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Markus Brunnermeier: Welcome back everyone to another webinar organized by Princeton for everyone worldwide. We are happy to have Yuriy Gorodnichenko with us. Hi, Yuriy.

Yuriy Gorodnichenko: Hello.

Markus Brunnermeier: Hi, Yuriy. Yuriy's from UC Berkeley and also from Ukraine originally. And he will talk about Ukraine's war economy. Before I pass on the mic to Yuriy, let me just give a few opening remarks. So in a war economy, essentially, typically, we move away from a decentralized economy much more to a planned economy, so things become more centralized, more concentrated. Power becomes concentrated also regionally. And the question is, what are the rationales for this? One is, of course, coordination across the country becomes more important than fine tuning. And you have one overarching objective, winning the war rather than a manifold of many objectives for different people, so the price signal itself to convey the information about various preferences of various citizens is less important. It also becomes a little more short-term focused, you want to win the war the next few years rather than long-term growth focused, and you might also have a rationale to concentrate power because otherwise there might be some war winners, some weapon producers extracting some monopoly rents. And of course you also want to increase the substitutability between war production and non-war production to be more resilient so you can substitute more easily. And one characteristic of a war economy is essentially that there's often some rationing, so the price discovery is sacrificed to some extent, especially for basic goods. And if you think about conscription, there's no way you can buy your way out, so there's no price attached to that. And you essentially segment the markets between the rationed goods and the other goods. So even if you're very wealthy, you cannot buy through three, four units of the goods, so it's more equally distributed, so you have a segmented market and the rich essentially get the same number of units than the poor to some extent. Finally, it's also the case that you have to incentivize your citizens. And normally, you give them a lot of carrots through higher wealth. But if you lack finances, you probably have to use the stick rather than the carrots in a war economy, given the overarching objectives. The key in war is war financing. And of course, war bonds play an important role. And essentially, buying a war bond is your bet on the victory of your country. And probably a lot of behavioral elements to it as well. So naturally, if you were to hedge your risk, you would say I should actually buy the war bonds of my enemy because it gives me a better hedge. But that's probably not good for the identity. And in order to sell war bonds, you have to build some identity creation. It helps to build the identity for the country. And some nation building helps to have the war bonds as well and selling the war bonds. Now, you might also want to run the economy hot. So rather than following a 2% inflation target, you might actually run the inflation a little bit higher because supply is essentially depressed because you need a lot of the economy producing some ammunition and other war weapons. And also demand is given from extra demand from government expenditures. So the inflation might be higher. There's a high inflation tax. And you might also argue it's harder to impose other types of taxes. So the inflation tax is a tax you can impose more easily. So financing becomes a very, very important component. So moving to Ukraine, I just want to give an overview. Of course,

international support is very, very important for the Ukraine war effort. And here I've just taken from the Kiel Institute what the different institutions contributed to.

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And the red bars here, that's the military support. You see the United States is by far the biggest provider of military support, followed by Germany and the United Kingdom, and then all the other countries, and many bigger countries contribute not so much, but in percentage terms of GDP, the Eastern Central European countries are the biggest supporters in that. And then there's of course also humanitarian support with the light blue bars and financial support and a lot of them comes from the European Union as well. So Yuriy gave us some quiz questions which I think are not easy to answer, but here are his questions. So which country has the lowest inflation rate in December 2023? And you thought, you know, 23 percent Russia, 30 percent Ukraine, 17 percent Hungary, Slovakia 28 percent, Turkey 2 percent. And the correct answer is actually Ukraine. Ukraine had the lowest inflation and most of you got it right, so 30 percent got it right. Now, the second question was the share of economic aid used by the Ukraine for defense, for the defense industry, how big was the share? And nothing or 0% thought it's 5%. Between one and a quarter, that's 25%, 26% thought this was the case. The next bucket, 26% and 50%, that's about 23% was that's the case. And 51% to 75%, that's 42% thought it would be in this bucket. And only 5% thought it would be in this bucket. But 0% thought about 5%. So we're a small minority. The correct answer is actually 0%, according to Yuriy. Now, the next question was the fiscal deficit of Ukraine in 2023 as a fraction of GDP was 10%, 15%, 20%, 25%, or 30%. The correct answer is 30%. And let me just tell you that 53% got this right. And the share of US military aid to Ukraine, what fraction is spent actually through military aid, not in terms of dollars, but you build the military weapons first in the US and then send the weapons, that's actually 90% and 11% got it wrong. The majority thought it was 10%, so 31% thought it was 10%, but it's actually 90%. Most of the support is in the form of goods, so the production happens in the United States and then you ship it on route and give money for the military side, giving money directly and then Ukraine can buy some military equipment. So with this I pass on the floor to Yuriy, he will tell us more what the situation is in Ukraine and how do Ukrainians manage the war economy, which is a big challenge and I think we can always learn a lot from Yuriy and the situation, the sad situation in Ukraine and we hope of course the war will end soon, hopefully.

Yuriy Gorodnichenko: Thank you, Markus. I think it's going to be an important thing. fact-finding mission for us, to see what kind of inflation rate we have in Ukraine, what kind of deficit financing we have, and so on. And I think the timing of this talk is very good because we approached the two-year mark since the start of the Russian invasion of Ukraine. Clearly, it's a war of attrition, and so it becomes a competition of economic forces, and so it is very important to understand where the Ukrainian economy is and what is the outlook for the economy. Now, just to make sure everybody appreciates the size of the shock and make sure everybody is on the same page in terms of what is happening on the ground, let me start with this slide here, which shows you pictures from Bucha, a small suburb of Kyiv, immediately after the Ukrainian army liberated this little town. You see a lot of destruction, lots of civilians killed by the Russians. You know, enormous atrocities committed in this little place. And for many people in Ukraine,

this was really a turning point in terms of understanding what kind of life Russian quote-unquote liberators bring to Ukraine, what life and their occupation is.

