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Commentary

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Towards a better integrated, better equipped Ukraine

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As we approach the second anniversary of the Russian invasion a pessimistic mood has prevailed within Ukraine and among its allies. The military situation on the ground has not unfolded as expected after the failed summer offensive, there are signs that western support is waning, and Russia's economy and war support has been surprisingly resilient. While these important considerations will affect the war's outcome, there are several encouraging signs concerning Ukraine's post war security. This discussion may appear premature with the outcome of the war remaining in the balance, but a number of important trends are emerging in the defence industrials sector that will influence Ukraine's security situation for decades to come.

Ignoring extreme outcomes, such as the total collapse of the current Ukrainian government or the overthrow of the Putin's regime, it is likely that some sort of ceasefire and limited diplomatic accommodation will emerge. This will refreeze the conflict along new lines. If we take this outcome as a baseline, several inferences can be made about future of transatlantic security.

A major factor in this war has been the character of the respective combatants' and their supporters' defence industrial bases. Ukraine and Russia have exhausted their pre-war stocks of many types of equipment, munitions and stores (in some cases within days of the invasion), altering the conduct of the war. This forced both states to rely heavily on foreign suppliers for finished goods and subcomponents to continue even basic combat operations. The consequences of this extends beyond the immediate battlefield or even the potential outcomes of this war: it can be viewed as the leading edge of a broader strategic, economic and military shift towards the rejuvenation of Euro-Atlantic institutional structures, such as the European Union and NATO.

The paper will discuss the development of Ukraine's defence industrial base since gaining independence in1991 to understand how the 2022 Invasion has affected its development and the future of the country. Since 1991 Kyiv has attempted multiple reforms to their defence industrial base, but the 2022 invasion reinvigorated these efforts and accelerated their adoption. The outcome of these reforms will help to provide security and prosperity for both Ukraine and its allies and trade partners going forward.

Post-independence era (1991-2014)

Upon gaining independence Ukraine inherited a miniaturized clone of the Soviet military and industrial base. This was evident in its material, initially made up of soviet-era equipment.

Soviet Ukraine had a highly technical economy and was integrated in the country's overall supply chain, accounting for approximately 30% of the Soviet Union's defence industry, including 750 factories and 140 scientific and technical institutions, as well as firms such as Antonov, Motor Sich and Malyshev Factory, which were leaders in the production of large transport aircraft, aero engines and armoured vehicles, respectively.

The USSR's dissolution dampened but did not end the relationship. Russian and Ukrainian firms maintained their cross-border supply chains despite the difficult economic conditions that marked the first few years of independence. This was evident in gas turbines; Ukraine's Ivchenko-Progress and Motor Sich (two closely cooperating firms responsible for design and production, respectively), produced gas turbines engines for a wide array of Russian civil and military aviation designs, including military helicopters like the Mi-24 and 26 and large transport aircraft. According to a 2014 *Radio Free Europe* article, approximately half of Russia's strategic ICBM (Intercontinental ballistic missile) components could be traced back to Ukrainian subcomponent providers. By comparison defence exports to Russia accounted for 30% of Ukraine's entire civil and military export numbers.

This relationship remained strong between 1991 and 2014, but Ukraine started to diversify its export markets. It drew upon its excessive stocks of former Soviet equipment, but also developed relatively low-cost alternatives and modified systems to make them attractive to prospective foreign buyers. The People's Republic of China eventually rose to become Ukraine's largest and most consistent foreign customer due to its centrality in post-Soviet military supply chains. China frequently acquired Russian systems to accelerate its military modernization in the 2000s, while simultaneously developing its domestic industrial capacity. The latter objective was significantly easier to achieve, especially when People's Liberation Army started producing copies or close derivatives of existing Russian systems. Yet the entire industrial supply chain for complex military capabilities was difficult and cost-prohibitive, which presented Ukraine a lucrative opportunity to employ its expertise in subcomponent manufacturing and win a large market share with the Chinese market.

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These factors led to an impressive period of growth, capped off in 2012 when Ukraine became the fourth largest defence exporting nation, selling US$1.34 billion to foreign markets. But growing headwinds emerged. While Russia remained a critical partner, it also attempted to curtail Ukraine's defence export offerings in areas where its firms provided a competing product. This was evident in the armoured fighting vehicle market, where the Malyshev factory in Kharkiv was one of the two primary tank production facilities in the Soviet Union and could compete effectively with Russian producers.

In 1996 Ukraine signed a contract with Pakistan to supply 320 T-80UD: while final assembly was undertaken by Malyshev, they would have relied heavily on Russian parts. The contract was eventually fulfilled by substituting domestically produced components to replace embargoed Russian ones. This resulted in Ukraine building an entirely domestically produced derivative of the T-64/T-80 tank, the T-84, and is a good example of the import substitution policy which became common across the entire spectrum of Ukraine's defence industrial base.

