

It is a real pleasure to be here at Starmus. I go to many conferences, but Starmus is really a unique event that brings together both the sciences, the arts, and now the social sciences. I think I have learned more from this conference than many others I have attended. Certainly, I have learned more about infinity and space, as well as many other topics.

I want to take this opportunity to pay tribute to Stephen Hawking who has been an inspiration in so many ways to so many people around the world. I had the fortune of beginning my career in research at Gonville and Caius College in Cambridge where he was just beginning his career as a physicist and astrophysicist. I have memories of many moments of those years, and since the talk yesterday, I've been trying to locate the cells in my brain where they're stored, but I haven't been able to do that precisely.

I believe I was given the duty to bring the discussion back here to Earth. There has been a lot of discussion of optimism and there is grounds for optimism; the fact that we have broken so many frontiers of knowledge in recent decades. Two hundred years ago, most people had to spend almost all of their time working to make the basic necessities of life. Today, we spend a relatively few hours a week meeting the basic necessities of life. Now, one can spend

time having the kind of discussions that we are having at this conference.

But while the discussions in the last couple of days have struck a very upbeat, positive note, economics is known as the dismal science. Therefore, it would be wrong for me to not fulfil the role of the dismal economist.

Unfortunately, there is an awful lot to be dismal about. In Europe, there is the problem of Brexit. In the United States, we have the problem of Trump. At a more fundamental level, as we heard during a discussion yesterday, there is the problem of climate change. And while he ended his talk yesterday on an optimistic note, the unfortunate thing is that there are a large number of climate deniers in the United States, and almost a whole political party of climate deniers. One of the people in the White House described his job as daily re-litigating the Enlightenment because the acceptance of the basic principles of science are constantly being questioned.

There are many sources of concern, but I am going to focus on the growing inequality in most countries around the world.

The question I will address in my talk is: Is this growing inequality a result of the laws of nature or the laws of man? Moreover, is it the result of the basic workings of the market, which is a particular institution for organizing our society and the economy? In other words, is growing inequality an inevitable, if unpleasant, side effect of progress? Or is it the result of how we have structured markets, of how we have changed the rules of the game in our market economy, in some cases undermining the efficiency of the economy? Is it because there are some underlying forces creating more inequality and we just have not done enough to counter the forces? Or is it because rather than trying to stand against the tide, we have reinforced the effects of nature and we are creating more and more inequality?

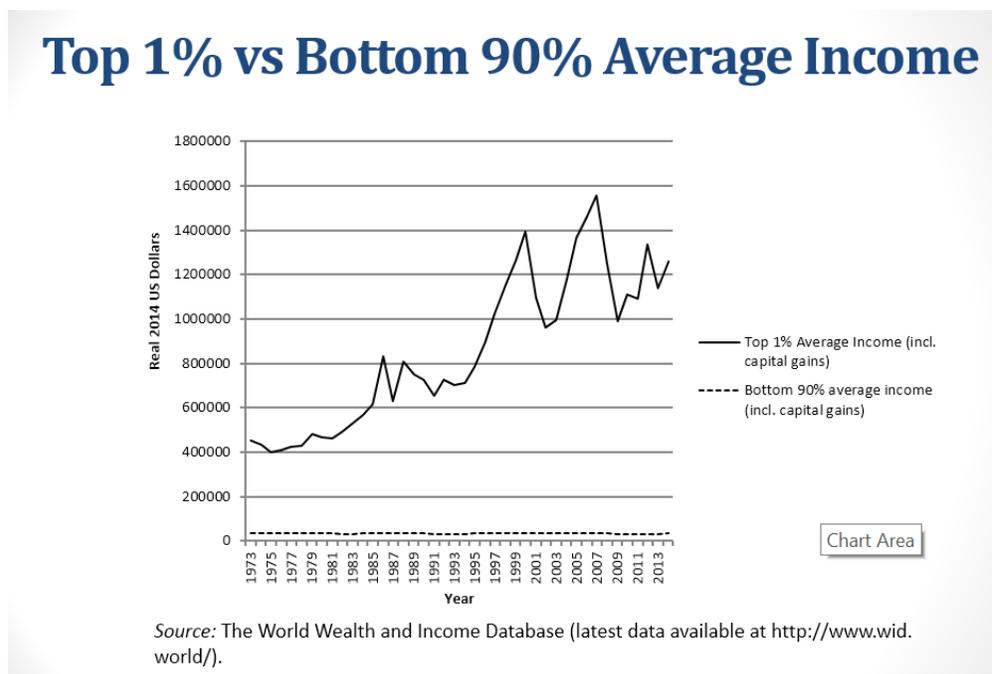
The central thesis of this lecture is that this growing inequality is largely the result of the laws of man, the result of how we structure the market economy and how we have restructured it in the last third of a century. With that in mind, I argue that inequality has been a choice and, of course, not a choice that we individually have made, but a choice that we collectively have made through our political system.