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And, you know, this kind of conclusion has been confirmed many times, including by the United Nations Human Rights High Commission, who was saying that we have all sorts of terrible things happening on the Russian occupation. Now, again, just to make sure everybody is on the same page, this map here shows the parts of Ukraine which were at least at some point under Russian occupation. The blue region is liberated land, the pink one is still controlled by the Russians. And it may seem like only a slice of the country is affected by the Russian occupation, a kind of direct military action. But Ukraine is a very big country. It's the size of Texas for those who are in the U.S., it's a very big piece of land. And when you take the area that was directly affected by the war, these blue and pink areas, we're talking about over 100,000 square kilometers. So it's a lot of land. If you take this land and superimpose it on basically any European country, very quickly you will realize that whole countries would be under Russian occupation like Hungary. So they should remember about, you know, 1956. Or, you know, if you look at Germany, this area here in the red is roughly the area of GDR, the Soviet occupation for over 40 years. Or Italy, the whole of north of Italy would be under Russian occupation, which roughly would correspond to the area that was controlled by the Nazis in 1944. So we are talking about lots and lots of people affected by the war, enormous suffering. And unfortunately, I don't have words to describe the degree of the suffering and losses, but the economic cost of the wars is very clear, that the initial shock was just astronomical. GDP declined by 30%, unemployment rate went all the way up to 35%, and this is despite the fact that many, many millions of Ukrainians left the country. So imagine, it's not just your denominator that is shrinking, it's also your numerator is expanding so much that you have so much unemployment. And again, it kind of helps you kind of visualize this, you know, when you look at images from Ukraine, but even then, it's hard to comprehend what does it mean to have your GDP contract by 30% in a matter of a few months. So it's as if, you know, you take the Great Depression and you compress it into two months, right? So this is the scale of damages that are done to Ukraine. And, you know, with modern technology, you kind of visualize this a little more maybe. by looking at nightlight intensity. This is Kiev, the capital of Ukraine. This is how Kiev looks normally, December, 2021 before the war. This is how Kiev looked in December, 2022 when the Russians attacked the Ukrainian energy infrastructure, right? So basically the whole city went dark. It tells you that life is difficult, economic activity is very much affected. And it's not just the fact that you don't have electricity. It's also the unpredictability of when you will have your electricity is a problem. You know, for example, you want to take an elevator. You don't know if you're going to make the trip. You can get stuck in an elevator for a few hours or maybe a few days. So you have to be thinking about this as well. Now, Kiev is not alone in this. Here is another map with nightlight intensity for roughly the same period. And you can see here, Ukraine is completely dark. It looks like North Korea, but, you know, Ukraine is usually not like this. It's usually, you know, bright spots like Moscow, Minsk, you know, Istanbul, right? So you have lots and lots of bright spots here in Ukraine, normally. Now it's completely dark. And obviously, this is very damaging for the economy.

Markus Brunnermeier: So Yuriy, is it because there's no electricity, or is it because we switch off the lights during the night in order to avoid...

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Yuriy Gorodnichenko: Because there is no electricity. A blackout. A blackout. And, you know, when you have these kinds of conditions, obviously, you will see big problems in the economy as well. And I'll get there in a moment. But before I do this, you know, one thing I also want to make clear is that people often think that a lot of destruction and fighting happens at the frontline and nothing else in Ukraine is much affected. There is, you know, some truth to this. Of course, when you look at the intensity of war reports compiled from the media, you see there is huge intensity here at the frontline. But then when you look at war reports from other parts of the country. So this may be a missile attack, it may be shelling, it may be some shooting. You see that none of Ukraine is really safe. You can have attacks in Lviv, in Kiev, in Odessa. So, you know, the economy is affected everywhere. You can have a Russian missile attack any day at any place in Ukraine. Now, usually it's very hard to get high quality data in Ukraine now because of, you know, the chaos of the war and everything. But, you know, for some statistics, we have reliable data and it says, you know, very clearly what was happening with the economy. For example, here you have some reports on the production of steel in Ukraine. This is one of the largest industries in Ukraine. And you can see this basically step function. A lot of production is happening here, then it really collapses maybe to less than the fifths of what Ukraine used to produce. You see some recovery, but this is still very, very depressed. Now, if you have a situation like this, obviously, in one industry, so big an industry, then it's going to create negative multipliers for everybody else in the economy. For example, you look at freight rail transportation, and you see a massive collapse here as well. There is just nothing to transport. Now, how big is this? My rough estimate is that a day of war in Ukraine costs roughly anywhere between a billion dollars and one and a half billion dollars. And the war has been going on for more than 700 days. So you do the math, and you can see that probably by now Ukraine in losses and damages is facing half a trillion dollars, a lot of money. It's a huge cost to the economy, the shock is really of cosmic proportions. And obviously, you have to think about all these challenges as a policymaker, and you have to think about what you can do.

Markus Brunnermeier: For the steel production, was it mostly in Mariupol and also in the Donbass? Is there more steel production there? How is the steel production allocated across Ukraine?

Yuriy Gorodnichenko: Yeah, so most of the steel production is happening in eastern Ukraine and central Ukraine. And Mariupol was completely destroyed, so there is zero production. This was, I think, the second-largest steel mill in the country. But the first-largest steel mill is in Kryvyi Rih, which is owned by ArcelorMittal. And it's attacked on a regular basis, and so they don't have full capacity. And it's not just attacks, it's also the inability of steel producers to take their products and export it somewhere else. So this is why there is really no freight, because you can't take it anywhere, I will come back to this in a moment when I'll talk about the seaports. Now, I will try to summarize, you know, their challenges and responses to these challenges in five groups. One is about the productive capacity. One is about the external position of the country. Then I'll talk

about fiscal issues, financial stability, and also extreme uncertainty that many businesses in Ukraine are facing.

