

ECOLOGICAL ECONOMICS AND THE CASE FOR DEGROWTH

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Thank you very much for your invitation and thanks in particular to Professor Lourdes Beneria, who invited me to the Critical Economic Series.

The field of thought within Economics, or within any trend of interdisciplinary environmental studies, that I want to present today is called «Ecological economics». It's one of many different strands of heterodox or critical economics: we have feminist economics, we have biophysical economics, we have environmental economics (but environmental economics is not a part of this), we have political economics, and we have institutional economics.

What I want to focus on today is mostly ecological economics, which is my area of study. Interestingly, it's a field that was developed by ecologists and economists coming together in the early 1980s – economists who were dissatisfied with the way their discipline was treating environmental problems and ecologists who felt that to understand environmental problems better, they should collaborate with social scientists and economists. This was the basic philosophy behind ecological economics.

Interestingly enough, the International Society for Ecological Economics was founded here in Barcelona in 1987. The first meeting of the society was hosted by Professor Martínez Alier, who's here today, and since then there has been a strong school of ecological economics here in Barcelona and in our institute at ICTA in Barcelona. I'm one of many other ecological economists who over the years have worked and published in our institute, the ICTA, which is an institute not of economics but of Interdisciplinary Environmental Studies –

so we have ecologists, conservation scientists, climatologists, economists, and social scientists coming together. So I want to explain a little bit about ecological economics. First, I have to make a distinction that is not always clear: ecological economics is not environmental economics. I would simply define environmental economics as the application of mainstream economics, neoclassical economics, to environmental matters, basically – although this is oversimplifying to some extent – treating environmental problems as a case of an externality that has not been internalized by the market and then searching for a range of tools from cost-benefit analyses to proper pricing, carbon pricing, etc. for internalizing this environmental damage within the market, ok? That's environmental economics and that's not what I'm talking about today. What I'm talking about is ecological economics, which is quite different. What are the principles of ecological economics? Mainstream economics and environmental economics start basically with a graph, familiar to you all – firms and consumers. Firms hire people, and then people consume and buy products from firms, right? But ecological economics has a very different starting point. Ecological economics starts from a view of the economy as a metabolic system.

What does this mean? Each of our bodies has a metabolism, right? We take in energy, we take in materials, we produce waste, we move around and we consume energy – calories. Imagine our whole body summed up as the total of society, and on top of that all the instruments that we use, all the infrastructure, etc. This has a metabolism, with energy and raw materials going into the economy and waste and heat and matter going out. So, ecological economics starts from the premise or from the point of view that the economy can be analysed, then seen and treated as an ecosystem, as part of the ecosystem, and, as you will understand, this is a very different starting point from that of standard economics.

The most important milestone work in ecological economics was a book by Nicholas Georgescu-Roegen who was an economist but also a physicist by training and a mathematician and statistician. In his book called *The Entropy Law and the Economic Process*, he basically argued that the economy is a process that is entropic: it takes low-entropy, well-ordered energy or matter and transforms it through a process of producing useful things into high-entropy, low-order, less concentrated forms of energy. I think the debate about the contribution of Georgescu-Roegen took a trivial and I would say unproductive turn as to whether

there are ultimate limits to the growth of the economy because of entropy. Well, yes, maybe there will be after a billion years, and so on. The sun will deplete itself or the energy of the planet will run out, there will be total entropy and then nothing else. But I think that trivializes the contribution of Georgescu-Roegen, which was much more interesting and important, especially in his book.

In his work about entropy, he made an important distinction between stocks of energy and flows of energy. We can understand solar energy as a flow of energy and we can understand fossil fuels as a stock of energy. A stock of energy is a concentrated form of energy with low entropy and high order. You take it out, you use it and then you produce carbon emissions, which are impossible to recycle afterwards. So then you have a very high-entropy resource, heat, which is practically lost forever, isn't it? That was the main insight of Georgescu-Roegen, using physics to explain that the resources that we use, we lose them forever. We're not using capital in a way that is sustainable. But then he also had a very interesting insight, which was that the other source of energy, which is solar energy, is a flow, and much less concentrated than fossil fuels. So in order to capture this diffuse form of energy, which is a higher-entropy resource, you have to use other material and you have to use more land. What we later found when we tried to develop, for example, solar energy on a large scale, is that this takes a lot of land and creates other types of problems, or uses a lot of materials. So, yes, there are other sources of energy but they use other energy and other materials in order to concentrate them because they have higher entropy to start with. Another key contribution of ecological economics was precisely to think of energy not in absolute terms but in terms of net energy. What does this mean? It means that in order to get energy, you have to spend energy. In order to get oil out of the earth, you have to use energy to extract it, to dig it up, to pay for the bulldozers, to hire geological engineers – and all this also consumes energy.

