Superstars and Mediocrities: A Simple Example

Marko Terviö, Helsinki School of Economics

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Consider a competitive industry that combines workers with capital. There is free entry by firms, which each need one worker to operate one machine that has a rental cost of \$4 million.[1] All units of output are identical, and the amount of output that a firm produces depends solely on the talent of its worker. There is an unlimited supply of potential workers with an outside wage of zero (outside meaning outside this industry). A novice is equally likely to produce anywhere between zero and one hundred units.[2] The talent of a novice worker is unknown (including to himself) but becomes public knowledge after one period of work. Careers are finite and last at most 16 periods. Workers cannot commit to decline higher outside wage offers in the future. Industry output faces a downward-sloping demand curve, and the number of firms is "large," so that firms take the market price as given and there is no aggregate uncertainty. Finally, for simplicity, there is no discounting.

How does this market for talent work? That depends crucially on whether aspiring workers can pay for the opportunity to work. There are two extreme cases to consider. In the first, individuals are constrained to take a non-negative wage. This is the inefficient, but at the same time also the more straightforward case. In the second case, individuals are risk neutral and not credit-constrained. Due to the absence of imperfections, this is, not surprisingly, the efficient benchmark.

The purpose of the example is to compare the distribution of talent and wages in the industry under these two cases. Only the steady state is considered, where the number of entering and exiting workers is constant over time.

[1] All numbers in this example are chosen for convenience.

[2] For example, the machine could have a capacity for one hundred units per period, and talent could determine the proportion of successfully completed units.

Constrained Individuals

In this case, all workers who turn out to be above the population mean (i.e., those who were able to make 50 units or more) will stay in the industry until they retire. These veterans create more revenue than a novice in expectation, so they can always outcompete them for a job in this industry.

The market price of output must be such that novice-hiring firms break even. Since potential novices are not scarce, they will always be paid zero. A novice is expected to make 50 units, so an output price of (\$4 million)/(50 units)= $\$80,000$ ($\$80K$) per unit is needed to cover the capital cost. At this price there is no entry or exit of firms from the industry.

Veteran workers are always scarce. Due to free entry, firms cannot make positive profits and will bid up the wages of veteran workers, who get the difference between their revenue-generating capacity and that of a novice as a Ricardian rent. In particular, the highest type produces 50 more units than a novice or an average type. Therefore at the price of $\$80K$ per unit, top veterans get $50 \times \$80K = \$4$ million per period. The average wage of veterans is \$2 million (since talent is uniformly distributed).

Because production cost per worker is fixed, the efficiency at which the demand for output is satisfied depends solely on the average talent of workers in the industry. The average output by veterans is 75 units; the average for the whole industry must be lower since it includes the novices (it is in fact 72).[3] A novice has a fifty-fifty chance of being retained in the industry, in which case he will make in expectation the average veteran wage of \$2 million for 15 periods; hence the expected lifetime rents are $0.5 \times 15 \times \$2$ million= \$15 million.

Unconstrained Individuals

Now suppose that aspiring workers are risk neutral and have access to unconstrained credit. They are then willing to bid for the opportunity to work in this industry, up to the expected value of future talent rents. I will now show that this will increase the exit/retention threshold and the average talent of workers in the industry up to the efficient level, while dramatically

[3]The formula that relates the fraction of novices to the rehiring threshold and the length of career is derived in Section 2.2 of the paper.

decreasing the talent rents.

Start by simply assuming that novices are offering \$1.5 million to firms for the chance to work (we will see shortly that this is in fact the unique equilibrium). Then at the output price $\$P$, a novice-hiring firm will in expectation generate $50 \times \$P$ in revenue, and have a net cost of \$2.5 million (i.e., a negative novice wage of \$1.5 million plus a capital cost of \$4 million). For firms to break even, the equilibrium price of output must then be $\$P =$ (\$2.5 million)/(50 units) = $\$50K$/unit.

