Labour Economics 52 (2018) 74–82

Contents lists available at ScienceDirect

Labour Economics

journal homepage: www.elsevier.com/locate/labeco

Peer effects in marathon racing: The role of pace setters

Jamie Emerson, Brian Hill*

Department of Economics and Finance, Salisbury University, 1101 Camden Avenue, Salisbury, MD 21801, United States

ARTICLE INFO

JEL codes:
J44
L83

Keywords:
Peer effects
Strategic interaction
Elite competition

ABSTRACT

Marathon races are rank-order tournaments with prizes determined primarily by relative performance. As a result, peer performance is an important determinant of an individual's performance. Peer effects have been extensively studied in a variety of settings, with much of the research concerned with finding a measure of peer performance that is exogenous. We focus our research on marathon races with pace setters as their presence allows for us to identify exogenous peer effects by identifying variation in peer performance and ability that is exogenous. Using data on elite male runners from 2009 to 2014 marathons in Berlin, Chicago, and London, we find the presence of negative exogenous peer effects and this result is robust to a number of peer performance variables. We attribute our result to the self-sorting of runners by ability and the subsequent invidious comparison that occurs in marathons with pace setters.

1. Introduction

1.1. Peer effects

Peer effects have been extensively studied in a variety of settings, including economics and psychology. A large body of economics research has focused on the identification of peer effects. Studies have found that peers are often important determinants of performance across a variety of activities, including education (HYPERLINK \l "bib5" Carrell et al. 2009, 2013; Duflo et al., 2011) and work (Mas and Moretti, 2009; Bandiera et al., 2009).

Whether peer effects are expected to be positive or negative is often theoretically ambiguous. Early research in psychology found both positive (Triplett, 1898) and negative (Pessin, 1933) peer effects in different settings. Recent economics research has often found positive peer effects (Carrell et al., 2009), but some studies have also obtained negative peer effects (Carrell et al., 2013). In a working paper, Brady et al. (2017) attempt to explain the possibility of obtaining both positive and negative peer effects in an educational setting using a framework that models student behavior as a utility maximization problem with utility depending on both performance and a "homophily index."

As described in Brady et al. (2017) and Carrell et al. (2013), when peer groups include individuals of varying abilities, it is possible that individuals of similar ability will be attracted to each other (homophily) and segregate according to abilities. This sorting by ability that occurs is a possible explanation for the negative peer effects that the researchers found in their studies. As described in Hoxby and Weingarth (2005), the sorting by similar abilities can lead to an "invidious comparison" effect which causes the performance of individuals to suffer as they compare themselves to higher achieving individuals.

Studies have also investigated the role of peers on the performance of athletes in different sports settings, and the results of this research are also inconsistent. Guryan et al. (2009) investigate peer effects in professional golf and find that a playing partner's performance has very little impact on a player's own performance in professional golf tournaments. This is contrary to Brown (2011) who also searches for peer effects in professional golf. She finds that peers do matter, as the results in her paper show that golfers consistently perform better (shoot lower scores) in tournaments with higher quality peers.

Yamane and Hayashi (2015) investigate peer effects in swimming. They find that swimming next to swimmers with faster personal best times is related to an athlete swimming faster. Using data on 5000 m races from 2001 to 2011, Hill (2014a) finds that runners' times are positively related to the abilities of runners within their heats as well as the abilities of runners competing in other heats. This result is consistent with Hill (2014b) who finds that athletes run faster in 100 m competitions with peers who have faster abilities.

1.2. Marathon running

While we are not aware of research looking for peer effects in marathon races, researchers have studied the performance of athletes in marathon, and other long-distance, races. Maloney and McCormick (2000) use data over a variety of distances (including marathons) and find that larger average prizes and greater prize spread was associated with faster finishing times. Frick and Prinz (2007) also investigate the relationship between prize structure and performance but

* Corresponding author.
E-mail addresses: jdemerson@salisbury.edu (J. Emerson), bchill@salisbury.edu (B. Hill).

https://doi.org/10.1016/j.labeco.2018.03.008
Received 20 June 2017; Received in revised form 8 February 2018; Accepted 29 March 2018
Available online 9 April 2018
0927-5371/

Table 1
Chicago prize money (2014).

Place	Prize	Time	Time bonus
1st	$100,000	Course record	$75,000
2nd	$50,000	Sub 2:04:15	$55,000
3rd	$25,000	Sub 2:05:00	$40,000
4th	$15,000	Sub 2:05:30	$25,000
5th	$10,000	Sub 2:06:00	$10,000
		Sub 2:07:00	$5,000

they focus exclusively on marathons. In baseline models, their findings are similar to Maloney and McCormick (2000); larger average prizes and larger prize spreads are related to faster finishing times. However, in some alternative econometric specifications, Frick and Prinz (2007) find that the prize spread is still associated with faster times but the prize size is not important.

Marathon running is an increasingly popular sport among amateur and professional runners. In the United States, 509,000 runners completed marathons in 2015 which is up from the 395,000 finishers in 2005 (Running USA, 2016). There were 90 marathons in the United States with at least 1000 finishers (Running USA, 2016). Finishers in marathons span across ages with a median age of 40 for male runners and 36 for female runners, and males made up 56% of the finishers and females made up 44% of the finishers (Running USA, 2016).