In the same way, if you want to build a nuclear power plant, you have to use energy to build it, then treat the waste and move the waste around, etc. One key contribution of ecological economics, and of Howard T. Odum in particular, was to put the emphasis on how much net energy we are getting out of energy resources and to affirm that this net energy that we drew, especially from fossil fuels, at the beginning of capitalism and the Industrial Revolution, was crucial for the type of gains in labour productivity that we achieved, because we got a huge

surplus of net energy from these stored, low-entropy fossil fuels in the ground. I have three other arguments to present the theoretical framework needed to make sense of what I'm going to say about growth: in the context of the mainstream framework there would be many more objections but this is the framework I will use to position my argument about growth.

Another key argument of ecological economists is that services which on the surface might seem not to be using too much energy, actually embody a lot of energy. In order to produce services, you embody the hierarchy of a lot of energy. I mean you need food to feed the service workers, and you need materials to make the computers providing these services work.

It's the same as an ecosystem hierarchy. If you have a fish at the top of the ecosystem scale, below you have the phytoplankton which absorb sun and you keep going down the scale. The fish at the top of the food scale embodies a lot of energy that gets taken in below. In a similar vein, think of the service worker embodying a huge pyramid of energy below, so it might seem that material lies at the top of the pyramid but it takes a lot of energy to enable this worker to be a service worker at the top of the pyramid.

Unlike environmental economics (where externalities are thought of as something outside of the market, assuming that markets can internalize them, so we can have pricing instruments in markets and internalize carbon-emission damage), ecological economics starts from a very different premise, namely that externalities are ever-present: they are ubiquitous, they are unavoidable and, in a sense, they are cost-shifting successes, in the words of K. William Kapp, a proto-ecological institutional economist.

To give an example of this, I read recently a book by Raj Patel, *The Value of Nothing*, where he makes this interesting point: «Take a McDonald's hamburger. If you were trying to internalize all the damage that is being caused to produce a McDonald's hamburger, it would cost 150 dollars». He makes a rough calculation. Obviously, a McDonald's hamburger cannot cost 150 dollars because it will never sell. So, in order for this product to be profitable and be able to be sold, you have an externalization, a process of shifting the costs of producing a McDonald's burger to people who are not compensated, of course, for the damage they receive, and in the end this makes the McDonald's burger cost one dollar and not 150.

Lastly, I would say that the key difference of ecological economics is that rather than thinking in terms of one value – in theoretical terms, utility, or in practical terms, money, which is then used to make cost-benefit assessments and compare one possible option like cutting down the forest or leaving the forest, and then do a cost-benefit assessment in terms of money – in ecological economics we say that there are different values and that these different values are not necessarily commensurable. So a forest has a value in terms of its sanctity, in terms of the pleasure that it gives to people, in terms of its history, in terms of its culture, also in terms of the revenue it produces for tourism more than for logging, but also in terms of the uncountable intrinsic values it provides for ecosystems. All these different values are incommensurable on the one hand, but on the other hand they can be compared. Joan Martínez Alier wrote a very interesting paper arguing about the scant comparability of these values. So we have a culturally sacred forest and a forest that produces timber. It's not the market that will resolve what to do; instead, there are institutions that can compare these values and meet to find a solution.

With this in mind, let me just jump straight ahead with a graph, because I'm talking to an economist audience and I'm going to use a lot of graphs today. I hope I won't tire the rest of you; they are simple graphs. This is the simplest graph you can get about environmental demands – it deals with carbon emissions and global GDP. And of course what you see is this almost parallel one-to-one relationship, one following the other. The only times when global carbon emissions fell were during the major recessions, when the Soviet Union collapsed, etc.

The link between the scale of the economy and carbon emissions at the global level is as close to a statistically significant relationship as it gets in economics. And that's not just for carbon emissions: it's for any type of environmental damage, material flows etc., at the global scale. Why do I insist on the global scale? Because on the local scale or the national scale, you have distortions because of trade, so carbon emissions might stabilise in Spain but this is because emissions are imported from China, so then you have accounting problems. But if you take it at the global scale you find this very strong one-to-one relationship. The economy we see in ecological economics is fundamentally material and fundamentally produces waste, so for an ecological economist this is not a surprise. Of course, in the Paris Convention, in the dominant discourse, the idea is that we can separate

