U14 ranking for women is only significant when defining success as reaching the top 200. For males, on the other hand, ordinal rankings are significant throughout all definitions of professional success. The coefficients on being ranked at the age of 13, however, are not statistically different across genders. Finally, females age 12 and younger had a much greater likelihood of professional success than did their peers, namely more than a third ultimately ranked among the top 100 pros. The U16 subsamples (not displayed) yield results akin to those in the U14 category.

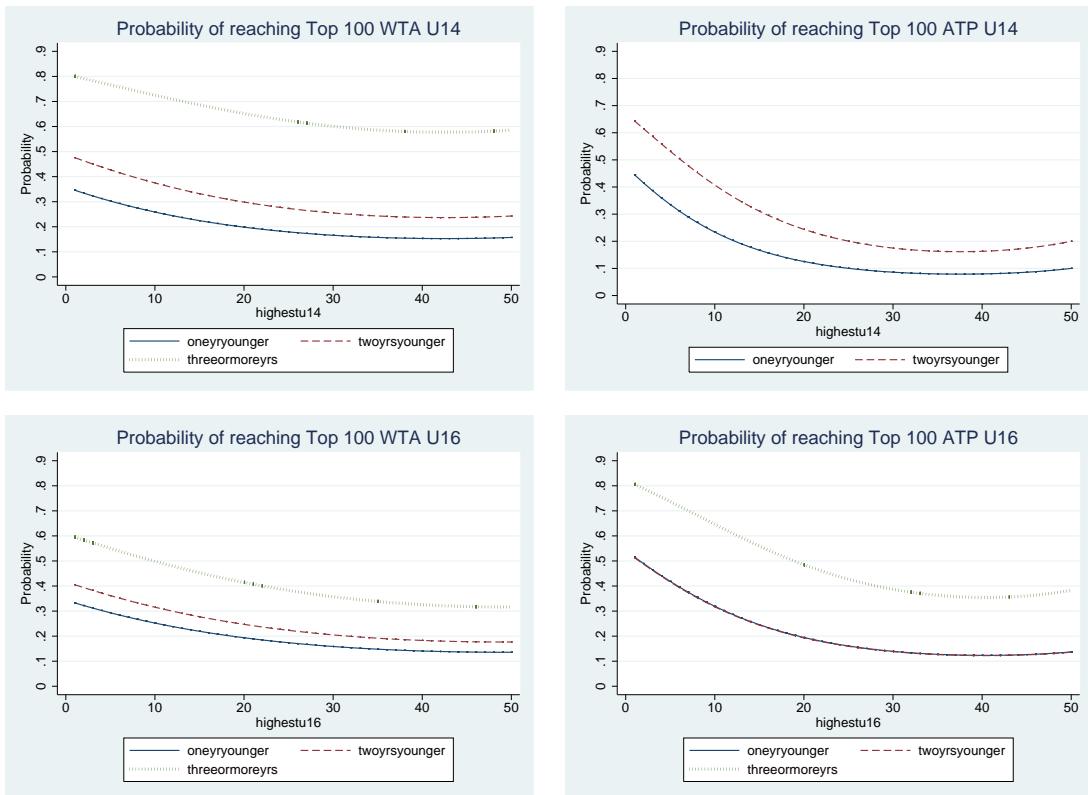
**Table 3:** Logit Estimates of the Probability that U14 Junior Players Reach Top Professional Rankings (Marginal Effects Displayed)

	Women				Men			
	(1) top10	(2) top50	(3) top100	(4) top200	(5) top10	(6) top50	(7) top100	(8) top200
<i>highestu14</i>	-0.001 (0.002)	-0.006 (0.005)	-0.009 (0.005)	-0.017*** (0.006)	-0.005* (0.003)	-0.011*** (0.004)	-0.016*** (0.004)	-0.017*** (0.005)
<i>highestu14sq</i>	0.0000 (0.0000)	0.0000 (0.0000)	0.0001 (0.0001)	0.0002* (0.0001)	0.0000 (0.0001)	0.0001* (0.0001)	0.0002** (0.0001)	0.0002** (0.0001)
1 yr younger	0.033* (0.019)	0.076** (0.035)	0.091** (0.042)	0.109** (0.045)	0.030 (0.021)	0.076** (0.033)	0.101** (0.042)	0.154*** (0.051)
2 or more yrs younger	0.070*** (0.022)	0.236*** (0.074)	0.342*** (0.107)	0.361** (0.146)				
<i>N</i>	443	443	443	443	509	509	509	509

Standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

All regressions include a variable indicating the player's birth year.

Figure 1 graphs the predicted probabilities of reaching the top 100 in professional tennis as a function of the highest achieved position in the U14 and U16 rankings.<sup>2</sup> Note the steep slope of the male probability curves relative to the females, indicating that ordinal ranking matters tremendously for males, but less so for females. The vertical distances between the curves represent age differences: being two or more years younger leads to a difference of about 30 percentage points for U16 players and over 40 percentage points for U14 girls.



**Figure 1:** Junior Rankings and the Probability of Reaching the Top 100 in the Respective Professional Rankings

What youth outcomes best predict future success? For females in the U14 category, the combination of being in the top 50 at age 12 and under, in addition to reaching the top 10 in these rankings at some point produces a 70 to 80 percent chance of reaching the top 100 on the

<sup>2</sup>The predicted probabilities are calculated as  $prob_i = \frac{1}{1+e^{-\text{logit}(p)_i}}$  following [Greene \(2003\)](#). We are using all four subsamples (female/male for U14/U16) individually and estimate the outcome for a reference player born in 1980. Notice that functions for *u16a* and *u16b* are almost identical.

professional tour. In fact, three of the precocious 12 and under girls in our U14 sample became the top players in the world: Kim Clijsters, Justine Henin, and Martina Hingis. For males, these odds hold for somebody who reached the top 50 U16 at the age of 14 and is ranked in the top spot in those rankings at some point.

## 5 Conclusions

We estimate the relationship between international youth tennis rankings and professional tennis success. In contrast to some coaches' claims and researchers results, we find strong evidence of the predictiveness of ordinal rankings and of being younger than one's competitors. In addition, our results reveal stark gender differences, namely being younger than the age category is particularly predictive for U14 girls and ordinal rankings matter more for males.

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