Ukraine's own military stagnated during the 90s, suffering from insufficient investment, corruption, a direct effort to contract its size, and a lack of pressing national security threats. The 1994 Budapest memorandum signed by Russia, the United States and Ukraine, promised to guarantee the latter's security in exchange for several concessions, the most notable of which was giving up its inherited soviet nuclear arsenal. Consequently, the Ukraine had little need for a large standing army and a major contraction occurred.

Ukraine's conventional military material remained soviet-era equipment, but locally-produced derivatives became more common as older equipment was replaced. For example the Armed Forces of Ukraine's (AFU's) primary Infantry Fighting Vehicle was the BTR-80, which was later supplanted by the locally designed and manufactured BTR-4. Similarly, The Armed Forces of Ukraine relied heavily on the T-64BM, itself an improved product of the Soviet T-64B.

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Finally, the Ukrainian defence industry was affected by structural issues surrounding overcapacity, poor rationalization and corruption. This was not surprising and was a common issue across all former Soviet and Warsaw Pact state-owned industries exposed to market forces for the first time. Reform was a perennial objective for successive Ukrainian leaders, particularly given the extreme levels of corruption in the system. Corruption undermined the sector's profitability and ensured that the Ukrainian military received substandard equipment and less value for money. Corruption and lack of accountability contributed to a lack of confidence in the sector from western investors. This diminished the competitiveness of Ukraine's defence industries, just before the country would require it most.

The post-Maidan era (2014-2022)

The Maidan revolution in 2014 and subsequent Russian-sponsored succession war that erupted effectively ruptured the Ukrainian-Russian defence industrial supply chains. Cross-border defence trade all but ceased, and programs realigned to address this reality. In aviation, for example, Russia started its own import substitution efforts to fill in subcomponents it could no-longer access from Ukraine, or western countries that had also added sanctions in retaliation for Russian aggression. This was particularly critical for aviation and naval engines because a number of Russian designs had no analogues in domestic production (or available for purchase on the international market).

The consequences of the war were far more profound for Ukraine. First there was the domestic imperative to rebuild the armed forces and meet the ongoing needs of the war in the east of the country, as well as the potential of direct aggression from Russia. From a low of 123,000 active duty soldiers in 2014[1], it had expanded its standing army to over 209,000 personnel by 2021.[2]

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However, equipping this rapid expansion faced some challenges as the government also attempted to reform the military along the lines of its broader political objectives: foremost was reorienting the country towards the Euro-Atlantic political, economic and military structures, such as the European Union and NATO. The Ukrainian *State Program for the Development of the Armed Forces of Ukraine until 2020* policy document from 2017 stated that the military would achieve the "standardization and codification of weapons and property in accordance with the NATO standard." Several NATO allies, including the United States, United Kingdom and Canada, ramped up their assistance in reforming the Ukrainian military.

Yet the *2020 State Program's* objectives were lofty and unrealistic, considering Ukraine's Soviet inheritance organizationally and culturally. Relevant to the industrial side, in 2017 there remained a complete reliance on former Soviet

Union-designed systems and their derivatives, which frequently did not conform to these standards. Furthermore, given the potential for a much larger conflict, Ukraine delayed the implementation of the 2020 program to ensure that their military readiness remained high. This meant that the Ukraine's defence industrial base largely continued the development and fielding of its former Soviet-based designs, rather than adopting NATO-standards.

Ukrainian defence exports declined precipitously after 2014, only reaching $514M in 2020 from its 2012 high of $1.34B in 2012. The country had dropped from the worlds' fourth largest arms exporter to fourteenth in 2020. The growth of the domestic procurement made up for the loss of the Russian export market – two thirds of Ukroboronprom's total production value was related to domestic production in 2018. China remained Ukraine's largest and most diverse customer, acquiring weapons and technical knowledge from across its defence industrial base, as well as investing in the sector when western investors were much more reticent to do so.

Defence reforms to bring the Ukrainian military into line with NATO standards enabled some new sales and acquisitions to NATO member countries – Ukraine made its first direct sale to the organization in 2018. But these were only the first tentative steps in the integration of their respective defence industrial bases, and much greater work was required in order to expand cooperation in the future.

The Maidan revolution also likely changed the character of the defence industry in a number of other ways. Kyiv continued export diversification efforts to develop new markets for their products. The aviation engine industry was a key driver in this and saw significant success selling their jet engines to foreign military customers. Ukraine was able to tack onto a changing global defence market, where new entrants have been able to make substantial inroads into the marketshare of major arms producers like The United States, Russia and France. Ukraine was an early leader in this push, but it was later joined by states such as Poland, the Republic of Korea and Turkey.