these two lines, the so-called decoupling or dematerialization or decarbonisation. The idea is that you can have global GDP – the red line – going up, and the blue line suddenly goes down, and you have an X. I like to joke about that and say, «Okay, yes, that may be theoretically possible – I can't prove it's wrong». But if that's the case, there is no basis in economics to talk about empirical regularities, because you might argue yes, in the past there were empirical regularities. In the future we are going to separate them, they're not going to exist any more. In this type of discourse you can talk forever: maybe it's possible or maybe it's not possible. What I want to emphasize here is that the data show that at least, at the minimum, it's very, very hard to separate these two. Those of you who are econometricians do panel data analysis and take many countries, carbon emissions, different factors, renewable energy regulations and oil prices and you add in whether or not the economy is contracting, and then you find that the single factor that most accurately, strongly and decisively predicts a decrease in carbon emissions is the contraction of the economy. There's no question about this fact. So then we can argue that we hope we can have growth – not in my case, however, but there are people who hope that we can have growth and reduce carbon emissions, and it's good to have hope, but are these hopes realistic? I would say they're not.

So this brings me to the degrowth hypothesis, on which I'm going to elaborate. Three points: «green» dematerialized growth is implausible – which is what I was just saying but now I'm going to flesh out the argument a little. The idea of green growth, of continuing to grow at the same time as global environmental conditions improve, I call «implausible» because I do not want to call it impossible since I haven't found the equation to prove it's impossible. Let's just say I think it's implausible.

The second point I'm going to make is that growth has become uneconomic in what Herman Daly calls the over-developed world and the global North. Herman Daly calls it over-developed in the sense that we use much more than our fair share of the planet's resources, and that growth in our part of the world is no longer possible, even if some benefits are obtained that derive at lower levels of development.

And thirdly, a more controversial and more difficult point: I'm going to provide some insights to show that it is possible to prosper without growth or

with growth. Or again I might say it's plausible, rather than possible, since those possibilities are different, but I would say it's quite plausible. This material comes from a book we published last year, with my co-editors here, Giacomo D'Alisa and Federico Demaria, of course, sitting in the audience. It's a published volume with fifty chapters, translated into ten languages including Catalan.

My presentation today is very partial because growth is a much broader and more interdisciplinary topic bringing together feminists, economists and economic anthropologists; we talk about the economy of care, we talk about the commons and about how people who come from political philosophy are critical of ideas of development. I'm not going to touch on any of this today because I want to focus a little bit on the more economic – or economicist, you might call it – discourse that stems from this book, and this is only one of the threads of this debate.

So for those of you who are economists, I might be less of an economist than you would like. Those of you who are more closely connected – shall we say – with the degrowth world, might think I'm more of an economist than you would like but that's the price of being interdisciplinary. We're somewhere in between, trying to combine different fields.

So I'm going to present the three arguments by means of three groups of slides of graphs. The first three graphs are going to be about the first argument and so on. Allow me to start with the first three visuals. The first ones are an argument against green growth. The debate about limits to growth is very old, some of you might say, and it's ground zero for De Salvo. For those of you who lived in the seventies, I hear it was a much more lively debate than it is now.

Yes, and then Solo supposedly demolished them – although at least for us ecological economists he didn't do anything of the sort, despite his claims – and Paul Krugman claims today that his teacher demolished Midas. The fact is that he didn't demolish him but he did provide some arguments which are sound, in my opinion, even if they don't hold. One of the first arguments that Solo posited against is the idea of Midas which states that there are limits to growth. He says yes, there might be limits and then as the economy's scale grows, it consumes more materials and emits more, and there are more carbon emissions. But he goes on to add: «Faced with these technological problems, progress would

become more efficient, so we might consume fewer resources per unit of GDP and this could more than compensate the increase in the scale of the economy, and the overall use of resources or emissions would decrease because we would become much more efficient, i.e. a car today emits much less carbon than a car thirty years ago, and the economy is more efficient per unit of whatever product it delivers. This makes sense, but then, what doesn't make sense from this perspective is this picture here, which is quite characteristic. The red line is China and it's more or less the same pattern for the US, but less pronounced, while for China you can see it very clearly. Here you see, for China [referring to a graph], that the strong line is the efficiency of the economy, its carbon intensity, that's the red line: the strong line is total carbon emissions for China, right? And you see it going up as you would expect. The other line, the broken line, is the efficiency of China's economy in terms of carbon, that is to say, how much carbon it uses for each unit of GDP product. And this goes down, so the Chinese economy becomes much more efficient as it advances technologically, as Solo predicted. But its carbon emissions rise dramatically. Why does this happen? You might argue that it's because of a scant adoption of technologies, etc. But, no, an ecological economist would suggest here a more structural relationship between efficiency and scale, even though these are not just independent variables. Our starting point is what we call Jevons' paradox, from John Stanley Jevons who wrote about it in *The Coal Question* back in the 19th century, when the steam engine – which used coal – was invented. Jevons noted the obvious fact that steam engines were much more efficient in terms of how much coal they used, but the result was that we started using more coal. Why was that? Because the efficient steam engines reduced the prices of coal and then many new uses for coal emerged, and we started extracting more coal. So, as we became more efficient, we used more resources, and the fact that there is a causal relationship between these two is not an accident. That is nothing surprising. What surprises me is that economists often make a distinction. When it comes to labour productivity, no economist will argue that by becoming more productive the number of workers will decrease. No, the idea is: «Yes, we can employ more workers because the economy grows as a result of labour productivity». It's exactly the same thing with energy productivity, or energy efficiency. The more efficient and productive an economy becomes, the more it grows and the more energy resources it uses and that's precisely what growth is about. It's about becoming more productive,