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So let me start here with productive capacity. This figure here is from the National Bank of Ukraine. It plots a two-time series. The real GDP, that's the red line, and the dashed line is potential GDP. I told you real GDP declined by 30%, right? A massive collapse here. This is the first round of Russian aggression when we had the occupation of Donbass and annexation of Crimea. What is really different between here and here is that we have a huge contraction in potential output, and this is very important when you think about the possibility that Ukraine has when it thinks about the speed of recovery and the size of recovery. So we have a massive contraction here, and not just in actual output, but also in productive capacity. Now, why is that? Well, you know, you look at the labor side and you see lots of people left the country. You have many, many millions of internally displaced people. President Zelensky just a few days ago announced that the size of the Ukrainian army is about a million people. That's a huge number given that the labor force in Ukraine just before the war was about 20 million people. And then you have many, many, many people who were seriously injured by the war, traumatized and so on. So we have a huge contraction on the labor side. You have lots of people who are inactive. Again, this may be IDPs, internally displaced people, it may be injured people. But some of this is coming from what I will discuss later and it's related to the reallocation shock. Now, this is on the labor side, on the capital side. It's also equally striking. You know, think about this. Nine percent of housing stock in Ukraine has been destroyed or severely damaged. Twenty thousand, roughly, now, probably, this is as of September, apartment buildings are destroyed. So, we're talking about millions of people who are affected by this. Airports, bridges, roads, you know, productive capacity, as of Mariupol, it will be here. And it's not just physical capital, it's also human capital. Lots of schools, preschools, colleges, you know, health care sector, all of this is affected by the war. Obviously, it's going to reduce the productive capacity of the economy. And then we have to think about all this, you know, productivity issues that are going to happen in Ukraine when we have all these energy disruptions and uncertainty and so on. All of this is very, very bad for productivity.

Markus Brunnermeier: So does the government reassign housing for them, or how does it work? You just reallocate it by force?

Yuriy Gorodnichenko: No, it's not allocated by force. It has a combination of responses. One is that there are basically like small towns created for internally displaced people. But, you know, most of the people basically use vouchers from the government to rent their housing from, you know, private providers. So it doesn't have to be this, you know, little town where people are going to be housed. Now, again, speaking of this labor side, because so many people are not available for work anymore, maybe not surprisingly, you see that many, many businesses are reporting that they face serious shortages of labor. It's the biggest, one of the biggest limiting factors for them. You know, the number one factor is war. Number two is going to be lack of labor. So that's a big challenge.

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Markus Brunnermeier: How was the female labor participation before the war, and did it go up, essentially, that you tried to replace missing men with female?

Yuriy Gorodnichenko: Yeah, so unfortunately, many of the refugees here, this 9 million people, are going to be women with children, and so that part of the labor force is severely reduced. It's true that there is more labor force participation for women, but it's not nearly enough to compensate for the losses of men you see through this. Now, I mentioned that, you know, part of the reason why we have something like this, and also why we have so much non-employment in Ukraine, is because we have a giant reallocational mismatch shock, if you will. This map here shows the share of restaurants opened in 2022 relative to pre-war levels, and obviously, you see whenever we have big military action, this place is just shut down, but even in the rest of the country, you have relatively small numbers. So then you have to take resources from here, this area is directly affected by the war and move them somewhere here. And it's not just restaurants, right? You look at other industries: construction, trade, manufacturing services, you see the war was very, very uneven in its effects on these industries. For example, construction had massive collapse and trade was much less affected. Industry was affected, but not as much as construction. And so we have to move resources from, you know, one area, one sector to another. You, Markus, mentioned that, you know, we have two models of how to do this. You know, one is government direction, another one is market-based forces. And normally you see in wars, governments take a very, very proactive role. And this is what Ukraine did early in the war. It started to regulate prices and so on, but very quickly, the government realized that that's not effective. For example, they started to regulate the prices on gasoline, diesel, and other fuels. And almost immediately, the economy started to experience very serious shortages. And so they realized it's better to work through market-based mechanisms to ensure that resources are flowing to the best users. Now, as you said, you know, in some sense you can't regulate through the market. So conscription is working through non-market forces, but many other things are working through market-based, you know, incentives and price signals to make sure that resources are flowing to the right users. And kind of strikingly in Ukraine, you don't see many shortages of things, right? For a country that's so much affected by the war, you would have expected that we're not going to have food, we're not going to have this and that. You don't see shortages really in Ukraine as much as one would, or could have expected given the size of the shock.

Markus Brunnermeier: And to what extent could you repurpose some industry to now produce military weapons and all this? Is it too big in terms of GDP?

Yuriy Gorodnichenko: I will say more about this, you know, initially the defense sector was relatively small in Ukraine, now there is a lot of redirection and, for example, textile industry used to export a lot of, you know, garments to Europe and other countries, now probably their biggest business is military uniforms in other sense. So you can see that some industries are completely moving in this war production mode. Some other industries are a little harder just because, for example, production of tanks, you have to have a lot of steel, but unfortunately

production of tanks is kind of complicated because it's very concentrated and it's easy to attack.