Unfortunately, our political system has often exhibited what might be called a democratic deficit. What we have done has resulted not only in more inequality, but in lower growth, more instability, and lower overall economic performance including extensive environmental destruction.

I am now going to go back to the beginning and describe some of the changes in inequality that have been happening around the world. I will focus on the United States, because the United States does things bigger and better than any other country— including creating more inequality. We are the number one country among all the advanced countries in creating inequality. There are many countries that are emulating the American model. Those countries that have done so have achieved, or are striving to reach, almost as much inequality as the US. If they keep working at it, they will achieve that goal.

Before turning to the question of how we understand the growth of this inequality, I would like to begin with a description. Describing inequality is like describing a probability distribution— there is no single number that can describe it. Instead, what we talk about is that there is more money at the top, there are more people in

poverty at the bottom, and there has been an evisceration of the middle.



This chart illustrates some of what is going on. The squiggly line at the bottom of the chart represents what has happened to the bottom 90 percent in the last 40-some years. If it looks like the line has not moved, that is because it has not moved very much. In short, there is stagnation at the bottom – not just the bottom of the bottom, but the bottom 90 percent. The other curve that goes up and up and up is the top one percent and, of course, they have done very, very well. This pattern is shared across many other countries.

Just like in physics, there have been a lot of advances in economics thanks to new ways of measurement and the power of computation. We have access to new data sources that give us a

fuller picture of what is going on in inequality. This chart is based on some of those richer datasets.

The chart illustrates what I said before; that the United States has the most inequality. However, this dataset does not include capital gains, which is one of the more important sources of income for the top one percent. If you include capital gains, then the top one percent gets 20-25 percent of all income.

CEO salaries perhaps provide the best example of inequality. They have risen to more than 300 times that of the average worker. That is an increase of more than tenfold in recent decades, and not because American CEOs have suddenly gotten more productive than their colleagues in other countries, but because they figured out how to better take advantage of the system.

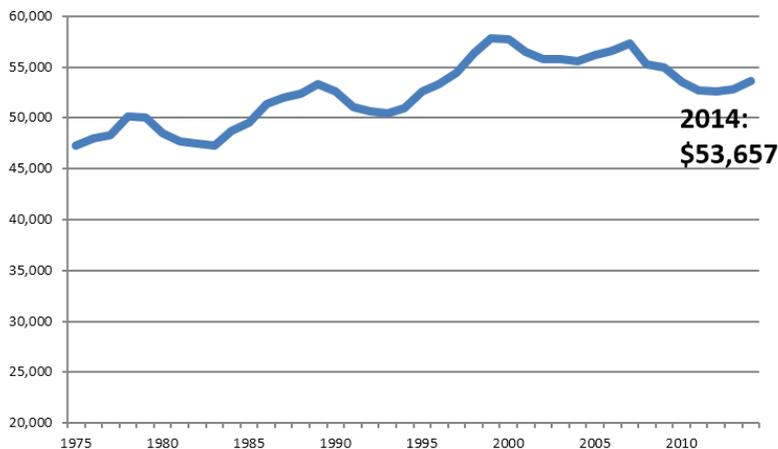
The one event that brought this home most forcefully was the 2008 crisis where the bankers walked off with major bonuses even as they brought their firms and the global economy to the brink of ruin.

