Talent Show$_s$

"The role of randomness in success and failure" revisited

Table of Contents

Abstract

In this paper I will, with an agent-based model in the statistical coding environment of RStudio, replicate and review the study "Talent vs Luck: the role of randomness in success and failure" (Pluchino, Biondo, & Rapisarda, 2018). In particular, it will offer a new conclusion, namely that randomness doesn't play as big role, as previously claimed. This paper shows 3 models: A RStudio replication of the original model, an expanded and more realistic version of the original model, and a version of the expanded model embedded into larger governing systems such as a welfare system. We find, unlike the previous study, that meritocracy has a much larger influence on the allocation of wealth compared to randomness, than previously shown, with talented agents winning forth in every rendering of the developed models.

Several future expansions of the model are discussed, under the understanding that a meta-analysis/systematic review would be needed for future parameter selection.

Essentially this exploratory study shows that the original articles question of "luck vs. talent" (Pluchino et al., 2018) might be the wrong question to ask. Instead one might ask: "What degree of wealth inequality can a society justify IRT meritocratic encouragement of talent?"

Paper Length

Total count of pages (2400 characters) including four figures made by me (counting 800 characters each (AU, n.d.)), excluding Titles, Table of Contents, Literature List, Abstract, Header, Footer & Appendix (AU, n.d.): **11.6**

Introduction

Our age is interesting. Steven Pinker and Bill Gates herald the decline of violence(Pinker, 2019) and the rise of third world nations (Gates, n.d.), but wealth inequality hasn't been this stark since the time of emperors. (Fig. 1)

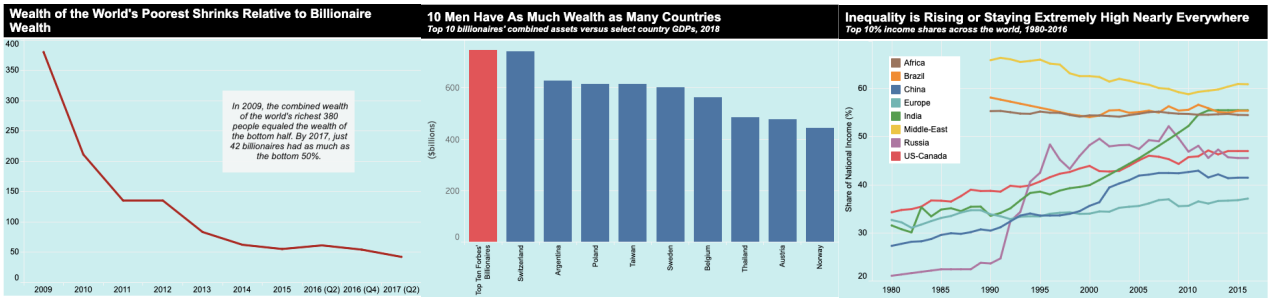

*Fig. 1 – **I**: Wealth of the world's poorest half compared to a number of most wealthy billionaires holding the same wealth (OXFAM, n.d.), **II**: Wealth of billionaires compared to countries (Forbes, n.d.)(IMF, n.d.) **III**: Global Inequality index* ("World Inequality Report 2018," n.d.)

One could and probably should be a bit worried about the effects this will have on the social fabric of our planet's many societies, but what I'm interested in exploring with this paper is what actually determines who gets to the top in these times of plenty? Gates himself is one of the richest men alive, and seem like a talented individual capable of stewardship. But do these character traits hold true for everyone at the top? Is everyone at the top also the most talented, wilful and intelligent? Do we really live in a meritocracy? This is exactly what the paper "Talent vs Luck"(Pluchino et al., 2018) looked into and refuted with a resounding "No":

"we suggest […] randomness. […] Almost never the most talented people reach the highest peaks of success, being overtaken by mediocre but sensibly luckier individuals" (Pluchino et al., 2018)

Reputable news sources(arXiv, n.d.; Kaufman, n.d.) instantly spread the claims to the world, and while I think the results will lead to well needed global conversations about future governance, I can't stop questioning the model setup.

The Original model (OM)

The paper reveals an agent-based model (ABM) illustrating the evolution of wealth acquisition in a population affected by talent and luck. The population is of a 1000 agents, each starting with 10 units of capital. Their talent is normally distributed from 0-1 with a mean of (.6) and a standard deviation of (.1). The population goes through 80 iterations in a 2D space (A work-life period of 40

years, assuming that the agent population get paid every half a year - “from the age of twenty to the age of sixty”(Pluchino et al., 2018)), each iteration leaving the agents with multiple chances of either a having good or a bad event happening to them - doubling or halving their total capital (Fig. 2). The only substantial constraint in the model is that if an agent gets lucky, the agent will have a random draw between 0 and 1, and only if the agent’s talent is higher, they get rewarded.

