ECONOMIC MULTIPLIERS OF THE DOMESTIC DEFENCE INDUSTRY: AN EMPIRICAL ANALYSIS OF THE IMPACT OF ARMS EXPORTS ON GDP OF SMALL WESTERN BALKAN ECONOMIES (2019–2023)

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Abstract: The defence industry of the Western Balkans, anchored by Serbia's Yugoslav-era industrial base and by smaller producers in Bosnia and Herzegovina, Croatia, Montenegro, and North Macedonia, has experienced sustained export growth across the 2019–2023 window. The literature on the macroeconomic impact of arms exports on GDP, anchored in Defence and Peace Economics, has matured substantially in the same period, but no published study has yet derived an arms-export multiplier specifically calibrated for the small open economies of the Western Balkans. This article, written with the benefit of the SIPRI Arms Transfers Database update for 2023 and the most recent national accounts releases for the five reference countries, addresses that gap by constructing the Western Balkan Defence-Export Multiplier (WBDEM), a country-specific GDP-elasticity-of-arms-exports metric calibrated to the small-open-economy structure of the region. The WBDEM is operationalized through a four-step procedure that decomposes the arms-export shock into direct, indirect, and induced components and adjusts the elasticity for the conducting economy's domestic-absorption capacity, import-content of intermediate inputs, and labor-market frictions. The article reviews the underlying evidence base, presents WBDEM estimates for the five Western Balkan economies, and discusses the policy implications of the results for industrial-policy planning across the region. Three hypotheses are tested: that arms exports exert a measurable positive multiplier on the GDP of small Western Balkan economies; that the multiplier is heterogeneous across the region with Serbia exhibiting the largest absolute coefficient; and that the multiplier's magnitude is conditioned by the import content of intermediate inputs in the defence supply chain rather than by arms-export volume in isolation. The doctrinal and policy implications are that defence-industrial policy in small Western Balkan economies should integrate the WBDEM as a planning instrument and that NATO and EU partners engaging with regional defence-industrial cooperation should weight their offset and procurement strategies against the WBDEM-derived absorption profile of each partner economy.

Keywords: *defence industry, arms exports, economic multiplier, Western Balkans, small open economy, GDP, defence economics, SIPRI.*

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INTRODUCTION

The defence industry of the Western Balkans is the smaller, regionally anchored remnant of what was, in the 1980s, one of the world's mid-tier arms producers. The Yugoslav-era industrial base, distributed across Serbia, Bosnia and Herzegovina, Croatia, Montenegro, and North Macedonia, did not survive the 1991–2001 dissolution wars intact, and the post-conflict recovery was uneven and slow (Vidović, Dželetović, & Beriša, 2019). Across the 2019–2023 window, however, the regional sector has experienced sustained export growth: Serbia's annual arms-export value exceeded one billion United States dollars in 2021, and the sector now employs an estimated several thousand workers in Bosnia and Herzegovina alone, with similar concentrations in Croatia and Serbia. The Russian invasion of Ukraine in February 2022, with its catalytic effect on European defence demand, has further intensified the export pressure on the region's producers (Tian et al., 2023).

Inside this transformed environment, the question of how much the regional defence industry contributes to the GDP of the small open economies that host it has acquired analytical urgency. The literature on the macroeconomic impact of military expenditure and arms exports on GDP, published primarily in Defence and Peace Economics, has matured substantially during the analyzed period. Laborda Herrero and Utrero González (2023) document direct spillovers from arms-export shocks to labor productivity and GDP growth in the United States; Emmanouilidis and Karpetis (2022) demonstrate that the cross-country relationship is mediated by total-factor-productivity heterogeneity and global shocks; and Solomon (2022) re-examines the demand-side determinants of NATO's two-percent guideline through a dynamic panel framework. None of these contributions, however, has been calibrated to the small-open-economy structure of the Western Balkans, with its high import content of intermediate inputs, narrow industrial backward linkages, and pronounced labor-market frictions.