An important aspect of this example is that it undermined the standard theory that prevailed for some 200 years in economics;

that compensation in a market economy is based on marginal social contributions on marginal productivity. That theory has been undermined by lots of other evidence, different from this dramatic example that will be addressed later on.

If those at the top were doing very well by creating jobs and making innovations that everybody else benefited from, it would not be so bad because as their incomes rose, so would the incomes of everybody else in society. However, what is actually happening is that their incomes are going up, but to a large extent at the expense of others.

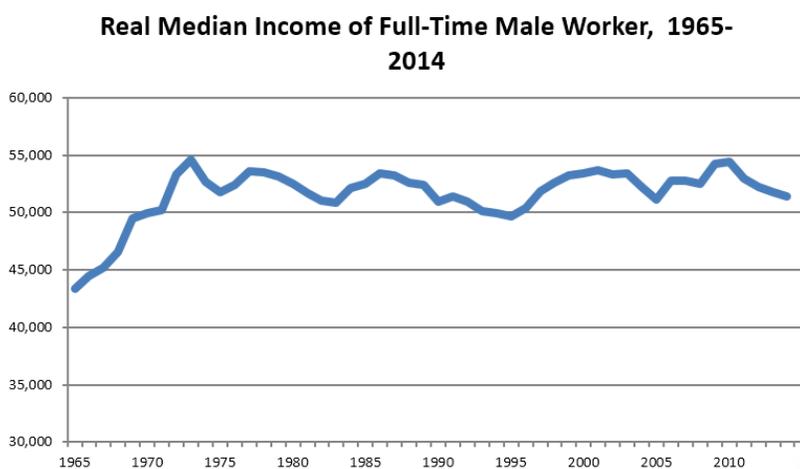
Stagnation: U.S. median household income (constant 2014 US\$)



Source: U.S. Census Bureau

Here you see what has happened in the middle of the United States: median household income (half are above, half below) adjusted for inflation today is lower than it was almost a quarter century ago. Of course, this is an average of incomes of various groups from different locations. If you look at various demographic groups, it comes out worse in some groups and better in others. One important demographic group is men. If we look at the income of full-time male workers in the middle, their income today is lower than it was 40-some years ago.

Decline in median income of full-time male worker



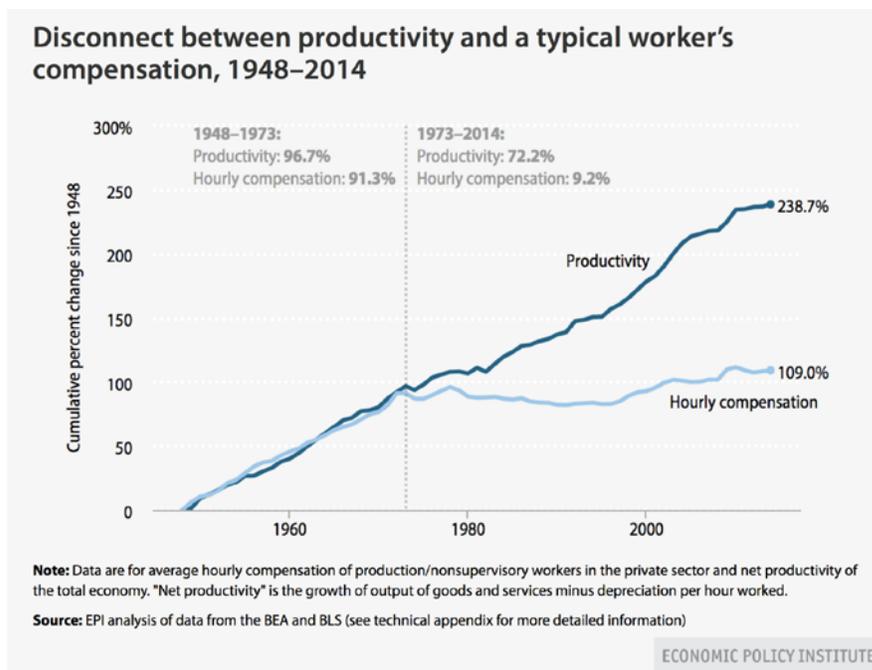
This one chart provides a lot of explanation and insight into what is going on today. People want to know why there are so many people supporting Trump, why there are so many people, men particularly, who seem so angry? Everybody has been told that