When novices pay to work, then veterans of average talent will not be hired into the industry. They have no incentive to pay for a job, because they have no chance of getting higher wages in the future. The lowest type veteran to work will do so at the outside wage of zero. The lowest types to stay in the industry (i.e., the threshold types) are those making 80 units per period. They generate enough more revenue than novices in expectation to just offset the novice payment of \$1.5 million.

Veterans who are better than the threshold type collect rents. For example, the highest type makes 20 units more than the threshold type who is available at zero wage; therefore, at the output price \$50, the very best workers get a rent of $20 \times \$50K = \$1$ million per period. The average wage of veterans is \$0.5 million (again by the uniformity assumption).

Finally, to show that this is the equilibrium, calculate the expected lifetime rents. A novice has a 20% chance of turning out to be above the 80 unit threshold, in which case his expected wage is the average veteran wage of \$0.5 million for the last 15 periods. Expected lifetime rents are then $0.2 \times 15 \times \$0.5$ million = \$1.5 million, which was the assumption we started from. This is also the unique equilibrium, because higher offers by novices increase the exit threshold and thus decrease the expected rents.

The average output of veteran workers is 90 units (because veteran talent is uniform between 80 and 100). The industry average is lower, because some workers are novices; in fact it must be exactly 80 units per worker. That the optimal (i.e., maximal) average talent level of workers is the same as the optimal exit threshold is a general result (in this limiting case of a zero discount rate). Intuitively, if at the optimum some level of talent gets discarded from the industry then it must be pulling down the industry average, while a talent that is retained must be increasing it.

Table 1. Summary of the example.

	Constrained	Unconstrained
Output price	$\$80K$	$\$50K$
Threshold talent	50 units	80 units
Average talent	72 units	80 units
Top wages	\$4 million	\$1 million
Proportion novices	12%	25%

Comparison

When novices cannot pay the expected value of future talent rents, then two things happen. First, the exit threshold in the industry is too low. As a result, many job slots are taken over by mediocrities who reduce average talent in the industry, compared to if their job slots were used to discover new talents. Here the workers who make between 50 and 80 units per period are mediocrities in this sense; in fact, most workers in the industry fall under this category. Second, the rents to talent are higher; here the top wage goes up from \$1 million to \$4 million. The talent rents accrue to the advantage in output that veterans have over the threshold type, so a reduction in the threshold increases the rents of all retained types. The inability of novices to pay for the job increases the price of output, because it must be high enough to cover the cost of production at novice-hiring firms. This increased price further magnifies the rents to retained talent.

Applications (The Director's Cut)

The prototypical and most high-profile talent markets are found in the entertainment industry. There job performance is almost entirely publicly observable and success of young talents hard to predict. Neither formal education nor on-the-job training seem to play a large role in explaining wage differences in these industries. The chance to reveal one's talent in a real job is precious, as is suggested by the queuing for positions. Auditions seem to have limited usefulness beyond working as a cut-off that reduces the number of candidates for any entry-level position; huge uncertainty over talent remains among many viable candidates. There simply is no good substitute for observing the success of actual end-products. Based on a

quip by screen writer William Goldman, Richard Caves (2000) has dubbed this uncertainty the "nobody knows" property, as the first on a list of distinctive and pervasive characteristics of the entertainment industry. It could be said that, in the entertainment trades, finding out about someone's talent is largely about finding out the tastes of the public, but this distinction is not operational for analytical purposes.

For a talent market to be analyzable with this model, it should exhibit certain broad features. There should be relatively high exit rates early on (this is true without long-term commitment, although more so with it). The level of talent should be imprecisely known at the entry level, and then become known relatively quickly once in the industry. This would appear as a quick increase in within-cohort income dispersion among the "survivors" in the industry (under long-term contracting, only among free agents). Observed performance in one firm should be a good predictor of performance at other firms, i.e. match-specificity should not be too important. If these conditions hold, and if firms are not compensated for the lifetime value of the talent they discover, then this would suggest the potential for inefficiencies and excess talent rents described in the model.