24:07

So I don't know actually where this stuff is happening and how it's protected. That's one of the government secrets, I guess, at this point. Now, despite this economic devastation, I think what is also striking about the Ukrainian experience is that you see a lot of resilience and recovery. For example, you look at the number of new business registrations and new entrepreneurs. This is entrepreneurs, this is business registrations. This is the start of the war, everything goes to zero. And then you have a very strong recovery here, here, and roughly we're back at, you know, the levels we had before the war. Even the blackouts that were engineered by the Russian missile attacks in 2022, you know, they had only a temporary dent on this dynamic. Here's another hard statistic that we can use. This is the number of tickets sold by the National Railroad Company, Ukrzaliznytsia. You know, roughly every month, half a million people will buy tickets. This goes to zero, then you have a recovery. Again, these blackouts have a dent, but now we have the number of tickets, which is greater than the pre-war level. So, that's really striking. Now, how do you achieve this? It's really a combination of various policies and steps. One is decentralization of economic activity. Basically, you should not concentrate your production in one facility because this may be affected. I will talk more about this, but for example, all major oil refineries in Ukraine were destroyed by Russian missile attacks. So, because it's just concentrated production, it's very easy to take it out. Then, you try to missile-proof whatever you can. This means not only anti-missile weapons, it also means structuring your production in such a way that you have layers of protection. So, the first explosion is not going to affect you right away. You also build in lots and lots of redundancies. Ukraine is probably one of the biggest users of Starlink terminals. I don't have statistics for other countries, but it's over 40,000 Starlink terminals. Now you don't want to depend on Elon Musk doing, you know, something. You want to have a backup channel and there are lots and lots of, you know, possibilities here. So Ukraine, typically when it uses starlinks, also has a backup channel to make sure that you have stable connections and so on. Now let me use this decentralization argument here to visualize this a little bit and show you the time series of exports for some of the major goods and services that are produced in Ukraine. This is for steel, this is the orange, this is food, this is transportations, basically transport of natural gas from Russia to Western Europe, this is IT services. Now what you should see here is that the steel industry has been declining quite a bit over time and there is a big drop here because it's so much affected by the war. Just strike the steel mill and it's not... not functional for a while. Agriculture is much harder to take out because it's so much land. And you can see that it was much less affected by the war. The IT industry, you know, massive growth here. It was growing double digits for many, many years. Many people don't know, but the number one export from Ukraine to the United States is IT services. It accounts for roughly 5% of GDP, 14% of total exports. And you see this little kind of bleep down in exports, but that's not because Ukraine can't produce stuff. It's more of an issue of the IT industry globally that they have downsizing in that sector. So again, this kind of tells you that this resilience is coming in a variety of forms. And decentralization is one of the big things. One slide I also wanted to show here is that we'll often talk about reconstruction and rebuilding happening after the war. And obviously a lot of that will happen after the war, but a lot of this is already happening. This is Bucha immediately after

liberation. This is how the same street in Bucha looks now. It's not a perfect road, right? So we still have some missing asphalt here, but it's nowhere near how it used to look, right?

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So there is a lot of recovery happening in various places in Ukraine. And as a rule of thumb, if you're 40 kilometers away from the front line, you are relatively safe in the sense that you can't be shelled at will. Russians have to use expensive missiles and stuff to attack you. And so this greatly reduces the probability that you're going to be hit by something. And Bucha is obviously very far from the front line. This is why we see so much recovery. And the final thing I wanted to mention in this context of recovery and resilience, just a few days ago, Transparency International released new perception index numbers. And you see Ukraine gained three points in the most recent year. the largest number in the world, the biggest improvement, and you can do this in very, very difficult conditions, obviously. And also, I want to impress on you that this is where we started. This is what Ukraine was when our president was Viktor Yanukovich, engaged in rampant corruption, who is now hiding in Russia. It started this low, and then you continue to grow significantly. So, we have to keep in mind that the country is cleaning up its act, even in these very difficult conditions.

Markus Brunnermeier: Is it a perception index? But the underlying corruption is also going down.

Yuriy Gorodnichenko: You know, I would say it's probably going down faster, because perception is a backward-looking variable. Okay. Yeah, so I think real progress...

Markus Brunnermeier: Is it domestic perception within the country, or how outsiders perceive it?

Yuriy Gorodnichenko: You know, they look at various variables. They ask domestic businesses, they ask foreign businesses, foreign experts. So, it's really a combination of sources. They try to take a broad view of what is happening in the country. So, this is a good statistic. You know, Ukraine is showing steady progress here. It's good.

Markus Brunnermeier: Elena Goldman would like to know how did the imports of oil and gas from Russia change during the war? Is there still some oil imports of oil and gas from Russia? Is there still some oil coming from Russia to Ukraine as well or not?

Yuriy Gorodnichenko: Since 2014, Ukraine has not imported any natural gas from Russia. And in this year, 2022, 2023, the most recent years, Ukraine is basically self-sufficient in terms of natural gas. In part, this is because the industry declined so much that we can just use our internal resources to keep the economy going. With oil, it's a different story, we have to import a lot of oil. And this is one of the reasons why we have an external imbalance. For example, here, this figure shows that every month, the trade deficit is about \$3 billion every month. And a lot of this is coming from the fact that after the initial collapse in imports, there is a big recovery here. What is that? Well, I mentioned that all oil refineries in Ukraine are destroyed. And so you have to import a lot of gasoline, diesel, and other fuels. Demand for that is very inelastic. You have to

do this no matter what. And this is one of the kind of bottlenecks we have in the Ukrainian economy, that you have to do this kind of stuff.

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Now, this is not just, you know, fuel. There are other things happening here. On the other hand, when you look at exports, there is a big shock, some recovery, but it's nowhere near where we have imports. Why is that? It's basically because Russia blockades Ukrainian seaports, and you can see that Ukraine was much more reliant on black seaports than Russia, right? So, the volume of traffic in Ukraine was much, much higher than Russia. Then it goes to zero. This is the first month of the war. This is the grain deal between Ukraine, Russia, Turkey, and the United Nations. Then Russia pulls out from this deal. Again, the volume goes to zero, and this will be very damaging. You know, this is why these experts are declining here. But Ukraine, again, has been very creative in addressing these challenges. Let me show you this map. This is the old grain corridor, which was sanctioned by the Russians. This is the new grain corridor invented by Ukraine. So, basically, you hug the shoreline of the Black Sea in the west. You go close to Romania, Bulgaria, and so on. This is much safer, obviously, because it's protected through territorial waters of these countries. But in addition, Ukraine is relying on what are called the new ports, right? So this is a big port. Ukraine also has some ports here close to the Romanian border, close to the river Danube. And you see that these new ports, they used to be very, you know, small hubs for transportation. You see this light green area. It's very small. It's much, much bigger. It's as important as, you know, all these big ports like Odessa. So you kind of try to redirect your trade in such a manner, your shipping routes, so that you are not affected by Russian threats. There is also-

Markus Brunnermeier: So they go along the river Danube then, all the way to Germany? So the deliveries go along the river Danube, all the way to Germany, I guess.