Fig. 2 - Example of the NetLogo ABM environment. Each agent is represented with a stickman, lucky events are represented by green circles and unlucky events by red. Elements follow a random trajectory. (Pluchino et al., 2018)

The result is that even though the agent population has a normal distribution of talent (Fig 3: I), the distribution of wealth looks more like a Pareto distribution (wiki, 2019), with few agents holding excessive amounts of wealth (Fig. 3: II). A distribution of capital across talent (Fig. 3: III) shows that the most talented people aren’t the ones with the most capital, but instead, a few averagely talented agents seem to have gotten forth with extreme luck.

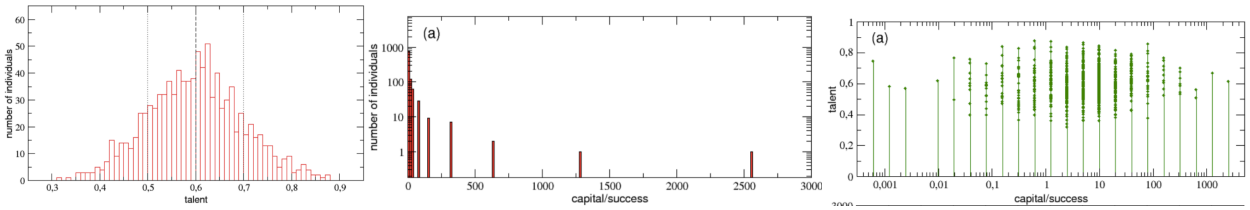

*Fig.3 - **I**: A normal distribution of talent. **II**: An Individual-Capital bar plot for the share of wealth after 80 iterations. **III**: A talent-Capital scatter plot from the original paper. (Pluchino et al., 2018)*

My Critique

First and foremost, the paper lacks a clear motivation for their methodology - e.g. why do they use a 2D space to render their agents? Moreover, the authors don’t provide a clear explanation of the parameter value selection - Why didn’t they try multiple levels of luck in the system, and what motivated them to choose this specific level of 250 lucky events (Green dots) and 250 unlucky events (Red dots)? (Fig. 2) Running simulations studies often require sober parameter-selection,

based on systematic reviews of the literature, or trying to validate the model by putting it up against real-world data. But in this study, there's no explanation given for how the model's setup relates to the real world, and the model results might as well have been built in from the get-go.

This Paper

The Original Model (OM) Revisited

In this paper, I'll first set out to replicate the OM in the RStudio statistical coding environment. Then I'll explore what happens when you adjust the unsubstantiated parameters of the OM – e.g. the number of events happening and the amounts of agents in the model.

The Revised Model (RM)

Next, I'll build a more realistic RM. I'll fix some core assumptions of the OM as well as introduce socioeconomic factors to ground the model more firmly in real-world data:

Escapable bad luck

One assumption of the OM that I find unwarranted, is that talent has an influence on the agent's likelihood of getting something good out of a good event, while bad events are unescapable. The reason for this decision is left unjustified. (Pluchino et al., 2018). Therefore, I'll remake the parameter for bad luck so that agent's ability to escape bad events also depends on talent.

Return on luck

Next step is to make talent influence the return on luck. As for now the nature of luck has been equal for all agents, but this seems unrealistic when 'Talent' is to be synonymous with "Intelligence, skills, smartness, efforts, wilfulness" as stated in the original paper (Pluchino et al., 2018). Therefore, I'll adjust the outcome of events, both good and bad, based on an agent's talent.

Paychecks and Interest Rates

So far, the RM relies heavily on luck, as if nothing happens to an agent's capital if there isn't an event. But in reality, people and capital don't just sit around. People have a regular income and capital most likely earns interest. So, the third change to the RM is to add two new parameters - **W** for wage and **R** for interest rate.

Poor Tax

The last parameter I'll add to the RM is **P** for Poor Tax. Poor Tax is the real-world phenomena of poor people staying poor because they over the long run have to pay more for goods and services, as they can't buy in bulk, buy quality, invest in health etc.

A phenomenon summed up well by the Author Terry Pratchett:

"A man who could afford fifty dollars had a pair of boots that'd still be keeping his feet dry in ten years' time, while a poor man who could only afford cheap boots would have spent a hundred dollars on boots in the same time and would still have wet feet." — **Terry Pratchett,** Men at Arms

The parameter **P** adds social realism to the model and is motivated by a recent OECD report(OECD, n.d.) stating that there's a "*lack of mobility at the bottom […] of the social ladder*" for most industrialised countries.

The Governed models

The last intervention of this paper is to embed the agent population in governing systems. No man is an island (Martin, n.d.), and neither should the agents in this model be. In specific I will include a welfare system, as well as capitalism into the model.