each generation is going to be better than the next. However, now we have had two generations of stagnation, two generations where incomes have not increased, and in many cases, have declined.

At the bottom, things are even worse. If you look at the wages at the bottom, adjusted for inflation, in the United States today, they are actually roughly at the same level that they were 60 years ago.



An economic system that does not deliver for a large fraction of the society, for a majority of their citizens, one that leaves living standards stagnant, is a failed economic system. So, the question I am going to address is, what happened to make it fail?



It is not because workers stopped getting more productive. If you look at this chart, it shows the increase in productivity over the last 70 years. What the dark blue line shows is that productivity has continued to grow at a fairly steady rate. In the period before the mid-'70s, you see wages and compensation tracking productivity. Historically, and in most economies around the world, wages track productivity. Suddenly, in the mid-'70s and beginning of the '80s, that pattern broke. And while productivity continued to grow, compensation for workers stagnated. And, of course, that meant that all the difference was going into profits.

Before coming to a broader interpretation of what is going on, I want to emphasize that income is just one dimension of inequality.

There are many other dimensions of inequality like health and access to health care which is of particular concern in the United States where we do not recognize access to health care as a basic right.

One of the striking results that came out of a study by Case and Deaton (Angus Deaton just got the Nobel Prize in economics this December), is that white, middle-aged males who had not gone to college were having a decline in their life expectancy.

The only other time that I have seen anything similar was at the time of the dissolution of the Soviet Union. We had income data that suggested that things weren't going very well. GDP was going down. It looked like it was going down by a third, but we weren't confident that our data was right. However, when we started getting demographic data saying that life expectancy in Russia was going down by a couple of years when that of the rest of the world was going up, it was apparent that there was something significant going on.

When you look more closely at what's going on in the United States, to a very large extent, the decrease in life expectancy is a

result of drugs, suicide, and alcoholism. These social diseases correspond to the picture I showed earlier of the income stagnation, particularly of middle-class males.

Another aspect of inequality in the United States are attempts at disenfranchisement of the poor, Hispanics, and African Americans.

Access to justice is still another dimension of inequality. In the United States, we have this program of mass incarceration. While the United States has four percent of the world's population, we have about 25 percent of the world's prisoners, who are disproportionately African American. In the Great Recession, we were throwing poor people out of their homes who didn't owe any money. There was no access to justice for these individuals.

We also have inequality of wealth, which is much greater than inequality of income. A couple pictures and statistics give an overview: 62 individuals own as much wealth around the world as the bottom half.

Every year at the meeting in Davos, Oxfam releases a report that asks what bus size is needed to fit the people who have as much wealth as the bottom 50 percent. Many of those people are there at

Davos. When they first began doing this about four years ago, the bus was a moderately sized bus of about 88 people. Then last year, it was down to just 62 people. So we're getting very efficient in the production of inequality.

In the United States, we have a similar picture where two families, the Walton family and the Koch brothers (both of whom inherited their money so it was not as a result of hard work that they got where they are), have as much wealth as the bottom 44 percent of the country. This example is testimony both to how much wealth there is in these few people at the top, but also how little wealth there is at the bottom.