Yuriy Gorodnichenko: Okay. They could, yes. They could. Another big margin of adjustment is that instead of relying on seaports, you see more than 60% of shipping was going through seaports. There was a lot of redirection, and now a lot of this is happening through railroads and trucks. And so, as long as the EU-Ukraine border is open, we can exploit this margin and be much less affected by all these Russian constraints, blockades, and so on. Obviously, the EU border has to be sufficiently open, let's say it that way, to make this happen. And, you know, I'm hopeful that this is going to happen. So, this may be expanding even further. Now, let me move now to the fiscal challenges. That's really a big problem in Ukraine. The current fiscal deficit is about 30% of GDP. It's a huge number. And, to be clear, Ukraine is not like, you know, some problematic country that consistently runs these huge fiscal deficits. You look at what was the deficit before the war, and Ukraine was basically running balanced budgets. Then the war starts, and you see this wide gap between spending, this light green line, and revenues. This is military spending, defense spending. This dash line here is what Ukraine collects internally. This green line, solid one, also includes economic aid from other countries, grants, okay? But even with grants, you look at the size of these bars here, this is the deficit, huge numbers, huge numbers, right? Somehow we have to close this gap. And this is a big gap. It's about four billion dollars a month, maybe more, at least four billion dollars. Ukraine has been receiving a lot of economic

aid to cover this in terms of loans and grants. And to be clear, none of that economic aid, so the answer is zero. I don't know if it's precisely zero dollars, but I think it's effectively zero.

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None of those dollars are spent on military aid in Ukraine. Those dollars, those economic aid dollars are spent on doctors and teachers and pensions and kindergartens, basically social spending. None of this is funding military spending. All military spending is funded by internal tax revenues in Ukraine. Now let me say a little more about that component of spending, because ultimately this is going to be one of the most decisive factors going forward. And again, to give you a little bit of perspective, this is the level of spending Ukraine had before the annexation of Crimea. Three billion dollars, Russia had close to 90. So it's an order of magnitude difference between Russia and Ukraine. There is zero threat, military threat, from Ukraine to Russia. Now after the annexation of Crimea, Ukraine started to spend more, but there is still an order of magnitude difference in spending. Now when the full-scale invasion started, Russia increased its spending and so did Ukraine. Now the gap is smaller, maybe a factor of two to three instead of 10, but still it's very, very large. And so this is a big problem because if you want to match this, you have to get some help. And this help is coming from the U.S. and in other countries. The U.S. was, you know, a champion of giving military aid in 2022, Europe was lagging behind, now they are more even. And so this gap between Russia and Ukraine is closing. But we should also appreciate that, you know, when we don't have economic aid and military aid, you know, if you look at this year, this is what happened after the first round of Russian aggression, there was really no response. Ukraine was on its own. And this obviously invited more aggression. So when we talk about the costs of not helping Ukraine, we have to be thinking about this non-punishment of Russian aggression. There are also two cents I wanted to mention here to give you two benchmarks. One is about the size of Ukraine's GDP, just to give you a sense of how much resources Ukraine commits to war effort and also how far it can go in principle. So this is the level of GDP. You look at this, it's a big number. So it's a lot of resources spent on defense. And also I wanted to mention that this spending that happens here in the U.S., it's all, almost all of that is staying in the U.S. So when you send missiles from the U.S. to Ukraine, this is going to be a Lockheed Martin that gets money. It's going to be Boeing that gets money. Very little money is going outside the United States. So, you know, by supporting Ukraine here, the US government is actually supporting its own defense industry and broader economy. So just to be clear, 90% of that is staying inside the US. Okay. Now let me move to, yes.

Markus Brunnermeier: So Jan Vena has a question coming back to earlier— so the EU and some neighboring countries imposed some import restrictions on some Ukrainian goods, in particular agricultural goods. How big was this effect on Ukraine? That, you know, for example, Poland was restricting, essentially, Ukraine from exporting some wheat and all this. Was this a big deal?

Yuriy Gorodnichenko: You can see it here. You can see it here. It's a big decline. Just to give you a sense of, you know, what was happening, 5,000 giant trucks were stuck at the border. 5,000. People had to wait for months. Three Ukrainian truck drivers died waiting. This is just to give you a scale of, you know, problems there. Now I hear that the border is reopened, but you

still have to process this backlog. And so I hope that things are going to improve going forward. But that was not very helpful. Okay. So military spending. Let me move to now economic aid.

40:14

This is monthly receipts of aid from various donors according to the National Bank of Ukraine and what you should see here is the slight green bars here. These are grants mostly coming from the United States there's dark green bars, these are loans mostly coming from the European Union and from this figure you should see several stylized facts. First is that it's not a stable flow of resources, that's not good. It creates a necessary uncertainty, number one. Number two, grants is probably the best source of funding because the economy is so much destroyed by the war, it will be really really hard to repay this loans, so we should focus on grants, not loans, and yet you see that a lot of funding a lot of economic aid is coming in the form of loans and the third thing I want to emphasize here is that when you look at the size of this slide in bars, they are shrinking over time. And if we look at what was happening in January 2024, Ukraine did not receive any money from the United States whatsoever in terms of economic aid. That's a very sad part. Now, Europe is ramping up economic aid, which is great, but it's only a part of the story. There has to be more to keep it going. If the U.S. is not coming.

Markus Brunnermeier: When the payment happens or when the agreement was struck, like yesterday, they announced that they would give 50 billion euros to Ukraine.