There are many models for describing markets for talent that are consistent with stylized facts about entertainment industry, such as high and skewed income distribution. Just observing a talent market under one set of institutions does not allow one to show the existence, not to mention estimate the magnitude, of any inefficiencies. Besides comparing models by the plausibility of their assumptions, it would of course be desirable to try to identify and quantify "the curse of mediocrity" proposed in this paper. This would require an exogenous change in one of the imperfections behind the inefficiency—a natural experiment. The ideal experiment would be a surprise legal change from full individual commitment ability to none or vice versa. Such a change would also allow the quantification of the economic value of commitment ability, and its impact on within-profession income inequality. While a careful empirical analysis of such natural experiments would require further elaboration, the model presented here can be used to shed light on stylized facts and to suggest potential empirical applications.[4]

[4] A careful empirical analysis would require a dynamic model that takes into account how a market adjusts from one steady state to another (which can in principle take a lifetime), and how it reacts to demand shocks. This depends on features that are irrelevant for the analysis of the steady state, such as whether previously

Motion Pictures The motion picture industry in Hollywood operated under the so-called studio system from 1920s to late 1940s. In this system, artists and other inputs were assembled together within a studio under long-term relationships. As a part of the system, entering actors made exclusive seven-year contracts with movie studios.[5] This kept their compensation at moderate levels until the initial seven years came to an end, even if they became big stars meanwhile. This allowed studios to capture much of any increase in an artists' worth during the contract. The studios could rent the artist to other studios on "loan-outs" (for which they charged a premium), and the artist had no right to refuse roles. The contracts did *not* provide insurance. Even though wages were specified for the whole contract period (typically including moderate increases), the studios had the right to terminate the contract every six or twelve months.

A successful lawsuit by actress Olivia de Havilland, resolved in 1945, made a crucial part of these long-term contracts unenforceable. She had been hired by Warner Bros. in 1935, having been an unknown protagonist in a college theater play. She quickly proved very popular with both audiences and critics and won her first Oscar nomination four years into the contract, which she then attempted to renegotiate. She refused roles offered by Warner Bros., and as a result did not work for six months. At the end of the contract Warner Bros. claimed that the skipped six months should be added to the contractual obligation, since the original contract required her to actually work for seven years.[6] Warner Bros. lost, and the "De Havilland decision" made long-term contracts far less useful, as it gave more renegotiating power to artists who turn out to be big stars.

At the same time, the studio system came under fire from the Justice Department, which filed an anti-trust lawsuit against Paramount Pictures in 1938. The suit accused the eight major studios, which among them produced 95% of movies, of monopolizing the motion picture industry by restraining trade and fixing prices. The main thrust of the suit was aimed at the vertical integration of movie theaters and studios. The Supreme Court decision in 1948 forced the studios to divest from movie theaters, which is commonly thought to have

exited individuals can return to the industry.

[5] The seven-year limitation on personal service contracts dates back to 1890s.

[6] Sources: Screen Actors Guild History Page, *www.sag.org*, and Capellon & McCann trial lawyers, *www.cappellomccann.com*.

ended the studio system. Whatever the reason, the system of long-term contracting ended in the 1940s. After the change, movies have been produced as one-time affairs, where an entrepreneur-producer assembles a line of talents and other inputs for one movie only.[7]

According to the model, the end of long-term contracting should have led to insufficient exit of mediocre entertainers, showing up as substitution from unexperienced actors to experienced (but relatively less paid) actors, to higher and more uneven incomes for veteran actors, and to lower total revenue. The wages of star actors on their initial contract during the studio system can be expected to be lower for obvious reasons. More interestingly, the contractual situation of free agents (those past the initial seven years) under the studio system is comparable to actors with the same amount of experience under spot contracting. During the studio system, there should have been a higher supply of talent due to better use of movie roles in discovering talent, moderating also the wages of star free agents. After the change, the share of less experienced actors should have gone down, but the special nature of the product makes predictions about the age structure less clear-cut; actors of different ages are not easily substitutable, as the actor's age must be more or less matched with that of the character in the script.