Welfare systems

In particular the welfare system is being incorporated in the form of two models: One **wealth-distribution** model (**WD**) with a progressive tax ranging from 0-50%[1] of capital earnings for the whole agent population, with everything being redistributed equally to all agents. Another, the **universal basic income** model (**UBI**), also with a progressive tax range, but where only 85% of the tax income gets redistributed back to the population, as a flat UBI is also given out[2]. The flat UBI is set to 10 (same as the starting capital), which make the UBI operate as an "investment" from the state at the beginning of the model's runtime. (See model A13-15 in the appendix) This becomes a

[1] The discretionary choice of a Tax level ranging from 0-50%, as well as the cooperate tax of 20 percent, were based in finding a median maximum and minimum income tax as well as a median corporate tax, amongst all the developed countries of the world (wiki, 2019)

[2] UBI is hard to compute, as it haven't been implemented at full scale anywhere in the world, but serious attempts have been made quantify the costs of UBI, with one such estimate being around "15%" of overall federal spending. (Widerquist, 2017)

progressively lesser share of the total tax-revenue as the total capital of the model develops, which functions as paying the state on its "investment"[3].

Capitalism

Capitalism works by taking the 40%[4] of the capital gains at each time-step, from the bottom 80% of the population and redistributing it to the top 20%, mimicking the Pareto principle.[5] Moreover, both the **WD** and **UBI** model puts a 20%[1] corporate tax on capitalism, as rich agents are now set up to benefit from the lower 80% as production-owners and can also be expected to pay taxes.

Motivation

These superstructures govern the means to ownership of production for profit in the real world, and in the ABM, this equals to the means to produce capital. Inferring these systems on the model not only makes the model more realistic, but is also motivated by the growing need to model the societal effects of different tax-schemes and tax-subsidies (Piper, 2019; Porter, 2019), as well as model systematic inequalities dependent on e.g. the labour-share[6], which has dropped in recent years for most OECD countries. (see Fig. 4) (*The-Labour-Share-in-G20-Economies.pdf*, n.d.)("The labour share of the national income," 2018).

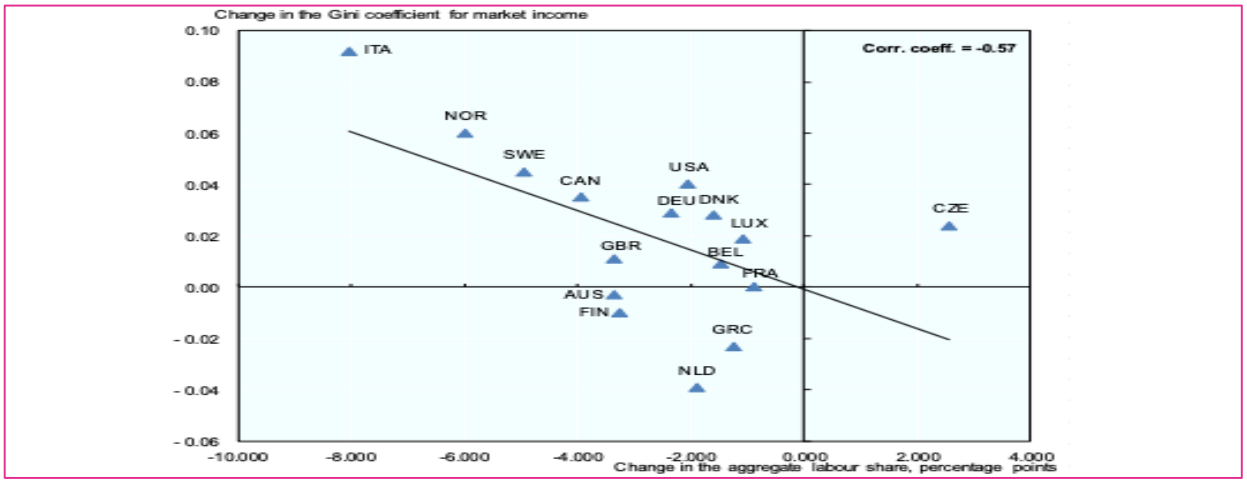

Fig. 4 – Change in Gini coefficient compared to changes in the labour share in OECD countries, the 1990s to mid-2000s (The-Labour-Share-in-G20-Economies.pdf, n.d.)

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[3] This was to allow modelling of a different type of welfare distribution than in %, which was used in the **WD** model.

[4] The 40% is based on a global average of labour share of G20 countries (*The-Labour-Share-in-G20-Economies.pdf*)

[5] The Pareto Principle was also used extensively as a guiding light in the original article.

[6] The labour share, indicates the percentage of production of profit goes to wages, salaries before taxes and employers' social contributions.(*laborshare.pdf*, n.d.)

Including governing structures will also enable the final model to be compared more specifically to societies (e.g. tax rates in Denmark) and thereby hold much more general predictive power than the OM.

Note:

For now, there exists no meta-analysis or systematic review on which parameters to include in such models as these. But with the aim of reengineering the OM, I've found these key parameters, listed above, to be essential throughout the literature (Bouchaud & Mezard, 2000; Dragulescu & Yakovenko, 2000; Düring, Georgiou, & Scalas, 2016; Persson & Tabellini, 2002; "Robert Reich," n.d.). I set out to revise the OM in a top-down fashion, looking at societies biggest compositional subsystems (e.g. wages and redistribution), leveraging real-world data from big databases whenever possible to ground the modelling. (OECD, n.d.) Moreover, from a typological standpoint, I've revised the parameters of the OM that seemed arbitrary and unsubstantiated (E.g. not being able to escape from bad luck). Baseless parameters such as different Event_likelihoods are moreover left non-settled as to not skew results (See final model in Fig. 8). (Max Weber, n.d.)