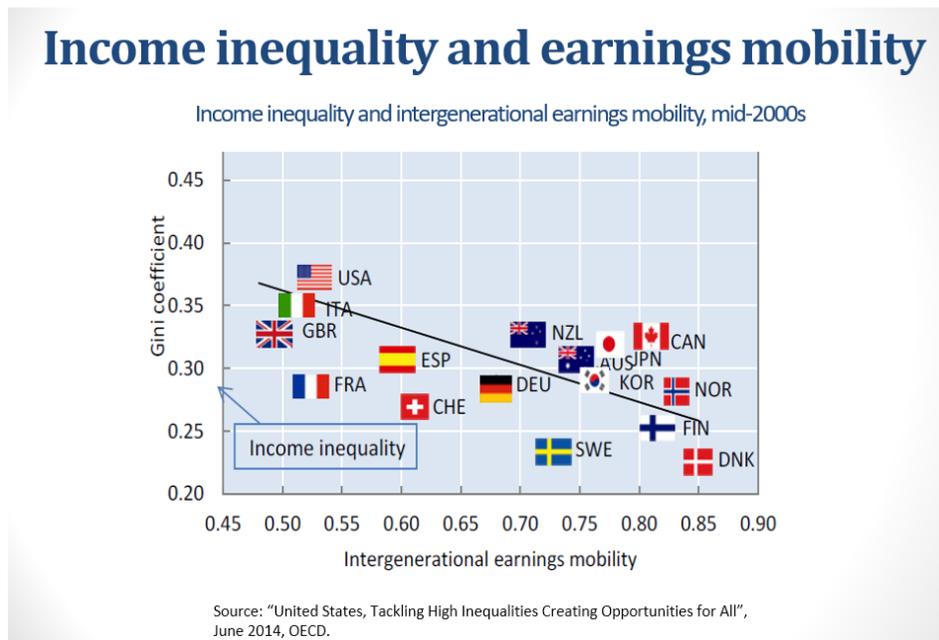
Of all the different aspects of inequality, the one that I think is the most invidious is the inequality of opportunity. Americans like to think of themselves as living in the land of opportunity. Others too like to think of the United States as the land of opportunity.

Everybody knows somebody who made it from the bottom to the top. The newspapers celebrate those people, but the fact that newspapers are writing about them should tell you something.

Newspapers only write about things that are unusual. The fact that they are writing about it is itself evidence that it is unusual.

It is not that somebody could not possibly make it from the bottom to the top. Rather, what social scientists mean by equality of opportunity is, what are the life chances? What are the life prospects? What are the probabilities?

The basic result is that America is among the advanced countries with the least opportunity. In other words, the life prospects of a young American are more dependent on the income and education of his or her parents than they are in other advanced countries. In many ways, this is not a surprise. When you have a lot of inequality, the rungs of the ladder are further apart. Access to quality education becomes more difficult, so the ability to move up becomes more difficult.



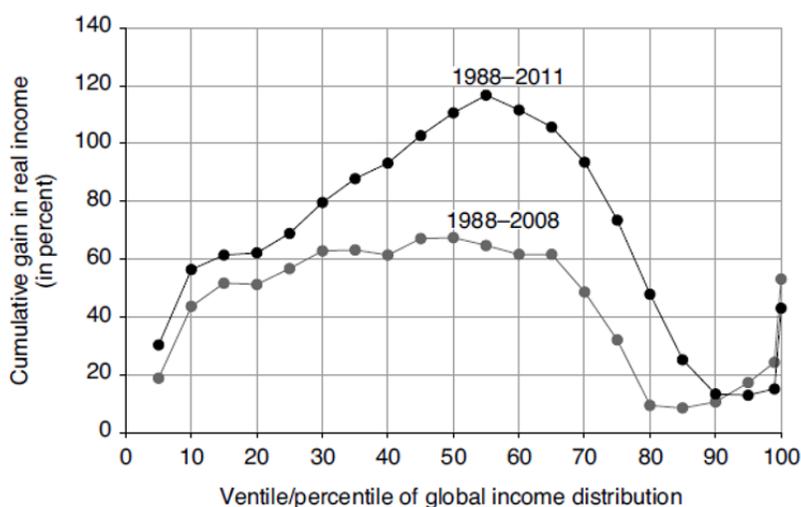
We have observed that there is a systematic relationship between inequality and incomes and outcomes and inequality of opportunity. On the horizontal axis of this graph, you see opportunity, a measure of inner-generational mobility, and on the vertical axis, a standard measure of inequality. On one side you see those countries with the highest level of inequality. They also have the lowest level of opportunity. At the other extreme, the Scandinavian countries, Denmark, Finland, Norway and even our North American Scandinavian country, Canada are countries with high levels of opportunity and low levels of inequality.