The empirical record from the region during 2019–2023 yields three observations that motivate the present analysis. The first observation is that arms-export growth has been uneven across the five economies, with Serbia accounting for the largest absolute volume and Bosnia and Herzegovina exhibiting the highest export-to-GDP ratio in defence-related goods. The second observation is that the regional sector's value-added structure is dominated by light weapons, ammunition, mortars, light artillery, and military vehicles, a portfolio whose backward linkages into the domestic economy differ categorically from those of the large-platform aerospace exports characteristic of the United States, France, or Germany. The third observation is that the existing macroeconomic literature, while rich in models for large producers, has not produced a multiplier specifically calibrated for the small-open-economy structure that characterizes the Western Balkans.

The central research question of this article follows from that gap. Across the 2019–2023 window, what is the GDP-elasticity of arms exports in the small open economies of the Western Balkans, and how does it vary across the five reference countries? Three hypotheses guide the analysis. The first hypothesis (H1) holds that arms exports exert a measurable positive multiplier on the GDP of small Western Balkan economies, consistent with the broader spillover findings in Laborda Herrero and Utrero González (2023). The second hypothesis (H2) holds that the

multiplier is heterogeneous across the region, with Serbia exhibiting the largest absolute coefficient on account of its relatively deeper industrial backward linkages and its more diversified export portfolio. The third hypothesis (H3) holds that the multiplier's magnitude is conditioned by the import content of intermediate inputs in the defence supply chain rather than by arms-export volume in isolation, consistent with the cross-country heterogeneity findings of Emmanouilidis and Karpetis (2022).

The original contribution of this article lies in the introduction of the Western Balkan Defence-Export Multiplier (WBDEM), a country-specific GDP-elasticity-of-arms-exports metric calibrated to the small-open-economy structure of the region. The WBDEM is operationalized through a four-step procedure that decomposes the arms-export shock into direct, indirect, and induced components, adjusts the elasticity for the conducting economy's domestic-absorption capacity and import-content of intermediate inputs, and integrates labor-market frictions through a wage-share parameter drawn from national accounts. To my knowledge, no published study in the SCOPUS-indexed defence-economics literature available at the time of writing has produced such a region-specific multiplier instrument for the Western Balkans. Where existing scholarship treats arms-export multipliers as a single number applicable across heterogeneous economies (Reuter, 2021), the WBDEM disaggregates the multiplier into its structural components and produces five country-specific estimates for the 2019–2023 window.

The remainder of the article is structured as follows. The next section reviews the relevant literature on defence-export multipliers, small-open-economy defence industrialization, and the Western Balkans regional context, and sets out the mixed-method research design. The Research Results section presents the WBDEM estimates for the five Western Balkan economies and the underlying components of each. Three analytical sections follow, treating in turn the conceptual structure of the WBDEM, its empirical application across the five reference countries, and the doctrinal and policy implications for industrial-policy planning in the region. A concluding section returns to the three hypotheses, articulates the limitations of the design, and identifies the validation studies that the article cannot complete on its own.

LITERATURE REVIEW AND METHODOLOGY

Literature Review

The literature relevant to defence-export multipliers in small open economies can be organized into four sub-fields. The first sub-field is the general macroeconomic literature on the relationship between military expenditure and economic growth. Solomon (2022) re-examines the demand-side determinants of NATO's two-percent guideline through a dynamic panel framework, finding that fiscal conditions exert significant influence on the rate at which member states approach the formal guideline; the empirical signature of his analysis is that the demand for military expenditure is income-elastic in periods of fiscal expansion and inelastic in periods of fiscal consolidation. Emmanouilidis and Karpetis (2022) document the cross-country dependence and heterogeneity of the defence-growth nexus, demonstrating that the relationship is mediated by total-factor-productivity heterogeneity and by global shocks; their findings imply that any country-specific multiplier must be calibrated rather than assumed.

Biscione and Caruso (2021) extend the analysis into the transition-economies

cluster relevant to the present article, documenting a positive relationship between military expenditures and income inequality across a panel of 1990–2015 transition countries; while inequality is not the primary outcome variable of the present analysis, the structural similarity between transition-economy defence sectors and the Western Balkan defence sector provides a relevant comparative anchor. Tian et al. (2023), reporting in Defence and Peace Economics on the developments in military expenditure following the war in Ukraine, document the structural shift in European defence demand that has reshaped the export environment of small producers across the 2022–2023 window. The implication for the Western Balkans is that the export pressure on regional producers has intensified materially in the analyzed period, a contextual fact that conditions any 2019–2023 multiplier estimate.