GitHub

Additionally, all codes used in the model setups are available with annotations on my GitHub https://github.com/sebsebar/Alouishes/blob/master/Social%20And%20Cultural%20Exam%20ABM%20-%20Sebastian%20Scott%20Engen.Rmd

The hypothesis' investigated in this paper:

H0: The claims of the article "Talent vs Luck"(Pluchino et al., 2018) does not endure under review.

H1: Meritocracy plays an exceedingly high role in a revised version of the model from "Talent vs Luck" (Pluchino et al., 2018).

H2: The degree of Inequality and meritocracy both change under the presence of redistribution mechanisms.

The Orginal Model (OM

Setup

Rather than using NetLogo to simulate the evolution of wealth acquisition, I decided to use the RStudio environment. The OM had three parameters, and so does this replication: **N**: Number of agents, **timemax**: How many time-steps the model runs, **Event_Likelihood**: the probability for an event to happen.

I switched the Red and Green dots random movement in the 2D space (See Fig. 2) for random coin-flipping using the Bernoulli process(wiki, 2019). This made it easy to quantify the luck in the system as I were now able to choose multiple values for the parameter **Event_Likelihood**. As an example, setting **Event_Likelihood** to (.5), would mean that an event happens approx. every second time-step - in other words: Once a year in the system.

Results

Recreating the plot, **I** & **II** from Fig.3 in RStudio, we see the exact same spread (See Appendix Fig.A1), but recreating plot **III** we find something curious (See Fig. 5).

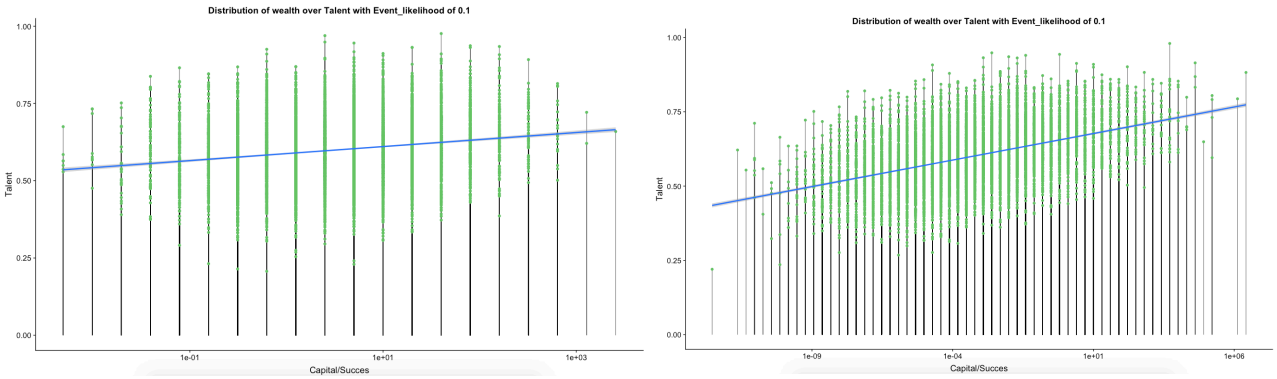

*Fig. 5 – **I**: Distribution of wealth over Talent with **Event_likelihood** of (.1), **II**: Distribution of wealth over Talent with **Event_likelihood** of (.9).*

As we raise the likelihood of an event from ones every 5 years (**Event_likelihood** (.1)) to almost every half a year (**Event_likelihood** (.9)), as well as raising the population size by a factor of 10, we find a positive trend for meritocracy. Plot **I** in Fig. 5 shows a similar spread to the plot from the original study, but plot **II**, where events happen more often, shows us that the results from the original study had more to do with the small population size, low frequency of events, and the

effects of a normal distributions low frequency of highly talented individuals, than with randomness. Therefore, H0 is confirmed, as this review shows a greater impact of meritocracy.

Onwards

Before starting to explore the RE, I will lay out how we can evaluate future model plots. Looking at Fig.6 we can get an idea at how to evaluate future models. Seeing a wide clustering of data points within each talent level means that the model is more luck-based and therefore less meritocratic. A Wider distribution across the Capital/Success axis means that we see a high economic Inequality, as some have a lot and some very little – on this note I find it wise to add that U should bear in mind that all plots will have Capital/Success on a logarithmic scale, which is to make outliers comparable. A Positive correlation as manifest in the slope is an indication of the model being more Meritocratic.