This graph itself has an important message: all these countries are advanced countries. The laws of economics are the same in all these countries and, yet, the outcomes are different. This message is the central theme of this talk, which is that the problem is not the laws of economics, it is our policies, the laws of man.

If we look around the world, almost all of the advanced countries have experienced an increase in inequality over the last 30 years, but some countries have to a greater extent than others. It is interesting that there are some countries in the world, particularly in Latin America or Namibia, in Africa, where there have been significant reductions in inequality. These cases show that

inequality is not inevitable that even if there are global forces that might lead to more inequality, there are countries that have undertaken policies that can actually buck the trend and reduce inequality.

Global inequality: income growth by percentile



Source: Branko Milanovic.

This chart from Branko Milanovic, one of the great scholars of inequality, gives you a global picture of what's going on. There are two things that I want to call attention to. There are two groups that are doing very well. The global one percent is way off on one side as well as the emerging markets' middle-class in China and India. But there are two groups that are doing very badly, those at the very bottom in the poorest countries, the poorest people in Africa and in India. Our trade agreements are designed to disadvantage

these poor countries, and they have succeeded in making these countries poorer. But the other group that is actually doing the worst is the middle class in the advanced countries with stagnant incomes. What is going on as well is illustrated in the earlier chart of the United States, but this is a global phenomenon.

That brings us to, in a sense, the greatest challenge. How do we understand what has been going on? How do we explain it?

The first basic idea that comes across is trickle-down economics which is an old idea that never had any empirical or theoretical basis to it, but was believed by and is still believed by many politicians. If you throw enough money at the top, everybody will benefit. I wish it were true because we've thrown so much money at the top. If it were true, we would all be doing very well. But trickle-down economics does not work.

The second thing is that there are very large differences across countries, both in terms of outcomes and opportunities. Among advanced countries with similar situations, it is policies, not inexorable economic forces that are at play.

The third is that economies with less inequality and less inequality of opportunity actually perform better. That is an idea that I put forward in a book I wrote a few years ago called, *The Price of Inequality*, because I wanted to emphasize that we were actually paying a very high price for inequality. Some people have said if you want to reduce inequality, you will get poorer economic performance. But I gave a whole set of arguments for why one might expect that greater equality would lead to better performing economies.

The interesting thing is that now there is a wealth of empirical evidence supporting this view and it has moved into the mainstream. The International Monetary Fund (IMF), is not a left-wing organization and it basically reflects the perspectives of financial institutions, but it has been emphasizing how inequality and inequality of opportunity actually undermine economic performance.

To put this in a historical perspective, Simon Kuznets, who got one of the first Nobel Prizes, wrote in the 1950s something that came to be called Kuznets law that explained why, in the early stages of development, there would be an increase in inequality. Those parts of the economy that could seize new opportunities would get ahead

of others. Then in the second stage of development, those behind would catch up and there would be a reduction in inequality. He believed that in the early stage of growth there would be a growth in inequality and then it would come down.

But he was writing in what is now sometimes called the Golden Era of Capitalism—the period where inequality was relatively low in the decades after World War II. He could not foresee what would begin to happen in the late '70s and the beginning of the '80s, the Reagan-Thatcher Revolution, that was the increase in inequality.