However, the nature of Ukraine's involvement in this shift has started to diversify, encompassing all tiers of production, from prime to subcomponent contractors. Ivchenko-Progress, for example, has become the leading supplier of aeroengines for the successful Turkish unmanned aerial vehicle (UAV) manufacturer, Bayraktar Defence. The burgeoning relationship can be attributed to several factors – the performance and cost competitiveness of

Ukraine's offering, its proximity to Turkey, but also Ukraine expresses less concern with the potential end-use of these systems compared to other liberal democratic nations including Canada, which curtailed sales of specific systems to countries over human rights concerns.

As 2021 ended Ukraine's defence industrial base showed some significant efforts to improve its capacity and capability but was far away from meeting its own objectives. It was completely unprepared for what occurred next.

The Russian invasion and beyond (2022 to present)

Russia's direct invasion of Ukraine in February 2022 created a disruption even more profound than the 2014 Maidan revolution for Ukrainian defence industry. It became responsible for keeping the country war effort going, while undertaking major reforms in order to rationalize the sector better for a number of purposes.

First, a significant proportion of the country's industrial capabilities, both military and civilian, suffered damage or capture during the course of the war. According to analysis from the Kyiv School of Economics in August of 2023, the state has suffered approximately $150 billion in direct damage to Ukrainian economy, with industry accounting for $11 Billion of that total. It is fair to assume that defence industry related damages are disproportionately represented in that total, as Russia has attempted to disrupt military production. Furthermore, a number of key defence industrial firms are located in the eastern half of the country, making them vulnerable to Russian attack. For example, the Malyshev Tank work in Kharkiv came under significant attack at the beginning of the war, and has suffered regular attacks since. Similarly Motor Sich's facilities in Zaporizhzhia province have been frequently attacked, while many smaller subcomponent producers have suffered similar disruptions. As a result, several production facilities have been relocated into Western Ukraine or out of the country altogether.

Second, Ukraine has placed its economy onto a full war footing, focusing its energies on its military needs. Although this trend started in the wake of the 2014 revolution, the 2022 invasion provided a far greater impetus for reforms. Defence exports have all but ended – for the most part due to prioritizing the material needs of the war, but also the reticence of some states, including China, to be viewed as a party to the conflict.

The 2022 invasion also spurred a much-needed reorganization of Ukrainian defence industries in order to rationalize production for the war effort. Perhaps the most significant was the reform of Ukroboronprom from a State-owned enterprise to a joint stock company named Ukrainian Defense Industry (UDI) with the intent of aligning closer to western business standards, increasing accountability, rooting out corruption, and better allocating resources.

The primary outcome has seen a monumental increase in domestic production. As one report by the Institute for the Study of War noted, Ukraine sought to triple its defence output in 2023 and sextuple it in 2024.

The equipment base of the Ukrainian armed forces has changed over the last two years, becoming decisively more aligned with NATO and its close allies. The Ukrainian military has increasingly come to rely on Western systems to replace combat losses and equip newly stood-up units. This is due in large part to the scale of the conflict, which revealed shortcomings in the country's war fighting capacity. The conduct of the war has attrited many of Ukraine's existing military capabilities, and forced it to diversify the sources for replacement, which only NATO allies and its partner states can provide.

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A novel development to Ukraine's industrial base has been the willingness of foreign defence firms to invest and build facilities in the country, despite the ongoing hostilities. According to the then-Defence minister Oleksii Reznikov in August 2023, approximately 50 firms plan on investing in the country, including major players like BAE Systems, Rheinmetall and Bayraktar Defence. These deals will include the capacity to produce artillery systems, armoured vehicles and drones as well as other defence equipment.

One critical aspect is Rheinmetall's decision to build an overhaul and repair facility in Ukraine to service vehicles damaged in combat. Modern advanced systems require extensive contract support to provide sustainment. As Ukraine adopts more NATO-standard equipment this segment of the defence industrial base activity will grow organically within the country – deepening its relationship with allies and their supply chains.

These industrial relationships have been heavily encouraged by Allied governments. Several, including Germany and the United States, have facilitated meetings between Ukraine and their domestic firms. According to the ISW's analysis, "At least 10 European countries have established joint production, weapons development, or military equipment repair partnerships with Ukraine."