Yuriy Gorodnichenko: Yes, I'll come back to this. This is their receipt. And, you know, lots of promises were made here in the first months of the war, but nothing really materialized. For example, here, the European Union said that it will give Ukraine nine billion dollars. In the end, it gave six and was done here almost a year later. That was not good timing. And we know what happens when economic aid is not available. We have sort of an ultimate form of fiscal dominos. You know, if you have a gap that you have to fund, you have to go to the central bank, the National Bank of Ukraine, and basically ask this bank to print money to finance the government. And when you look at 2022, the biggest source of funding in Ukraine was not the United States, it was not the EU, it was none of these countries. It was printing money, the National Bank of Ukraine. And as a result, obviously, you create a lot of inflation, 20-25%. Maybe relative to other countries that also experienced double-digit inflation, it was not as shocking, but still, it's very, very damaging when you have this kind of rate of inflation. Now, on the other hand, when the aid becomes available, you can do the right things as a central bank. You can tighten monetary policy to not get the economy overheated. Markus, you mentioned this earlier, it's very important. And so they raised interest rates, the policy rate to 25%. They also fixed the exchange rate to create a nominal anchor. And so all of this was designed to keep inflation in check. And maybe not surprisingly, we see that inflation is dramatically coming down. It's actually very close now to the inflation target of the central bank, which is 5%. Also, you see inflation expectations are coming down. And one of the quiz questions was about the rate of inflation. I'm surprised somebody said that Turkey has the lowest rate of inflation – I don't think it's anywhere near. But what is striking is that Ukraine has the lowest rate of inflation. And here as benchmarks, I have Hungary and Slovakia that really depend on Russian energy and continue to import a lot of Russian gas and oil. Also, Russia has a higher rate of inflation. And

Russia has no military action, no significant military action on its soil. Yet it has a really overheated economy.

44:08

So it's kind of striking that Ukraine manages so well in these very difficult conditions. All right, now let me move to the next important thing, which is financial stability. And here, the main issue is that Ukraine has a long and distinguished history of banking crises, currency crises. You look at the financial stress index for Ukraine and you see the global financial crisis was a huge disaster. Then annexation of Crimea and the Donbas, occupation of the Donbas, that was a huge banking crisis here. And these were the times when the Ukrainian banking system was not prepared for the shocks. Then you have this period here from 2016 to 2021, when the National Bank of Ukraine put a lot of effort in cleaning up the banking system, proofing it and so on. And so when the war started, the full scale invasion started, there was a lot of stress, it was not as bad as we saw here, and also it dissipated relatively quickly. Okay, so that was really remarkable that despite all cyber attacks, all sorts of, you know, panic attacks, everything was holding up. For example, there was no bank run. You look at the dynamics of deposits, they don't go to zero, you know, minus 10% change in deposits, the worst kind of statistic here, is not a bad number, given the size of the shock. The system is flooded with liquidity, right? So it has a lot of resilience. I don't think any bank run is going to happen anytime soon. So there is a lot of confidence in the banking system, and there is also a lot of liquidity there. Now, this is not to say-

Markus Brunnermeier: So it's a lot of government bonds, or what, the biggest asset class is probably government bonds for them, or?

Yuriy Gorodnichenko: Yes, yes, they are, yeah. So, you know, the deposits are growing, and you wonder, you know, where are they going? And the answer is, they are not going to the economy. You look, for example, at the volume of loans in Ukraine. And you see that in foreign currency, you basically have a lot of contraction in domestic currency until recently also have the contraction and all these extra deposits which are basically going into government bonds. So from here, you know, one bad sign here is that credit is declining. It says the economy is not doing well. On the other hand, this year has some signs of optimism saying that the degree of dollarization is actually declining in Ukraine. People don't hold, you know, many dollars. Now, why is credit declining? Obviously the war is a big issue. The default rates are really high, you know, close to 15%, they're coming down now, but still very, very elevated. So that's a problem.

Markus Brunnermeier: Is it easy if I have deposits in the local currency to swap it in the dollar account?

Yuriy Gorodnichenko: Now, yes. Now, yes. In the early months of the war, you will have to face, you know, some very serious restrictions on that. But now you, as a regular person, will have very little trouble doing that.

Markus Brunnermeier: And to buy war bonds, it's also easy to buy them electronically, or you come to that?

47:24

Yuriy Gorodnichenko: Yes. Yeah. So, you know, in fact, there is a program, there is a government app on your smartphone, and you can use that app to buy government bonds directly. Now what else? Okay. Non-performing loans. Here, the main issue is that we had a stock of non-performing loans before, and the war obviously exacerbated this, but the stock of problems here we have in our balance sheets, that comes from the first round of aggression, and even from the global financial crisis. So that's kind of a legacy issue. Nonetheless, it's very high, you know, close to 45%. That's clearly not a good sign. Now the government understands that it needs to restart its lending in the economy, and it effectively subsidizes various loans. For example, this eOselia, this is a government program to subsidize mortgages at 7%, 3%. Not everybody can qualify for this, but you can see that almost all of the mortgages are coming through this government program, okay? Why do we do this? Well, because you have to de-risk lending. It's inflation risk, military risk, default risk, you know, all these risks. It has to be supported by the government. So maybe it creates a distortion here, but, you know, going forward, hopefully this will be more market-based. The final thing in terms of challenges I want to mention here is the extreme uncertainty. We know this is potentially very damaging for-

Markus Brunnermeier: Okay, can you come back to the bank? So can you just give us an idea about the banking landscape? Are there few dominating banks and how does the government control them or are they totally independent? Is there some strict war oversight over the banking activity? Do you have any take on that?

Yuriy Gorodnichenko: Yes. Yes. So, unfortunately, many banks in Ukraine, major banks in Ukraine, are now state-owned. One is called the Oschadbank. It was founded in Soviet times. It's still around. It's one of the biggest banks. It has branches everywhere. The plan was to privatize this bank before the war, but it didn't happen. Then another big bank was nationalized. It's called Privatbank because one of the oligarchs, who has basically, through fraud and other means, was bankrupting this systemically important institution. And when you look at the share of non-performing loans, almost all of that stuff is coming from Privatbank, from this oligarch. And so now when you look at the share of assets owned by state-owned banks, it's going to be way above 50%. That's not a good state. The plan, after the war, is to privatize these banks. But now it's government-owned. But having said this, there is a lot of reform in that sector in the sense that corporate governance is very different. You have independent boards, you have, you know, some high-quality sort of decision-making there, and those banks are doing surprisingly well. So, they're kind of quasi-private, if you will. Now, uncertainty. Okay, so these are projections from the National Bank of Ukraine for inflation and for GDP. What you should see here is that the central bank is projecting growth, but anything between minus 10 and plus 20 can happen. So, imagine you have this range of possibilities. You can have a major boom, or you can have another economic catastrophe. Same with inflation. You can have a deflation, you can have 20 percent inflation. It's extremely hard to operate in these conditions, right? So, your planning horizon is not 10 years, it's not five years, it's not even one year. It's going to be like a

week, a month, maybe a couple of months. It's very hard to operate in these conditions. And some of this is obviously dictated by the war because you don't know where it's going and, you know, you have questions, you know, if you're going to be around and what will happen with sports, what will happen to the Polish-Ukrainian border, so lots of unknowns.