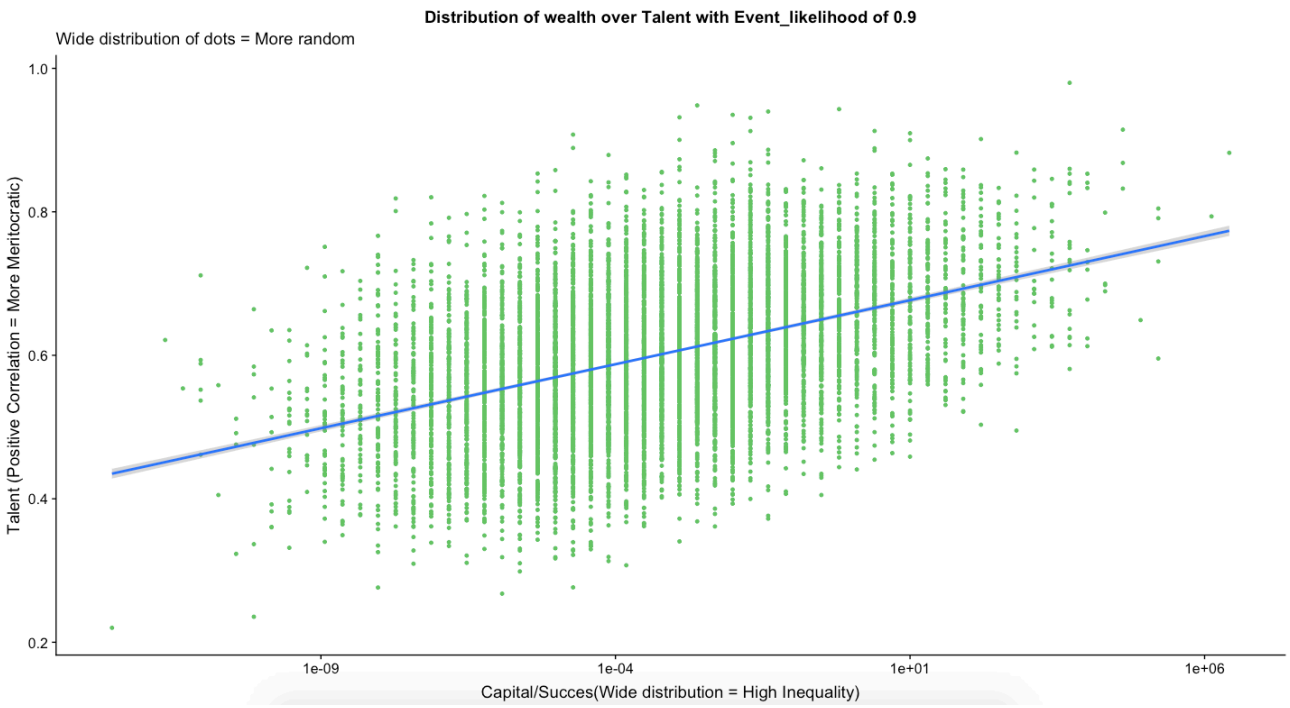

*Fig. 6 – Distribution of wealth over Talent with **Event_likelihood** of (.9), showcasing how to read future plots.*

The Revised Model

Setup

Escapable Bad Luck

This feature was implemented by using the same random draw function, as was used for good events.[7]

Return on luck

This feature was implemented by switching the doubling/halving for a dynamic function. If an agent got lucky, the function multiplied the agent's capital by the agent's talent level plus one, and if the agent got a bad event, the function would multiply the agent's capital by the level of talent. As an example:

Good event: Capital = 10*((.8)+1) = 18

Bad event: Capital = 10*(.2) = 2

Paychecks & Interest Rates

The parameter **W** for wage adds a specific wage-constant to the capital of all agents at every time-step. But also, to allow for the concept of meritocracy, **w** is multiplied by the level of talent, such that if **W** is 1:

Talented agent's wage = 1*(.8) = (.8)

Untalented agent's wage = 1*(.4) = (.4)

R for interest rate is added at every time-step by multiplying with the agent's capital plus 1. With an **R** of 0.05 and a Capital of 10, it would look like this:

Capital after **R**: 10*1.05 = 10.5

Both **W** and **R** happen at each time-step before events occurred.

Poor Tax

The parameter of Poor Tax **P** is set as a regressive tax for the bottom half of the agents. When an agent falls into the lower half, its capital will be adjusted by a tax-range. E.g. Setting **P** to (.001 - .01) means that the poorest agent will lose 1% of their capital at that timestamp, whilst the agent who just entered the bottom half has a **P** of (.1) and will lose 1/10th of a percent of its capital.

[7] See GitHub for codes with annotations.