The significance of these deals is threefold. First, they provide badly needed foreign direct investment into the Ukrainian economy, when few in the non-military space would be willing to do so. As noted earlier, they also assist Kyiv's warfighting ability in the short-term, potentially enabling the transfer of critical production knowledge to the country in order to improve the AFU and sustain that advantage. Finally, establishing these relationships now builds the foundation for a post-war future for Ukraine, even if the outcome of the war's termination remains difficult to parse. The AFU's current force structure remains heavily reliant on its Soviet-era base designs, but this will inevitably decline after the war's conclusion. Many platforms currently in use are suffering war-weariness and likely to be considered unserviceable at the conflict's end. Furthermore, a large segment of Ukrainian systems are Russian in origin and no exact replacements will be available. Consequently, the end of the war will likely accelerate Ukraine's movement towards western standards and equipment.

The investments into defence production by Ukraine both inside the country and in neighbouring allied nations will facilitate a rehabilitation of the country's defence industry after hostilities end. In some areas this will likely lead to production overcapacity. For example artillery shell demand was relatively low for the past thirty years, which resulted in production capacity shrinking. Although demand for artillery shells has dramatically spiked due to the war, it will likely return to previous levels afterwards (especially considering allied efforts to bolster their own munitions production capacity). This may not be a completely negative outcome – Ukraine may well find new niches where it can develop a strong, sustainable marketshare using the capacity it has built for the War. The opening of a UAV manufacturing plant by Bayraktar Defence is one such venture that has strong potential given the Ukraine's deep aviation sector and the strong market demand for such systems. All in all, these industrial partnerships could become a major source of economic activity and security partnership at the war's conclusion.

Conclusion

Well before the 2022 invasion, Kyiv had set the country on the path to align itself with Euro-Atlantic political and military structures. The invasion, accelerated these efforts, which might have taken a decade, to a matter of short years. They include reform of Ukrainian defence industries, the replacement of former soviet designed or derived systems with NATO-standard analogues, and the investment of allied firms.

These efforts solidify Ukraine's relationship with its western neighbours in several key respects. On a broad political level, the integration of Ukraine's defence industry into the western market is an important step for the country's inclusion into Euro-Atlantic structures like NATO and the EU. It facilitates its membership by harmonizing technical and legal standards, increasing competitiveness, as well as enhancing transparency and accountability. Remarkably, Ukraine's defence industry is on the way to achieving many of these objectives in the space of two or three years.

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At the same time, the unfolding transformation of Ukraine's defence industrial base has many practical consequences for the country's security situation that are less visible but no less important. The AFU's adoption of NATO standards and patterns will facilitate its allies ability to assist in providing for its defence. This can only occur, however, if the country's defence industrial base has the capacity to support its military. The establishment of modern sustainment enterprises in the country, manned by trained Ukrainians, will further add to the country's security. It will ease the transition to new weapons, but also blunt any potential concerns about the escalatory effects of military support in a time of war. If Ukraine already produces, employs and sustains the same or equivalent capabilities as is offered by NATO allies then allies contribution to Ukrainian efforts would have little to no escalatory effects.

Furthermore, there are benefits for Ukraine's allies in these developments. Ukraine's defence industrial base will have emerged from the war with a sharpened understanding of what is necessary to fight a modern war, which can aid their allies security and defence. There are, of course, trade-offs for Ukraine in increasing ties to NATO and NATO-aligned countries. Ukraine's integration into Euro-Atlantic structures will likely curtail its freedom to sell arms to some customers (such as competing great powers like China or countries with poor human rights records). Given China's previous position as Ukraine's largest export market, this may potentially be a significant challenge for the post-war rehabilitation of its defence industry.

These developments signal an optimistic future for Ukraine and the transatlantic community once hostilities cease. Developments in the Ukrainian defence industrial base suggest deeper, better aligned and more integrated security relationships; Ukraine will likely be much better equipped to resist Russian aggression in the future. MLI

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Richard Shimooka is a Senior Fellow at the Macdonald-Laurier Institute. He was a Senior Fellow at the Defence Management Studies Programme at Queen's University from 2007 to 2012, and a Research Fellow at the Conference of Defence Associations Institute from 2012-2017. Richard's work covers a diverse array of topics, including Canadian and American foreign and defence policy, modern airpower and defence procurement.

He is a frequent commentator in the media on security and defence issues and has published articles in the *National Post*, *Ottawa Citizen*, *The Hill Times*, *War on the Rocks*, *On Track*, *Canadian Military Journal*, as well as a book, *Let Sleeping Dogs Lie: The Influence of External Studies and Reports on National Defence Policy* (Queens' School of Policy Studies) with Douglas Bland and *Vimy Paper 33: The Fourth Dimension: The F-35 Program, Defence Procurement, and the Conservative Government*, 2006-2015 (CDA Institute). He has an forthcoming work with UBC Press entitled, *No Nobler Purpose: Canada, The United States and 1996 Rwandan Refugee Crisis*.

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Endnotes

1 See The Military Balance 2014, page 195.

2 See The Military Balance 2021, page 209.

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