The second sub-field concerns the specific question of arms exports as a macroeconomic instrument. Laborda Herrero and Utrero González (2023), publishing in Defence and Peace Economics on the United States case, document direct spillovers from arms-export shocks to labor productivity and GDP growth using a connectedness-measurement technology grounded in modern network theory; their finding that the spillover runs from arms exports to labor productivity and GDP growth, and not in the reverse direction, supplies the causal-direction foundation that the present article's WBDEM construction relies on. Reuter (2021), publishing in the same journal on the spillover effects from defence to civilian sectors, supplies an empirical methodology drawing on labor-market microdata that complements the macroeconomic Laborda Herrero and Utrero González approach.

The third sub-field concerns small-open-economy defence industrialization. Chovančík (2019), publishing in Comparative Strategy on the policies of Czechia and Slovakia, documents the institutional and procurement-policy structures that have characterized the defence industrialization of two small Central European economies, with implications for the Western Balkan cluster that shares both the post-socialist institutional legacy and the small-open-economy structure. Calcara, Gilli, and Gilli (2023) extend the analysis into the European context, examining the structural pressures on the European defence industry under conditions of Russian aggression, with implications for the supply-chain integration of small producers into the larger European defence market. Giumelli and Marx (2023) analyze the European Defence Fund precursor programmes and document the asymmetric distribution of EU-supported defence-industrial cooperation, a distribution that conditions the export environment of the Western Balkans even though the region is not (as of early 2024) fully integrated into the EDF mechanisms.

The fourth sub-field, most directly relevant to the WBDEM construction, concerns the regional Western Balkans context itself. Vidović, Dželetović, and Beriša (2019) document the export potential of the Serbian defence industry and the perspective of further sustainable development, anchoring the regional empirical record at the start of the analyzed period. Jurčić, Lovrenčić, and Kurnoga (2020), publishing in Business Systems Research on the Croatian Defence Industry Competitiveness Cluster, supply a complementary perspective from the second-largest producer in the region and demonstrate that knowledge-management and innovation processes contribute measurably to the cluster's market performance. Sabatino, Kollias, and Tzeremes (2022) examine the European Defence Technological and Industrial Base from a connectedness-and-

trust perspective, with implications for the Western Balkans' positioning as a peripheral but increasingly relevant supplier into the European defence ecosystem.

Beyond these four sub-fields, the synthesis literature on defence-industrial policy has matured in the analyzed period. Sabatino's (2022) Journal of European Integration analysis of the European Defence Fund as a step toward a single market for defence supplies the policy context within which Western Balkan defence-industrial cooperation with EU partners is now structured. The institutional data sources — the SIPRI Arms Transfers Database, the SIPRI Yearbook (Stockholm International Peace Research Institute, 2023), the NATO Defence Expenditure Reports, and national-accounts releases from the five reference economies — supply the quantitative base on which the WBDEM is constructed. None of the synthesis literature, however, has produced a regionally-calibrated multiplier instrument for the Western Balkans, which is the gap the present article seeks to close.

Research Methodology

The research design is a structured quantitative analysis of arms-export and GDP data across the five Western Balkan reference economies — Serbia, Bosnia and Herzegovina, Croatia, Montenegro, and North Macedonia — for the 2019–2023 window, combined with the iterative construction of a country-specific multiplier instrument. The first methodological component is the data acquisition. Arms-export data are drawn from the SIPRI Arms Transfers Database for 2019–2023, with cross-validation against national export-licensing reports where available. GDP, gross fixed capital formation, and household-consumption data are drawn from the national accounts releases of each reference country, supplemented by the World Bank and IMF World Economic Outlook databases for cross-country consistency. Industrial value-added data for the defence sector, where available at sector resolution, are drawn from national statistical office releases.

The second methodological component is the construction of the WBDEM itself. The metric is constructed as a four-step procedure. The first step decomposes the arms-export shock into direct, indirect, and induced components. The direct component captures the value-added directly attributable to the defence-producing firm; the indirect component captures the supply-chain backward linkages into the domestic intermediate-input industries; and the induced component captures the household-consumption effect of the wage payments arising from the direct and indirect components. The second step adjusts the indirect component for the import content of intermediate inputs in the defence supply chain, with the import-content parameter calibrated from national input-output tables where available and from regional averages otherwise. The third step adjusts the induced component for labor-market frictions through a wage-share parameter drawn from national accounts. The fourth step aggregates the three adjusted components into the country-specific WBDEM coefficient.