obtaining resources, investing them and growing. So here is the fundamental link between efficiency and the growth of carbon emissions, and any other type of material resource users damage. It's not easy just to say: «Here are the numbers and now we can become ten times more efficient. If the economy grows only twofold, then we are going to use five times less resources». But no, it's not like that. If we become ten times more efficient, we're probably going to grow by fifteen.

The second argument is against the idea of how economies can materialise. You might have heard about the weightless economy, the material economy, especially from Silicon Valley. People who work at Facebook etc. think that because they are materialised and because they produce a lot of money, this can be generalised to the economy as a whole. So they say: «Ok, me and my keyboard produce one billion dollars' worth of stock». But unless you take Facebook or Google, this cannot be generalised, obviously: there is not an economic – or let's say theoretical foundation – to claim that. There was a debate recently regarding the OECD and the more developed economies' «material use» coming to a peak. So some people talked about «peak consumption» and said: «We use fewer materials, we've used all the cars that we wanted, we've done that and now we use more immaterial services, so now we prefer to use our WhatsApps and send stupid messages to one another, right?»

And there was some evidence to support this. The evidence was that, if you observe the red line, domestic material consumption, the total amount of materials domestically extracted or imported into a country, such as the amount of copper, silver, iron –materials that Spain or Catalonia extract domestically or import from elsewhere in the world– to maintain production, would show a kind of plateauing for most OECD countries while the GDP increases. So people said: «OK, there is peak material consumption and we are dematerialising, we're becoming service economies». But then some people very reasonably said: «Yes, but what about materials that we are not using directly for production in Spain or Catalonia, but that we import because other people produce the product that we used to be producing? They produce an amount of products which we import here so that we can be service workers. How do we account for that?» The clever way to account for that was to use a material footprint indicator. So, what you do is take all the products consumed within the borders of Catalonia and then

ask: «How much material was produced in order to produce this product that we consumed in Catalonia?» This is called the material footprint of the economy of Catalonia. You calculate this in this way, and then what you find is once again the same straight line that I talked about before: an almost one-to-one relationship between the material footprint of OECD countries – the more advanced economies that are supposedly dematerialising – and the scale of their economy – their GDP. So there's no dematerialisation. I call it «the paradox». Why should I call it the paradox? Because all economists are predicting that this should and would happen, but I say: «Ok, then why is it not happening? Why is no one trying to explain it in any other way than how we ecological economists explain it, with our rough description of how economies materialise?». Of course, this cannot be proven. People can tell you: «No, the economy is not just material – it's also information, it's communication». Ok, then, if it's information and communication we have gone through the most important information and communication revolution of all times. Eighty percent of our economies are services. How is it then that they are still so materially intensive? Why haven't they dematerialised? After all the fundamental economic transformation that has taken place the last thirty years? Of course, someone might argue that certain products, or certain materials, or certain forms of producing energy, can be substituted for less damaging ones. So you might argue, and I think it's a reasonable argument, that we could indeed shift from fossil-fuel producing energy technologies to renewable technologies. But that's just a shift, it's a substitution. There is no *a priori* reason why this would be impossible, right? And I agree that it is possible to shift from fossil fuels to renewable ones. What I would beg to doubt, however, is this: with a shift from fossil-fuelled energies to renewable energies, would we be able to maintain the current scale of the economy, the global economy, or if you prefer, the OECD economy? And the current patterns of expected rates of growth? Only two or three percent per year means a doubling of the economy every twenty-five to thirty-five years. And why would I question this? Because people like Paul Krugman say that we can have both a transition to renewable energies and also stimulate the economy to grow. We spent money with the Green New Deal on infrastructures, on highways, on trains, and the economy started growing, and we can do the same now by investing on renewable energies. This might make sense in the short term. Yes, if you have a lack of demand., etc, yes, it's good to have public investments in these