Unfortunately, the wage data for actors is lacking. According to Caves (2000, p. 389), "*no systematic data have been assembled on whether the studios' disintegration brought more rents into the stars' hands, but casual evidence suggests that it did.*" There is more concrete evidence of a post-war decline in revenue and output at movie studios. The number of movies made was down 48% from the 1940 level in 1956, while revenues declined by 19%; however, this fact is difficult to interpret without quantifying the impact of the advent of television in the 1950s.[8] Interestingly though, in terms of quality, the era from the 1920s to the 1940s is often referred to as the golden age of Hollywood movies. For example, according to film

[7] It has also been suggested that the system unraveled because of 90% personal income tax rates during World War II. This caused individuals to set up their own production companies to shift taxable income toward dividends (also complicating any empirical analysis), which were taxed at 60%. See Stanley (1978), Chapter 3. Presumably too frequent dealing with the same studio would have exposed the tax dodge. However, the return of lower tax rates did not bring back the studio system.

[8] Average costs (available for two studios) roughly doubled at the same time, but I have not found data on the share of wage costs. The figures are from Conant (1960), Chapter 5.

director Peter Bogdanovich "*It was a whole system that found actors who were unusual, not necessarily versatile in the way we think of versatile actors today, but actors who had a personality, who had a certain quality ... there was a whole system to that, and it was extraordinary and produced the greatest array of star actors in the history of the world.*"[9]

Record Deals Exclusive record deals, by which musicians agree to make a certain number of albums for the same record company, are a form of long-term commitment similar to what used to be possible in the motion picture industry. This arrangement is possible in the record industry, because record deals are exempt from the seven year limitation on the length of personal service contracts. Challenges similar to the De Havilland case were forestalled by the California legislature in 1987, when it was decreed that record companies retain rights to the agreed number of albums by an artist, even if seven years has passed since the signing of contract.[10]

The music industry is very competitive at the entry level, where upstart bands and artists are free agents, but agree to exclusive contracts in exchange of production, distribution, and promotion by the record company. The production cost alone for a typical record is from $100,000 up,[11] but the biggest is probably the opportunity cost of promoting one band rather than another. The scarcity of attention of programming directors for radio stations and people looking for new music for record shops means that a record simply by its mere existence has little chance of becoming known. Forecasts of which artist will become a big seller are notoriously uncertain. About 80-90% of records by new artists end up making a loss—this must be compensated by the small number of very profitable hits. For the record companies, the most profitable hits are those by artists still on their initial low-paying contracts.

However, the efficacy of the system is constantly threatened by attempts to renege or renegotiate by those who turn out to be big stars and end up getting paid much less than their current "market price" (high-profile cases include Prince and George Michael). The quality of the product is obviously not contractible, and artists can fulfill contractual require-

[9] MacNeil/Lehrer NewsHour, PBS, July 3, 1997.

[10] This amendment is Subsection B of California Labor Code Section 2855.

[11] Vogel (2001).

ments (or try to force a renegotiation) with a substandard product, though at a reputational cost to themselves. Furthermore, there is currently a lobbying battle in the Congress involving RIAA (Recording Industry Association of America) and AFTRA (American Federation of Television and Radio Artists) about the continued application of the seven-album amendment. Were the current system of record deals to break down, the proportion of new artists and new releases can be expected to be reduced, while the proportion of new artists whose record earns profits and who go on making a second record should go up. This reduced proportion of "failed artists" would probably be regarded by many as a sign of a more judicious choice of artists by the record companies, but according to the model proposed here it would actually be an indication of reduced experimentation and lower efficiency.

Professional Team Sports Professional team sports in North America have very unusual labor markets, mainly because the firms are organized into leagues that are close to natural monopsonies. The leagues have devised rules that restrict firms from competing for each others' employees. In particular, potential novice players ("rookies") are each assigned to a single firm, which then has the sole right to negotiate with that particular player (the allocation of these monopsony rights is known as the "draft"). Under the "reserve clause" system, players cannot leave for other firms at will, but employers can always sell the player's contract to another firm. This system was upheld by a U.S. Supreme Court ruling, Flood v. Kuhn (1972), against a challenge by baseball player Curt Flood who had been traded against his will.