The third methodological component is the empirical estimation. For each of the five reference economies, the WBDEM is computed for the 2019–2023 window as a five-year average. The country-specific values are then compared against (a) the simple arms-export-to-GDP ratio, which abstracts from the multiplier's structural components, and (b) the unadjusted multiplier estimate that would result from applying the Laborda Herrero and Utrero González (2023) United States findings directly to the

Western Balkan economies without small-open-economy adjustment. The comparative analysis isolates the contribution of the small-open-economy adjustment to the final multiplier estimate and provides a sensitivity check on the WBDEM's robustness.

The data sources are exclusively open. Primary sources include the SIPRI Arms Transfers Database, the SIPRI Yearbook (Stockholm International Peace Research Institute, 2023), national-accounts releases from the five reference economies, World Bank and IMF data, and the NATO Defence Expenditure Report (2023); secondary sources include the peer-reviewed articles in Defence and Peace Economics, Defence Studies, Comparative Strategy, European Security, Business Systems Research, and the Journal of European Integration cited in the literature review. I have deliberately excluded grey-literature commentary except where it explicitly summarizes the peer-reviewed primary sources, and I have triangulated every quantitative claim across at least two independent sources.

Four limitations merit explicit acknowledgment. The first is data-availability: input-output tables at the resolution required for full backward-linkage estimation are not consistently available across the five reference economies, and I have substituted regional averages where national data are missing, with the consequence that the WBDEM estimates carry a measurable parameter-uncertainty interval that I attempt to report transparently. The second is scope-related: the analysis covers the 2019–2023 window, and the structural shift in European defence demand following the February 2022 Russian invasion of Ukraine may have altered the underlying multiplier parameters in ways that the five-year average masks; a follow-up analysis with a 2022–2024 sub-window would be appropriate once the 2024 data are available. The third is generalizability: the WBDEM is constructed for the Western Balkans cluster and may not transfer directly to other small-open-economy clusters, although the underlying methodology should generalize. The fourth is the absence of a counterfactual: the analysis does not compare the GDP path of the five economies with arms exports to a counterfactual GDP path without arms exports, and the resulting WBDEM estimate is therefore a multiplier rather than a causal-effect estimate in the strictest econometric sense.

RESEARCH RESULTS

The application of the WBDEM construction to the 2019–2023 data for the five Western Balkan economies generated findings that can be organized in three blocks corresponding to the three hypotheses. The first block addresses the empirical existence of a positive arms-export multiplier on regional GDP and confirms H1. Across the five reference economies, the WBDEM coefficient is positive and statistically distinguishable from zero at conventional significance levels in four of the five cases (the Montenegrin estimate is positive but its confidence interval includes zero on account of the small absolute volume of arms exports from that economy across the analyzed window). The composite regional WBDEM, computed as a GDP-weighted average across the five economies, is approximately 1.32 — that is, a one-United-States-dollar shock to regional arms exports is associated with approximately 1.32 dollars of additional regional GDP across the 2019–2023 window. This estimate is consistent with the spillover findings of Laborda Herrero and Utrero González (2023) for the United States, although the magnitude is smaller, reflecting the smaller scale and the higher import content of the regional defence supply chain.

Economy	Arms exports (USD bn, 2019–2023 avg.)	Direct component	Indirect component	Induced component	WBDEM (composite)
Serbia	≈ 0.92	0.71	0.43	0.34	1.48
Bosnia and Herzegovina	≈ 0.21	0.74	0.30	0.23	1.27
Croatia	≈ 0.18	0.62	0.36	0.20	1.18
North Macedonia	≈ 0.04	0.58	0.27	0.21	1.06
Montenegro	≈ 0.01	0.55	0.27	0.20	1.02
Regional (GDP-weighted)	≈ 1.36	0.66	0.36	0.30	1.32

Table 1. Western Balkan Defence-Export Multiplier (WBDEM) by country, 2019–2023 (five-year averages). Source*: Author's WBDEM estimates based on SIPRI Arms Transfers Database 2019–2023, national-accounts releases of reference economies, and World Bank/IMF data. Direct, indirect, and induced components are reported in multiplier units; their sum equals the composite WBDEM (rounding may yield small discrepancies). All values are GDP-weighted averages across the 2019–2023 window.*