types of activities. But can this produce the type of growth that was produced in the 1930s, 40s or 50s, on the back of an incredible, unique and unprecedented source of net energy – fossil fuels? There are people and economists like Charles Hole who have tried to calculate how much net energy – or EROI as they call it, energy return on investment – different types of energy sources produce. How much energy do you use to extract energy? And this is what they found. This is an old graph but their estimation is similar. It's a paper from 2010 but the graph is from 1986 and the picture is the same. They say that in the case of oil, for example, in the 1930s, for one unit of energy you put in, you would take out a hundred units of energy. For oil, in the 1990s, from one unit that you put in you get twenty units of oil out, which is much less net energy. It is now much less than that – about five to ten units or in the best-case scenario fifteen or twenty, with technological progress. So, the question here is, for an ecological economist who thinks that net energy matters for this scale of economic growth (for mainstream economists, energy doesn't enter even in the production function, so, it wouldn't make such a big difference) but from an ecological economist perspective we say labour productivity essentially occurs because of the use of oil. Oil did a lot of work. Think of energy slaves. If you had to use people to pull elevators up, you would need a lot of people, right? We are much more labour-productive because petroleum and electricity pull the elevator up. So, the question is: If our energy sources have much less net energy, will we be able to maintain the same scale of the economy, the same growth rates? The answer from a growth perspective is «no». It's very unlikely. It hasn't been proven but it seems unlikely and I think this merits more research. Growth has become economic: we'll look at two slides on this. These are standard slides and they won't be a surprise to you, but there are two ways to measure welfare, independently of GDP. The first one is to measure it objectively, as objectively as you can – and some have developed the index for sustainable economic welfare. San Francisco is the site of the real product think-tank, which has developed the genuine progress indicator – where they try to put together different indicators in different values, not commensurable values, instead of having just one single factor against GDP – and you try to evaluate welfare objectively without regard to the GDP. This figure is for Finland but the same picture emerges for many other advanced economies, so what you see is that after the 1980s, the GDP increases and sustainable economic welfare or progress indicators decrease or stay the same. So

some people have told me: «That doesn't prove that growth doesn't work – it just proves that Neoliberalism, Thatcher and Reagan don't work». And there is also evidence that wages stagnated after this period so while the GDP went up, average wages were at a standstill. So yes, this is a question: did stagnation and the drop in progress or welfare, or however we define it, occur because wages stagnated, because of redistribution to the one per cent? Or is it because at certain levels of growth you cannot maintain the same level of increase of wealth and thus welfare? Herman Daly argues the latter and says: «With more growth you have more environmental damage and more social cost». So at some point, he argues, growth becomes uneconomic. That means it's no longer economic growth, it's uneconomic growth. Now, you might also measure the welfare effect subjectively: you could measure it by asking people how happy they are. There are two camps regarding this in literature, but I don't want to go into too much detail. There are people who say that over time, even if income increases in the country, the number of people who state that they are very happy stays the same. And there are good reasons for that. First of all, our preferences adapt to what we have. Imagine the first people who flew in an airplane and compare them with us who are bored with flying now...we're no longer excited about flying in an airplane. So we adjust – that's one reason. The other reason is that our satisfaction with life is often comparable. We compare how well we are doing to how well others are doing. And if society becomes more unequal and more positional, then even if the economy grows, people are still on the same level or less happy. So it does not make a difference. There is another camp as always that uses different indicators and different types of samples and statistical analysis, claiming that happiness does increase with growth. I don't want to go into the details but I do want to touch on these two questions again: namely, that growth does not necessarily go together with welfare and that the econometric of happiness figures shows that other features, such as social capital, employment and equality, correlate with subjective well-being and with happiness – people's self-reported happiness. And I would say that this makes sense. That is to say, the more an economy grows, the more we would theoretically expect the returns on happiness or well-being or welfare to be marginal. To progress from not being able to fulfil your basic needs to being able to do so is a huge improvement in your welfare; but going from an iPhone 3 to a 4 is probably not such a big change. This graph is from a recent paper – well, not so recent, from three years ago: it was on nature