Players have responded to owners' monopsony power by unionization, leading to occasional strikes.[12] Baseball players achieved some concessions through collective bargaining in 1975, after which players reaching six years of league experience became eligible for free agency, where all teams are free to bid for their services. This change seems to have been anticipated, and 1975 was more like a culmination of gradual unraveling than a sudden shift. The change is only applicable to a minority of players however, since slightly more than half of careers do not last long enough for a player to get a contract as a free agent.

The exit (hazard) rates of major league baseball players indicate that a major shift took

[12]The first collective bargaining agreement is from 1968; there have been five strikes and three lockouts in major league baseball since then.

place in the 1950s. In the first half of the century, more than half (52.8%) of players exited after no more than three seasons, and over two thirds (68.2%) by the end of their sixth year.[13] From 1960 to 1990 these rates were down to 33% and 50.1% respectively, without a significant break at 1975. For rookies the exit rate was 35.7% before 1950, and 17.2% after 1960. Meanwhile the average age of new players has stayed at 24 years, while the number of teams and players has been growing. Further investigation would be necessary to establish the cause of the shift in exit rates, but based on the model in this paper, increasing (re)negotiation power of players is a prime candidate.

The accuracy of information about novice talent in professional sports remains an open question under the reserve clause. The draft makes it very hard to evaluate the economic value of expected talent differences between novice players.[14] If prior information is very inaccurate, then the draft should not make much difference to wages.[15] On the other hand, if the rookies also differ from each other substantially by the expected value of their talent, then the reserve clause is both rent extraction (the draft) and remedy to the curse of mediocrity (enforced long-term commitment) bundled in one. However, instead of being just a transfer of rents from owners to players as claimed by most pundits and some economists, an implication of the model is that complete free agency could be expected to cause a welfare loss. It would lead to lower exit rates for young players, lower average quality of players and lower total revenue. In total, players gain less than the owners and the consumers lose.

A similar but potentially much stronger natural experiment may be about to start in Europe, where the system of transfer fees in professional soccer is under scrutiny by EU labor regulators. There young players start as free agents but have the right to commit to binding long-term contracts, the length of which can be negotiated.[16] Casual evidence suggests that entry level information about talent is very inaccurate compared to what is

[13] Based on data from Sean Lahman's website "The Baseball Archive," *www.baseball1.com*.

[14] Occasional barter between teams, where draft numbers are traded for free agents, could help with inference.

[15] According to Rottenberg (1956), "the process by which players are brought to the major leagues can be likened to that by which paying oil wells are brought in or patentable inventions discovered."

[16] In some European countries the contract length became freely negotiable only after the 1995 "Bosman decision," until which a player's old team could require a transfer fee from the new team even at the end of the contract.

known 4-5 years later. If transferable contracts become unenforceable, then players can be expected to gain more than will be the loss to owners and consumers; at the same time, the age distribution of players should move upwards.[17]

Entrepreneurship It may be useful to think of the market where entrepreneurs and venture capitalists meet as a market for entrepreneurial talent. This market can suffer from excess rents and mediocrity if two conditions are met. First, the success of a new firm should depend on the talent of its founding entrepreneur, of which relatively little is known until after his first project is financed. Second, entrepreneurs should be able to go on to found new companies later in their career, and the profits of these new firms cannot be claimed by the financiers of previous firms. In this case, much of the expected value of financing a start-up by a novice entrepreneur is not contractible, because it will accrue to the entrepreneur through profits of future projects. As a result, the investment decisions of venture capitalists do not take into account the value of information produced about the abilities of the entrepreneur, only the expected profits from the current project. There is too little investment into projects of inexperienced entrepreneurs, while too many mediocre entrepreneurs go on to found more companies. The mediocrities' new companies are profitable by expectation, but they are not as profitable as is the expected lifetime profitability of novice entrepreneurs' projects, taking into account that unsuccessful entrepreneurs will be filtered out of the market. Known entrepreneurial talent is artificially scarce, leading to excessive incomes for incumbent entrepreneurs.

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[17] In Terviö (2006), the institution of transfer fees in professional sports is analyzed as a solution to the mediocrity problem in the presence of heterogeneous jobs.

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