Results

Escapable Bad Luck

With this feature added, the agents have less frequent encounters with bad events, which means more capital overall (wider spread on Capital/Success axis) and a bigger effect of talent (Steeper slope). (See Fig. A2 in the appendix)

Return on luck

With talent influencing the return on luck, then as the **Event_Likelihood** gets bigger, the less talented agents are more heavily influenced by bad events and the economic inequality goes up (wider spread on Capital/Success axis), while talent renders a bigger relative effect (Steeper slope). (See Fig. A3 in the appendix)

Paychecks & Interest Rates

In the appendix, Figure A4 showcases what happens to the spread of wealth at different **W** values as well as what happens to the spread compared to the model without a set wage. The outcome of adding a **W** to the model is first and foremost renders a stable increase of capital in the system[8]. Moreover, we find that untalented individuals are able to recover more easily, as **W** protects them bad luck (less spread on Capital/Success axis). Moving on, we'll leave the wage at the conservative level of 1[9].

In the appendix, Figure A5 shows what happens to the spread of capital at different **R** values as well as what happens compared to the model with only **W** added. The outcome of adding **R** to the model is first and foremost, like with wages, that there is a stable increase of wealth in the system. Moreover, we find a higher degree of inequality in the system, (wider spread on Capital/Success axis). This is due to the fact that while the poor agent's capital is more influenced by the wages, the richer agents can more easily leverage the effects of compounding. Moving on, we'll leave the interest rate at the conservative level of 0.05^2.

[8] I will return to the inflationary consequences of this in the discussion

[9] Setting the **W** to 1, **R** to 0.05, as well as **P** to (.001 - .01) can be considered conservative, as it is the smallest number that renders visible change in the plots at the median **Event_likelihood** of (.1), which is the **Event_likelihood** we'll focus mostly on in this paper, as there's not enough room to include all models (See Appendix for more).

Poor Tax

The outcome of adding **P** to the model is first and foremost, that the very poor people get poorer, and thereby giving the bottom half of agents a harder and harder time escaping poverty and reaching a capital level that makes interest rates fortunate. We see the capital Inequality rise (wider spread on Capital/Success axis), which works against the paycheck's enabling of recovery from poverty (see Fig. A6 in the appendix). Moving on, we'll leave the **Poor Tax** at the conservative level of (0.001 - .01)[9].

Old vs. New

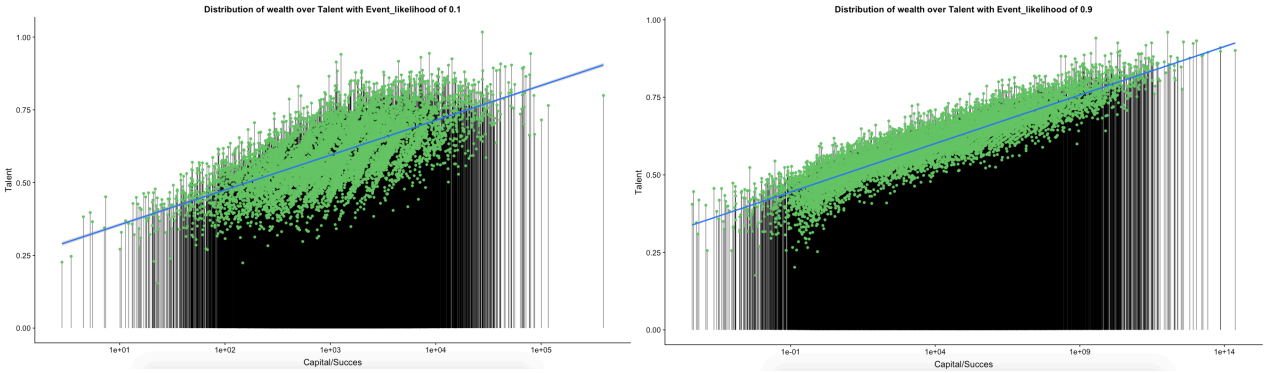

*Fig. 7 – **I**: Distribution of wealth over Talent with **Event_likelihood** of (.1), **II**: Distribution of wealth over Talent with **Event_likelihood** of (.9).*

Plotting the final revised model, we see that the merits of talent become prevalent. Comparing Fig.5 to Fig.7 (See Fig. 6 for help) we see that there's a steeper slope favouring a more meritocratic agent world. The clustering of agents also become more close-knit, especially in the condition with an **Event_likelihood** of (.9), meaning that there's less randomness in how well off different agents end up. The Inequality has also scaled up, both **W** and **R** put money into the system and this model puts these money in the hands of the talented few.

All in all, H1 was confirmed, as meritocracy indeed plays an exceedingly high role in a revised version of the OM.

The Governed models

Setup

Welfare system

Computing the progressive tax rates is done by z-scoring every agent based on their capital, before calculating the cumulative probability of each of these z-scores. E.g. taking the **tax_range** (.0 (0%) – .5 (50%)), the 90% richest agent will have a tax level of ((.9) *(.5) = (.45) = 45%), whilst the 10% poorest agent's tax will be ((.1) *(.5) = (.05) = 5%).

Essentially, take the cumulative probability and multiply it by the upper limit in the **tax_range**.

Capitalism

Finding the 80% poorest and 20% richest in the population for the Capitalism function also uses the cumulative probability based on z-scores. But instead of having a progressive wage share taken away, a flat rate of 40%[3] is taken.