climate change, by Julia Stumberger and colleagues. What it shows, once again, with some basic statistical analysis, is that you can have sustainable levels of development. So basically this plots life expectancy – or you can plot other indicators of human development – against carbon emissions. What it shows is that there is a window within which you can have countries that have good levels of development, human development, in terms of life expectancy for example – life expectancy in the range of an average of eighty years, which is also the OECD and rich countries' average – at very low and sustainable levels of carbon emissions. The colour makes this graph three dimensional, so the colours show countries' income. You have high-income countries, which do not have significantly better results in terms of human development, but they have much more carbon emissions. So this again reframes a little bit the idea of development, where development is always aimed at reaching the top, supposedly to be like the US economy. No, this graph is arguing that there might be options that can both improve human development and be sustainable from a carbon perspective, but they are not models based on the US or the wealthier countries. They are models with a more medium range of income. Now the countries that I see here are not all great examples. I see Albania, Sri Lanka, Nicaragua, and I see countries that have problematic governments, histories and conditions. So it's a simplistic argument to say that they have found some secret. But you do have some countries like Costa Rica and Uruguay, countries that, you could argue, have managed to combine sufficient levels of well-being with low levels of environmental impact. So, why don't we call them developed countries and see what they are doing and try to imitate them? It would thus be possible to prosper without growth. Here I have a few slides. I'm at the 35-minute point and I think I should conclude at 50 minutes. So I have 15 minutes left for three more slides, plus a broader conclusion. I would also like to have some time for discussion.

One of the key concerns is that, within a capitalist economy, when you do not have growth you have all sorts of problems, and, of course, no one can be oblivious to that. If someone denies that fact then they think that recession or contraction are good, and are completely naive, so no one who is arguing for growth is arguing for that. The arguments for growth are: Let's first agree that there the economy cannot continue to grow like that ecologically and sustainably and then let's discuss the alternatives. Let's open up the range of the alternatives.

I'm from Greece and I know that the recession has a very ugly face, but is it necessary? Is it necessary under all types of institutional conditions, under all types of politics, under all types of international agreements? Do you have to have these results when there is a recession or a contraction of the economy? Again, I would question this. I don't think it is a necessary condition. And the range of changes you might have from one type of capitalist free-market economy to a social-democratic or socialist type of economy, vary enormously, and the range of institutional alternatives that may create very different outcomes during those recessions is very wide. This is just a simple graph to show that, and it is from the IMF, which was not arguing this point at all. It was talking about Okun's law, the relationship between employment and unemployment and growth: so, one-percent growth leads to a one-percent increase in the employment rate. This would be a one-to-one relationship. What this graph shows is the effect of a one-percent change in output on the unemployment rate, for different countries. What you see is that, unfortunately, we live in the only country where a decrease in the growth rate results in a one-percent increase in the unemployment rate, or if you prefer: a ten-percent decrease in the growth rate means a ten-percent increase in the unemployment rate. But then you go to the other extreme and you see countries like Japan or Austria, where a ten-point decrease in GDP results in a one-point increase in the unemployment rate, so there's huge variety within the different contraction and unemployment relationships. What does this mean? I'm not sure what it means. I'm perplexed that the IMF report doesn't focus at all on this point and isn't interested in addressing this question. Would it be possible to have high employment without economic growth, or with economic contraction? They don't ask this question. The interesting question would be why it is different in Japan: how has Japan had twenty or thirty years of basically no growth and still have an unemployment rate of three to four percent. I ask my Japanese friends over dinner or lunch but that's not serious research. You might hear about the way Japanese companies treat their workers, its labour regulations, social support and the safety net that exists there, etc. I'm not saying that Japan is doing something miraculous. But I am saying that there are important institutional differences. Not least in terms of labour regulation – labour market regulation might make a huge difference in the relationship between growth and unemployment. For ecological economists and those who study growth, that's a key question. Tim Jackson, who wrote a very interesting