So there is a debate. Was the period after World War II an aberration, the result of social cohesion brought on by the war with now the economy returning to what might be called the natural state of capitalism? Or, is the increase in inequality after 1980 a result of a change in policies that were actually going against what would have been called a real market economy?

The view that I take, is that beginning about a third of a century ago, we began a process of rewriting the rules. We did two things. We lowered tax rates and that was supposed to provide more incentives. We deregulated which was supposed to give more

space for economic activity. The two of those together were supposed to lead to faster economic growth. Everybody acknowledged that lower tax rates and deregulation would lead to more inequality, but the idea was that those in the middle and the bottom would get a bigger piece of pie. Even if their share was getting smaller, because the pie would be getting bigger, they all would be better off. Instead, what happened was economic growth slowed. I argued that the reason it slowed was because of that change in rules that lead to things like short-termism. The result is evident in that chart I showed in the very beginning where the bottom 90 percent have a stagnant income and the basic necessities of what might be called a middle-class society are increasingly out of reach for a large proportion of the population.

Just like the discoveries that people have been talking about in the last two days which have led to a rethinking of basic laws of physics, so too in economics, there have been implications of the “discoveries” forcing a rethinking of economic theory; the standard economic theories really have not been able to explain the marked increase in inequality.

For a long time, there was an attempt to use the standard competitive models, the kind of models that you learn in your basic

courses in economics, to explain what was going on. It became increasingly clear that there was no way of reconciling that competitive model with what was going on.

During my early work at Cambridge, I constructed a model of inequality of wealth where I described a simple mathematical model with centrifugal forces creating more inequality and centripetal forces reducing wealth and inequality together, describing how there was a balance of the two under normal conditions, but changes in economic policy could upset that balance. We have had changes in economic policy that have undermined that balance. In the United States, we have moved to regressive taxes and to deregulation. All those changes upset the balance and have resulted in a movement away from the old equilibrium and into a new equilibrium with more and more inequality.

The other aspect of the change is that we have realized that the competitive model, that benchmark model that had been the workhorse of economists for a very long time, for 200 years, was not up to the mark. We have realized that part of what was going on was an increase in rents that are associated with monopoly and **monopoly** power. There were a whole set of other aspects of rents

in our economy and a whole set of reasons why our economy would be marked by increasing rents. But these theories based on rents have been able to do a much better job of explaining the growth of inequality than the standard model. And, of course, they raise fundamental issues about economic policies based on the old model, the model that assumed competitive markets.

The attempts to explain the growth of inequality have led to a rethinking of the foundations of economics. There is a growing recognition that this growing inequality in most of our societies is not only weakening the economy, but undermining democracy and dividing society. And you don't have to look very far to see that going on. I think each of us sees that. You see it in Europe. You see it in the United States.

At the next Starmus, you will bring some sociologists to talk about how this growing inequality is not only weakening our economy, but undermining our democracy and dividing our society with deep consequences, some of which already appear to be evident. It is showing itself in deep social distress.

All the other speakers have had a very uplifting message, and I found all the talks about the advances in science so uplifting that I

want to end on a note of hope. This inequality is not inevitable and that is an element of hope, because the fact that it is not the result of the natural laws of nature, or even those of the market, means that if we change the policies, we can reduce inequality and get stronger economic performance.

The inequality that we have is the result of how we have changed the rules of the game beginning about 35 years ago, leading in some cases to more market power for firms, weaker bargaining power of workers, overall leading to a more poorly performing economy marked by greater inequities. The growing recognition that inequality is the result of the laws of men rather than laws of nature is leading to a growing sense of social injustice and a lack of trust in our institutions including those entrusted with creating and maintaining a just society.

My hope is that by understanding better the forces that have led to this growing inequality, that we can collectively take actions to change things. That is the note of hope that I want to leave you with. Thank you very much.