Sanity Check

The final models are simulated 5 times each to make sure distributions do not vary substantially across renderings. (Se appendix Fig. A17-19)

Results

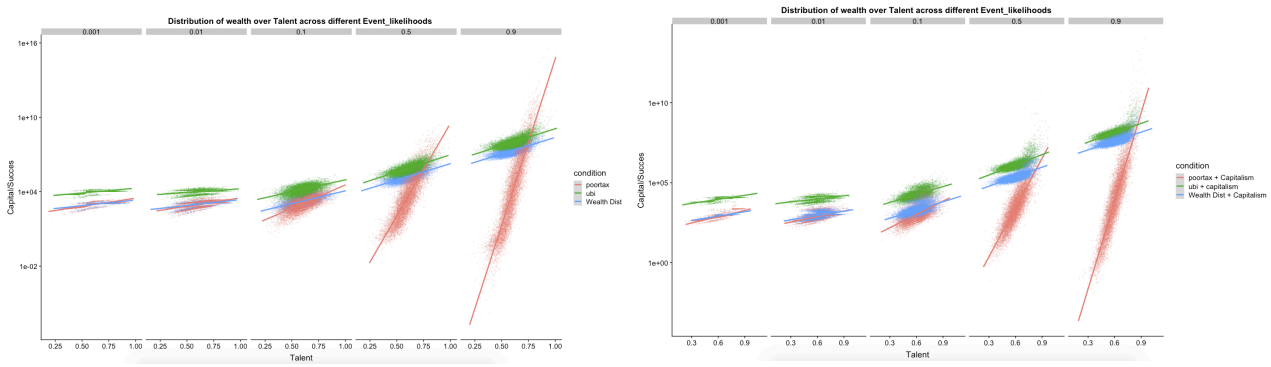

*Fig. 8 – **I**: Distribution of wealth over Talent across different Event_likelihoods, for the two welfare models and the revised model, **II**: Model **I** with capitalism added – **The final models**.*

Welfare system

The first noticeable aspect of Fig.8 is that both tax models vastly diminish the effects of capital inequality as more is redistributed (less spread on Capital/Success axis). The meritocratic aspects of the welfare models are preserved and very similar to the revised model when the likelihood of events is low, but when events are more likely they preserve a slightly meritocratic society compared to the ultra-meritocratic version present in the RM without redistribution systems (Steepness of slope).

Capitalism

Adding capitalism to the system means that it matters if an agent is above or below the 20% richest in the population, which we can see with the greater scatter amongst highly talented agents in the Event_likelihood (.9) scenario. (Compare Fig 8., plot **II** to **I**)

Looking at the Max, Min and Median capital (Fig A16 in the appendix) we can compare the redistribution benefits of the two welfare models. With the median, as an indicator for the middle-class in the agent population, the **UBI** model has a less unequal population when **Event_Likelihood** is at (.1), with the richest agent only having 14 times more wealth than the median, compared to the **WD** model's 24 times. This is likely due to the UBI effects on interest rates, as the "middle class" agents are gaining wealth equally fast to the rich at the beginning where the UBI is high relative to the starting capital. (This can be seen on the growth and GDP plots in Fig. A13-15 in the appendix) However, when **Event_likelihood** is set to (.9), the **WD** model's riches agent is only 814 times richer than the median, compared to the **UBI** models 909 times. This effect is likely due to

the high "real" distribution in the **WD** model. While the **UBI** wins out in equality when events are happening at a low frequency, the inflationary effect of having many events in an agent society makes percentage-wise redistribution more effective than a flat unchanging UBI amount[3].
Putting capitalism on the revised model, (See Fig. A16 in the appendix) we end up with vastly more economic inequality, with the richest agent having 194 times more capital than the median agent when **Event_likelihood** is (.1), and 40 billion times more when it's (.9).

Another way to quantify the effects of redistribution is to follow lucky and unlucky agents in the different models. (See appendix Fig. A9-12)
In the final **WD** and **UBI** model with capitalism, we see that the luckiest untalented and the unluckiest talented people reach approx. the same level of capital, whereas the talented and lucky, still win out by a large margin, though to a much lesser degree than if no wealth distribution was in place, as can be seen with the RM with capitalism, where luck plays a massive role for the talented. (Fig. A12) Here we again see, as discussed earlier, that it matters a great deal if the talented falls in the category of being the 20% richest or not.
All in all, H2 was confirmed, as the degree of Inequality and meritocracy, both vary greatly under the presence of redistribution mechanisms.

Discussion

First and foremost, it must be noted that this study is exploratory in nature. Synthesizing parameters in a top-down manner by looking at key dimensions in the literature(Bouchaud & Mezard, 2000; Dragulescu & Yakovenko, 2000; Düring et al., 2016; Persson & Tabellini, 2002; "Robert Reich," n.d.) as well as leveraging big databases such as the OECD(OECD, n.d.), is good, but the next step would be to do a systematic review - to more critically appraise research studies and find the best parameters.