51:29

Some of this you can control, obviously, but some of this unknowns you can't control. And this goes back, Markus, to your earlier question. These are commitments from various allies of Ukraine to support Ukraine over time. And you see nothing is happening here, right? That's a source of uncertainty, totally avoidable. This was the announcement made by the European Union that is going to give 50 billion to Ukraine over the course of four years. It was announced in June. It was voted, approved by the EU summit yesterday, so it's February 1st. And the first trans-Ukrainian Ukrainians can expect to see is going to be in March. So there is a big distance between June and March, almost nine months, right? So it's really hard to imagine that something like this can be happening when you have an active shooting war. You don't have this luxury to wait nine months until the money is going to arrive. And, you know, just there as a reminder, we have \$300 billion of Russian frozen assets sitting there. And I find it shocking that this resource has not been used because there's going to be enough to fund Ukraine for at least three years. This is economic aid plus military aid. So I don't see why European taxpayers or American taxpayers have to pay for this war. You know, the Russian government should pay for that. Now, let me move to maybe the most speculative part, which is what will happen if Ukraine is not going to receive aid it desperately needs for a whole variety of reasons. And my first slide is going to be about willingness to fight in Ukraine, because I think that's going to be the most important factor. And clearly, there is an overwhelming majority of people in Ukraine, according to various credible polls, who say, we are not going to accept any peace deal and sacrifice some lands to achieve this. And in part, this is because Russia has zero credibility in terms of, you know, signing any deals. Basically, it violated every single treaty it signed with Ukraine. But it's also about the people who are left under Russian occupation, and we don't want to leave them behind. So that's a very important consideration. So this theory is telling me that even if there is no aid or military economic aid, the war is not going to stop. There is still a lot of support to keep fighting.

Markus Brunnermeier: There's a lot of media news saying, oh, that the Ukrainian people are getting tired of the war. You would say that's overplayed by the western media?

Yuriy Gorodnichenko: Well, nobody wants to be a butcher himself or herself. And, you know, Leon Trotsky was saying that you may not be interested in the war, you may be tired of the war, but the war will be interesting to you anyways. So, we may be tired, but it doesn't matter, you have to keep going. In a way, it makes life easy in Ukraine, because you know there is really no alternative, you just have to keep doing this. Now, this is willingness to fight. How about resources? One margin of adjustment is reserves. This is reserves of the National Bank of Ukraine, foreign currency, it's all-time high, 40 billion dollars. Is this a big number? Well, to get a sense of how much this is going to help Ukraine, these are the interventions of the central bank. Now it spends roughly three, four billion dollars per month to support currency and cover all

other gaps in the economy. So you take 40, divide by four, maybe three, this is going to give you a year of resources. That's number one.

55:27

Number two, the government, the central bank is changing its policy framework. Now it allows some fluctuations in the exchange rate. And so this allows to stretch this resource, this reserves over a longer period of time. So maybe you're talking about 2024, 2025, being covered just straight through reserves. That's significant. Another thing I wanted to mention is that when in Ukraine, everybody is talking about war production, total war, this kind of sense. And we need to understand how far this can go. And during World War II, when we had total war, the level of military spending in the economy was really high. And especially when the situation gets desperate, like in Germany or Japan in 1944, you could have 70 or more percent of your GDP in military outlays. Now, as a point of reference, Ukraine in 2023 spent 32. It's a big number, but it's not roughly half of what it can be. And also see the defense industry, according to the, you know, an interview of the head of the defense industry, he was saying that in 2023, military production increased by 60%. It's probably going to increase even more. Now, how can you achieve this? Lots and lots of things that are possible here. One is to raise more revenue. Recently the government adopted a new revenue plan, a national strategy for taxes. You can be much more strict in terms of controlling your foreign exchange, since you can rely a lot more on financial repression, going back to your, Markus, point that there may be a lot more government intervention. There are lots of possibilities here. And so I think there is some reserve in terms of how the military economy can grow in Ukraine. I don't want this to happen, but it may be a possibility.

Markus Brunnermeier: Also, can you control the black economy better in a world where everything is digitized? Is digitization a big issue in Ukraine? And hence, can you somehow control the black economy somehow better or not?

Yuriy Gorodnichenko: You know, the estimates of the black economy, shadow economy in Ukraine before the war were anywhere between 30% and 50%. It's a lot. It's true that Ukraine is highly digitized. But despite all these digital advancements, I'm sure this is still very, very big. But you know, the government is actively working to prevent this from happening. For example, if they buy fuel like gasoline or diesel for military purposes, they're going to add color to it. So, it's very easy to identify that it was stolen from some military facility, and then it's going to be much easier to detect. So, the government is actively working on preventing this shadow economy from taking over. Now, the last thing I want to mention here is that, you know, we often talk about economic and military aid to Ukraine as an act of charity, and obviously there is an act of charity in that, but it's really also an investment in security, and just we have to think not only about the cost of money that goes to Ukraine, but also about the cost of not supporting Ukraine. And I don't want to kind of draw any apocalyptic kind of pictures here, but, you know, some things can definitely happen. For example, Ukraine generates 60 percent of its electricity through nuclear power. This largest nuclear power plant in Zaporizhia is still under Russian occupation. It's the largest nuclear power plant in Europe. The useful life of nuclear roads in this place is approaching the end. What is going to happen with this? Nobody knows. Now imagine

not just this part is in chaos, but all of it who is going to control that? You know people often say Yugoslavia was bad because it created all sorts of violence and arms in Europe.