Elite runners can also turn to marathons where they have the opportunity to earn relatively larger prizes when compared to prizes earned from competing in shorter distance races on the track. Traditionally, distance runners began their careers by running middle distances, such as the 5000 m and 10,000 m races, on the track before making the move to the marathon. The relatively larger prizes in marathons potentially alter the incentives for distance runners to compete in marathons at an earlier age.

One opportunity for elite marathon runners to earn money is by competing in the World Marathon Major series. The World Marathon Major series is a competition made up of 6 marathon races in Berlin, Boston, Chicago, London, New York, and Tokyo.[1] In this competition, runners earn points based on their finishing position of each race they complete and the runner with the most points after the year wins a monetary prize of $500,000.[2] This prize is in addition to the monetary prize that runners earn by performing well in each individual marathon. Table 1 shows the prize distribution for the men's Chicago marathon in 2014. The winner was awarded $100,000 with an additional $75,000 given if a course record was set. The prize structure varies across major marathons but elite marathon runners earn significant paychecks by winning major marathons.[3]

The marathon prize structure differs from what runners can earn by competing in the professional track series called the Diamond League. The Diamond League is a series of 14 major track and field competitions during a year.[4] Competitors within a discipline earn points based on their finishing position and the athlete with the most points at the end of the season wins a $40,000 prize. In addition to the season-ending prize, winners of each race earn $10,000.

As described above, the races of the World Marathon Majors are set up to reward athletes based on their relative performance but additional prizes are also given for absolute performance in the form of time bonuses. The rank-order structure of the tournament that determines the winner introduces a setting where a runner's reward depends on their performance as well as the performance of their peers.

1.3. Pace setters in marathons

Many major races, including some major marathons, employ runners as pace setters (or pacemakers or rabbits). These runners are contracted and paid by the race directors to run an even tempo and complete a portion of the race (usually the halfway mark or slightly beyond) in an agreed upon time before dropping out of the race. Pace setters are seen in races ranging from 800 m to the marathon. Race directors employ pace setters to change the runners' behaviors during the race. Because footraces are rank-order competitions, the runners could potentially run a tactical race where they maintain a slow pace during the majority of the race and then only compete over the final stage of the race. These tactical races tend to be slower races so race organizers will often employ pace setters to produce faster races without the early race tactical components.

The use of pace setters is not without controversy among some runners, fans, and organizers. Of the 6 marathons that are part of the World Marathon Major series, pacemakers are not currently used for elite athletes in Boston, Chicago, and New York but are used by elite runners in Berlin, London, and Tokyo.[5] Marathon runners recognize that competing in races with pace setters is very different than competitions without pace setters. To understand how running in a marathon with pace setters differs from one without pace setters, consider the following quotes by elite marathon runners from Monti (2015):

> "My only paced race was Berlin and you're right: it's totally different," the fastest American woman entered here (Boston), Shalane Flanagan, told Race Results Weekly in an interview. "I went in and I didn't have to think. I didn't have to use my brain. I literally just went in, locked in to my pacesetters, and just hung on for this train ride as long as I could." "I will say I enjoy, kind of like this match-up, like a boxing fight, when you come to an unpaced race," Flanagan, 33, continued. "It's more exciting for the fans, and I think it is more exciting as a competitor. You have to come out, and there is strategizing, there's thinking. It's a lot more exhausting. But, overall, I think it yields a much more entertaining race."

> "When you see the races with pacemakers, you can run one speed and you have to perform one thing," (Ethiopian Gebre) Gebremariam explained in an interview. "But Boston and New York, they haven't pacemakers, you have to run five, six races within one race. You have to use your mentality when you run in such kind of races. It's a huge difference."

As seen in these quotes, athletes view the presence of pace setters as eliminating the strategic interaction in races. Racers only concentrate on sticking with the pace setters through an established portion of the race before the racing occurs during the remainder of the race. Elite athletes would not be "off the pace" of the race because of any strategic interaction that occurs.

The presence of pace setters has the potential to affect peer effects among runners because of the impact pace setters have on sorting. The presence of pace setters causes runners to maximize their efforts early

[1] In the years that the Olympics or World Championships are held, these races are included in the series.

[2] Runners earn 25 points for a win, 16 points for a 2nd place finish, 9 points for a 3rd place finish, 4 points for a 4th place finish, and 1 point for a 5th place finish. There is a separate series for males and females and the winner of each series earns $500,000 from the $1million prize pool.

[3] In addition to prize money, elite marathon runners often receive appearance fees for participating in major marathons. Unfortunately, very little is known about the size or structure of these payments.

[4] For more information, see the IAAF Diamond League media guide at https://www.iaaf.org/news/press-release/2016-idl-money-points-statistics. The Diamond League is not the only professional track competition but it is a good example of prize structures in track races.

[5] Our empirical strategy described below relies on using races with pace setters. Even though Chicago does not currently have pace setters, all Chicago marathons in our dataset utilize pace setters as the race stopped using them beginning in 2015.