Leaving this aside When evaluating the final models it becomes apparent that they have crucial difference to the OM (Pluchino et al., 2018). By manipulating the number of events that happen in the system, we are in part manipulating how good the talented will fair, as their talent affects both their chance of getting a good outcome of events, but also the amount of capital to be made from each lucky event. One way of countering this mechanism favouring the talented ad-infinitum is to let luck be modulated by capital as well, in other words; let the rich get luckier[10], which seem intuitively acceptable, but would have to be researched.

Another quality of the OM that has been exaggerated, now that the final models add both wages, interest rates, UBI and redistribution mechanisms to the system, is that of inflation, which I've also hinted at throughout the paper. Since the mean of talent is centred around (.6) on a scale from 0 to 1, and not (.5)[11], then having agents luck depend on talent makes for inflationary results. Especially because the doubling of capital, means that those untalented who lose a lot, loose relatively little, while those talented who win a lot, win big. This seems to inflate the sum of the capital of the most talented population in a more straightforward way that could be argued for in real life. One should therefore remain sceptical when looking at the models, as to what frequency of events that are chosen.

[10] Codes for such a model can be found at the bottom of my GitHub but was a level too deep to bring forth in this study.

[11] This feature was copied from the original paper, but the authors never justified this decision. (Pluchino, Biondo, & Rapisarda, 2018)

What must also be noted is that both the wages, interest rates and UBI are all conservative exemplary values of 1, 0.05 and 10^9. In the future, these values should and could be adjusted to a specific society (e.g. Denmark) for a more realistic rendering of the models. Given these as well as tax-rates, one could, in essence, use real-world data of a specific country to calculate the rate of events happening in a population – In other words, one could use these parameters to estimate the **Event_likelihood**.

Staying with the parameter **Event_likelihood**, one could also take look at the timing of events. Given that the model is built on an assumption of a 40-year work-life, do agents then benefit more from events happening in their 20's compared to their 50's? Modelling this would enable one to investigate different ways of protecting the **elderly** in the population from unlucky events, as well as seed the ground for investigating both the effects of **inheritance** and different **lifespans** – e.g. do rich people living longer?

Beyond time, other key dimensions that could have been included in this model, but wasn't due to limited space, could be **debt**, **loans** and **bankruptcy**. What would happen to the Economic spread of wealth if individuals could go bankrupt, take loans before an event happened or be in debt to the richer people in the economy? These parameters are all vital to the real economy, and as the model is built right now, it doesn't account for any of them.

Another parameter that could be interesting to look at is that of the pay check, which in this model is only wavered by talent. In the real world, you can be highly intelligent, but still end up in a low-paying job. It could be interesting to expand on the model with **Unequal starting points**, and let luck influence the pay check to a higher or lower degree dependent on whether the agent started with little or a lot. This could give a better glimpse into the actual nature of coming from a low-income background, and give counterweight to the present models overemphasises of the role of talent.[12]

[12] Codes for such a model of unequal starting points can be found at the bottom of my GitHub but was a level too deep to bring forth in this study.

Having built the system of both a welfare state and capitalism, it could be interesting to look at the dynamics between the two. What role do **Subsidies** and **Tax-loopholes** play in creating an equal society? **Antitrust**, could also be applied to the model to "break up" the capital of agents, who have accumulated too much wealth and power.

A last interesting parameter for future models, that doesn't come directly from a systematic review, could be to add **running costs** to both the welfare system and rich agents. This would again create a more realistic model, but also be able to tell us about the impacts of highly efficient and **autonomous workforce** with low running costs compared to the high workforce cost of people. This would be interesting as the field of BIG data is looking to outdo humans in most sectors, creating a completely new economic environment.

Conclusive remarks

All in all, it seems the original article's statement:
"we suggest […] randomness. […] Almost never the most talented people reach the highest peaks of success, being overtaken by mediocre but sensibly luckier individuals" (Pluchino et al., 2018) was merely an artefact of a model with too low a frequency of events and too small a population size for the highly talented people to show their strengths - H0 was confirmed.
Also, H1 was confirmed, as the revised model with more key parameters showed a great increase in meritocracy compared to the OM – One could say:

Talent Show$_S$

Also, H2 was confirmed, as redistribution mechanisms also seemed to matter to the wealth equality of the system, as it opposed the accumulation of capital at the top, inherent to the meritocracy. The degree of meritocracy in fact showed inversely proportional to wealth equality.

Essentially this exploratory study shows that the original articles question of "luck vs. talent" (Pluchino et al., 2018) might be the wrong question to ask. Instead one might ask: "What degree of wealth inequality can a society justify IRT meritocracy's encouragement of talent?"
Or one could question the underlying assumption of how much benefit the whole of society gets from having the few talented succeed? Especially in times where robots threaten to take the working class's jobs away. (Porter, 2019; Trickle-Down Wiki, 2019)

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