59:37

What will happen in Europe if Ukraine falls is going to be much, much, much worse than Yugoslavia. Commodity prices will likely increase, you know, Ukraine is a big producer of food Russia is a big producer of food. Russia is supplying a lot of oil and gas. This war is not going to end anytime soon and all sorts of fires and problems in oil refineries in Russia will intensify. This is just from a few days ago, something happened in a big oil refinery in Tuapse, a city on the Black Sea. I don't know what happened, but it was a big fire, okay, so something happened there. We also see that, you know, once Europe becomes a risky place, you may have a serious possibility that it's not going to be an attractive place. You know, we see in Korea what is called the Korean discount, that, you know, Korea is an advanced economy, but it's not as attractive to investors because there is a possibility that some crazy dictator can fire missiles into South Korea or start a war. Something like this may be happening in Europe. We know from the Ukrainian experience, even if you don't have direct fighting, people move away from dangerous areas because they think it's not, you know, safe, and so people can move from Eastern Europe somewhere else in Europe. We also have a possibility of a migration crisis, refugee crisis, when it's not only Ukrainian refugees flooding Europe, and I want to remind everybody that in the worst days of this, you know, refugees 200,000 Ukrainians were leaving Ukraine, going to Europe on a daily basis, so it may be even worse than that. And then you add Africa to this because, say, food prices may be high, it may be really overwhelming. I also wanted to mention that I don't think Ukraine is the last target for Russia. You know, the Russian government is very clear that they want to push it as far as possible, and I see a real possibility that there will be a test of NATO's Article 4. Maybe the Baltic countries, maybe in Poland, maybe in Finland, who knows where it's going to happen. And just to give you a sense of progression in military spending that can happen, Ukraine was an average European country committing roughly 1.5% of GDP. This is roughly Germany. Okay? It went to 4%, now it's 32%. And you don't have active shooting war, but you have serious threats, you still have to commit huge resources. The U.S. was... spending 10% of GDP at the height of the Cold War. Now this will correspond to roughly two and a half trillion dollars every year. And those dollars are not spent on schools, hospitals, on green transition. And so I have to really think about where this is going to end and if it's going to help us in other dimensions, like to achieve green transition and decarbonization. Now, the final slide I want to do is to say that everybody should be prepared for a long war and everybody should be ready to support Ukraine for a long time. You have to be very careful in terms of your macroeconomy. Ukraine is doing an okay job, but it's very hard to do if you don't have economic aid. So this is probably the biggest source of uncertainty there. And to mention this one more time, you know, what we see here was this Russian invasion. It's not just about Ukraine. Ukraine is really a linchpin to so many fates in Europe and everywhere else in the world. In Korea, in Taiwan, in the Middle East, many, many places. And so we need extraordinary aid in Ukraine and sort of ironically military and economic aid to Ukraine is the best investment in peace you can have now. And my final slide, I know I gave you a lot of material. If you're interested in reading more about Ukraine, CEPR had a series of reports on the reconstruction of Ukraine on

wartime economy, on what should happen after the war. And there is a big book on the reconstruction of Ukraine. I'll stop here.

1:03:54

Markus Brunnermeier: Thanks a lot, Yuriy. So let me ask you this way, if you could do one thing with regard to the economic policy in Ukraine, which thing would you implement or change compared to what's done right now? Is there something in particular that could improve the economic situation?

Yuriy Gorodnichenko: You know, it's a long list of things that can be improved, lots and lots of challenges. I think, you know, the fiscal deficits, external deficits are the biggest challenge. If we can somehow protect economic activity in Ukraine through better air defenses, through better access to seaports, through better access to all sorts of solidarity links with the European Union, I think that's going to be a big boost for the economy. And so then Ukraine is going to be much more self-sufficient going forward.

Markus Brunnermeier: Are there any statistics saying all the regions where there's better air defense are less suffering from the economic crisis? Just to show how important air defense is. It pays off to have good air defense because the underlying economy is doing better. Using some variation in the data?

Yuriy Gorodnichenko: Yes. Yes. So there is. I'm not sure. military secret, but, you know, just from observing the effectiveness of air defenses in Kyiv, you know, it is a very well protected city. They shoot down almost everything that Russia sends to Kyiv. You look at other places like Kharkiv, Dnipro, and there, Odessa, and then you have much less protection. So Kharkiv is probably the least protected city because it's so close to the Russian border. It's only 40 kilometers away. They are shelled and, you know, missiled multiple times a day, like two times, three times. So that city is not protected.

Markus Brunnermeier: Okay. So we typically want to end at the positive note. Can you give us some positive outlook, your, I mean, I appreciate your outline, this what if scenario, you know, if the support crumbles and doesn't stay, perhaps you can end in one sentence or two with a very positive note.

Yuriy Gorodnichenko: Okay, one sentence is that my baseline forecast for how this war is going to end is that Ukraine will win, it will defeat Russian aggression, but it really needs help from its friends.

Markus Brunnermeier: I'm just reading some questions. Let me just ask, and with one final question, you know, there are some regional partnerships or twin towns or twin cities. Does this make any material difference in a sense, or is this at this stage a drop in the bucket?

Yuriy Gorodnichenko: You know, every dollar counts. Let me give you an example. Denmark took over, and became like a sister region for Mykolaiv, which was very much affected by the

war. And I know they do many wonderful things because they have this direct line with Denmark. So this can be effective.

1:07:24

But having said this, we have so many different donors in Ukraine, there has to be more centralization, more coordination there, just to make sure we don't have duplication and waste of resources.

Markus Brunnermeier: Okay, so I hope that the war will be over soon and the suffering will go away. That's a very sad situation at the moment. And I really appreciate you for laying this out. And I think we learned a lot about how the war economy is run in Ukraine. Thanks. And-

Yuriy Gorodnichenko: Thank you very much for giving me this opportunity. Thank you, Markus. Thanks.