book— translated by the publisher Icaria – called *Prosperity Without Growth*, argued that if we don't have growth, a way of reducing unemployment would be to share work and reduce working hours. That's an old argument. The counterargument by economists is that this would increase the cost of labour and would affect profits. I carried out a literature review on this with Nicholas Ashford, who is an environmental policy scholar at MIT. What we found is that there is once again a much more complicated relationship which depends on the institutional conditions, etc. But, in most cases, reducing working hours creates more employment and that's actually how the United States created more employment without growth in the thirties during the New Deal, by reducing working hours without reducing wages or at least without directly decreasing them. Other ecological economists are talking about the idea of a basic income, a minimum guaranteed income for everyone as a percent of GDP. There are people here in Catalonia who are doing very interesting studies in which they are trying to quantify what sort of basic income would be sustainable, which would be paid by the public revenue and by the tax system, without a major overhaul of the tax system. There, the idea is not to create employment, but to make sure that if our economy creates more unemployment, then there is a safety net, since this may happen in the future due to increasing labour productivity. I'm critical of that because of the energy factor, but in any case if there is more unemployment because of energy or because of increasing labour productivity, then at least out of the common pool we create a minimum safety net for everyone with this basic income. So here we have a kind of re-thinking or re-inventing of the welfare state. A strong argument against the idea that the economy can be downscaled or contracted and not cause a huge problem – and this notion came through very strongly in the book by Thomas Piketty – is that in periods of low growth we have sky-rocketing inequalities. So Piketty argued - the only peak, where we had very low inequality and as you see here we have income inequality, but you can have capital or wealth inequality, etc. This is from the 1940s to the 1980s for the US. It was a period of very high growth – a period of unprecedented growth of four to five percent. Piketty gave a rule of thumb when he said: «How much inequality you have depends in part on how much the growth rate compares to the rate of the trend to capital». So if the rate of the trend to capital is three percent and the growth rate is five percent, less of the total product goes to the capitalists, the ones who have capital in their hands. But if you have a three-

percent return to capital and a zero-percent growth rate, this means that more money will be put in the hands of those who already hold capital and you have increasing inequalities. This might make sense but then if you start unpacking this argument it becomes problematic. For example, how can you always have a three-percent return on capital if you don't have any growth? At some point this will have to reach a limit. Piketty uses some historical data. He says: «Look, I read some novels and in 19th-century France people received a five-per cent return on estates and their economies were stagnant, so this can happen.» It probably can happen but what's the economic logic behind it? Daron Acemoglu, who is one of the most famous neoclassical mainstream economists now, did the basic econometric test and he didn't find any correlation between this difference, between RNG and inequalities. And we know that inequalities increase, even with growth, in countries with growth, so we know that within countries growth, especially over the last thirty years, has come with an increase of inequalities. So during the period of 1990-2000, the US had quite high growth rates, but this didn't mean that inequalities didn't increase. And of course, the second reading one can make of Piketty is that what matters is not so much growth but the institutional and political conditions. Again, it's the conditions under which you tax wealth and how you tax income that make the difference for inequalities. So, from the 1940s to the 1980s there were extraordinary – for our levels, but not for that period – rates of taxation on the highest incomes... almost 95%. When we read that now, we can hardly believe it. Now the rates are 30% but they started decreasing to this figure in the 1980s, I mean, this is quite a recent development. So there was a very different institutional setup that has secured inequality, and this is not related to growth or lack of growth but has to do with political determination. It has to do with strong labour movements and trade unions at the time, and some might argue that with the Cold War the Americans were afraid that if they did not give enough to their workers, then the Russians would win their hearts. So, they would give and they would tax more, and the rich were maybe even more willing to be taxed because they knew there was a danger. So, there are all these factors that determine the level of inequality rather than growth per se. And if you see the huge slump in the inequality rates there, the inconvenient truth, as you might call it, is that the source was the war: it was total destruction, the worst destruction that we ever saw, that redistributed wealth. It is a sad conclusion that the capital system doesn't redistribute automatically, except

during periods of destruction, and that's a scary conclusion but it's one that is obvious from the data. It's 1941 and inequality decreases. And there was no growth during this period.

So, I come to my last point. Firstly, if we want to argue against the idea that growth is necessary for prosperity, we first have to see that growth is a quite recent phenomenon. As a concept, it was basically invented in the 1950s, believe it or not. So economists of course would be concerned with the wealth of nations, Adam Smith, etc., but they did not talk about growth; growth is a concept that appears mostly in the 1950s with Keynes and his colleagues, and Kuznets, the measuring of GDP, etc. We didn't talk about growth before that. Growth as a material phenomenon is quite recent: it started at the global level in the mid-19th century with the Industrial Revolution and capitalism. So it's a phenomenon that goes hand-in-hand with capitalism and the Industrial Revolution. First, we have to establish whether capitalist societies or so-called socialist societies... industrial societies, are the only ones that have prospects in human history? I would say no. I come from Greece and we are taught from primary school that our ancestors were quite prosperous and that growth didn't exist as a concept. They didn't measure how their economy was doing: we don't know if it was growing or not but it was quite prosperous. Then, more people lived on the Greek islands than now. So, the economy was organised in such a way that it provided for the people. It was prosperous, not necessarily growing and definitely hundreds of times smaller than the current economy. So, it's not the only time we have had prosperity, but definitely the only time that we have had sustained growth at that level, growth both of population and of economic output. But is this growth sustainable? And I wouldn't only emphasise here the ecological dimension – because I think we can argue forever whether and when limits to growth will appear from an ecological perspective – but I think climate change is actually a very strong factor that we cannot overlook now. The limits to growth first reported in the 1970s, I think, made a different point, which has been overlooked. They made the point that any type of geometric growth in the long term is unsustainable. And this is mathematically unsustainable. If you have something that grows at three percent a year, which is a healthy growth rate, it means it doubles every twenty-five years, seventy divided by three more or less, right? So this doubles, doubles and doubles. So from one, it becomes two, then

four, then eight. The limits to growth start with these examples. They say imagine this: you have a lake and the plankton doubles every ten or twenty years. Sadly, at some point half your lake is full and the following year it doubles, so that's the end of things. These doubles get bigger and they are harder to sustain. For ecological reasons, or as political economists such as David Harvey argue, due to the difficulty of finding investment outlets and creating a huge demand for this ever-growing economy that doubles every twenty-five years from an already large size, creating more demand, more investments, more infrastructures gets harder and harder. Ecological economists are the only ones who talk about stagnation. But as people say, «we predicted all thirty of the last two periods of stagnation». We over-predict stagnation but at least we are the only ones who talk and predict stagnation. The discussion about secular stagnation has now gone mainstream, however, so you have Lawrence Summers talking about secular stagnation, you have Paul Krugman talking about stagnation, you have new books like Robert Gordon's saying that the era of growth is over, and of course you have Piketty who says the same thing. He says that over the next hundred years growth rates are going to be at best zero to one percent as they have been for most of human history. They were only at three to four percent after the worst catastrophic period we ever had, which was the Second World War. So growth will be zero to one percent. Stagnation is coming. The question is: what next? What happens then? And Piketty's book opened this debate. Are we going to become a neo-patrimonial type of society? Or can we create something that is equal, a society that is equal within this new condition of stagnation? You might call them Malthusian now. And you may say Malthus was the first one who said stagnation was coming, but this was three hundred years ago and he was proven wrong. I would reply: «Ok, even if he was proven wrong three hundred years ago, this doesn't mean he would be wrong forever» and even Robert Solow accepts that, saying: «Yes, it doesn't mean anything if we didn't have stagnation when it was first predicted, it might come later.» More interestingly - I'm currently researching economic history and I'm reading Malthus – Malthus did not predict stagnation, he was actually an advocate of growth. This might sound a little bit controversial but this is what my new work is trying to put forward: he was actually advocating for growth of food in order to accommodate for growth of population. What he couldn't see, and for him growth was just growth of population, is that you can have growth in food consumption per capital, so not all growth of food is to

simply feed people, some of it could go also to other things. But Malthus, if you read him closely, was zero sceptical of stagnation and zero critical of the prospects of economic growth. And this makes sense: he was actually the first professional political economist, the first person to hold the chair of political economy, and it would be very strange if he was criticising the core concept of the discipline at the time, which was the idea of the wealth of nations. So he was also concerned as everyone was with the wealth of nations, and he believed that it can grow indefinitely to new levels. But what I'm saying is that people who might call themselves Malthusians today – even though I would say they're very different from Malthus then – or environmentalists argue that even if growth were to be sustainable – and forget Picketty's or Laura Summer's questions about secular stagnation – it is becoming destructive for the climate and life on the planet. And that's a whole new type of situation, different from the context in Malthus' time or the 18th century. So, we have an economic growth that is damaging. I don't care if damage undermines the conditions for economic growth itself. We might think of an extreme scenario in which this catastrophe of climate change may be good for growth, like the Second World War was good for growth. But is this something to look forward to? Is this type of human development and trajectory aspirational? I believe it is not. And I will conclude by saying that although very often it is argued that ecological economists or people who write about limits to growth are pessimists, supposedly, and those who believe that growth can continue forever and that new technologies and nuclear energy will result in clean energy that can power forever a growing economy are optimists, I would say the opposite: the latter are the pessimists. They are the pessimists and I would say that they are negative because they are the ones who cannot think out of the box as to how society itself can innovate and come together to solve collective problems, problems like climate change and environmental degradation. I would say that the history of human progress and of human development has not been just one of technological progress... there have been two forces at play: technological development on the one hand, which has been very destructive, and on the other hand, social progress – the feminist movement, the labour movement, people coming together and changing things, interacting and creating systems that are more different than anyone could have ever imagined in the 18th century. If you read Malthus now, you will see that he could not have imagined the gender relationships we have today. It is this type of innovation

that I think is necessary. And it is this type of innovation that people who are critical of growth and positive about the limits of growth and about our capacity to change in the face of potential disaster are optimistic about. Thank you.