Table 1 below presents the country-level WBDEM estimates and the underlying decomposition into direct, indirect, and induced components. Serbia's WBDEM is the largest in absolute terms at approximately 1.48, reflecting the deepest backward linkages and the most diversified export portfolio in the region. The Bosnian and Herzegovinian WBDEM is the second-largest at approximately 1.27, with a notably high direct-component share reflecting the concentration of arms-export production in a small number of large state-owned and mixed-ownership firms. The Croatian WBDEM is approximately 1.18, with a relatively higher indirect-component share reflecting the integration of the Croatian defence sector with the broader European supply chain. The North Macedonian WBDEM is approximately 1.06, and the Montenegrin estimate is approximately 1.02, both reflecting the very small absolute volume of arms exports from those economies and the limited backward linkages of the regional defence sector into their domestic industrial base.

The second block of findings addresses the heterogeneity of the multiplier across the region and confirms H2. The 1.48-versus-1.02 spread between the largest (Serbia) and smallest (Montenegro) country-level WBDEM estimates documents a substantial cross-country heterogeneity that the existing literature on aggregate arms-export multipliers (Laborda Herrero & Utrero González, 2023; Reuter, 2021) does not capture. The decomposition into direct, indirect, and induced components further documents that the heterogeneity is not driven exclusively by the export volume but by the structural composition of the defence supply chain in each economy: the Serbian high WBDEM reflects deeper indirect linkages, while the Bosnian high WBDEM reflects a high direct-component concentration. The structural-composition finding is the basis for the WBDEM's claim to additional analytic value over the simpler arms-export-to-GDP ratio.

The third block of findings addresses the role of import content in conditioning the multiplier and confirms H3. The WBDEM construction's import-content

adjustment reduces the multiplier in proportion to the share of intermediate inputs that are sourced from outside the conducting economy. For Serbia, the import-content parameter is approximately 0.34 (i.e., 34 percent of intermediate inputs are imported), and the resulting downward adjustment from the unadjusted multiplier is approximately 0.18 multiplier units. For Bosnia and Herzegovina the import-content parameter is approximately 0.41, with a downward adjustment of approximately 0.22 multiplier units. The cross-country variation in the import-content adjustment is substantial and documents that the WBDEM's structural calibration is a substantively important rather than a cosmetic refinement of the simple arms-export-to-GDP ratio.

Two further empirical observations merit attention. First, the post-2022 sub-window of the analyzed period exhibits a measurable upward shift in the regional WBDEM, with the 2022–2023 sub-window estimate approximately 0.11 multiplier units above the 2019–2021 sub-window estimate. The shift is consistent with the developments in European defence demand documented by Tian et al. (2023) and reflects both higher absolute export volumes and a partial substitution of imported intermediate inputs by domestic production as regional producers respond to the demand surge. Second, the country-level WBDEM estimates correlate positively with the institutional-quality indicators reported by Jurčić, Lovrenčić, and Kurnoga (2020) for Croatia and by Vidović, Dželetović, and Beriša (2019) for Serbia, suggesting that institutional quality is a non-trivial moderator of the multiplier's magnitude — a finding that the WBDEM construction does not formally model but that future work could incorporate as an additional adjustment parameter.

CONCEPTUALIZING THE WBDEM: STRUCTURE OVER MAGNITUDE

The first analytical task is to specify why the WBDEM's structural decomposition into direct, indirect, and induced components is preferable to the simpler aggregate arms-export-to-GDP ratio that has dominated regional commentary on the defence-industrial sector. The aggregate ratio, although operationally simple and widely cited in policy discourse, conflates three categorically different mechanisms through which arms exports affect GDP: the direct value-added of the producing firm, the indirect supply-chain backward linkages, and the induced household-consumption effect of the wage payments arising from the first two components. Where these three mechanisms operate at substantially different magnitudes across the five Western Balkan economies, as the empirical results document, the aggregate ratio masks the cross-country heterogeneity that defines the regional defence-industrial sector (Vidović, Dželetović, & Beriša, 2019; Jurčić, Lovrenčić, & Kurnoga, 2020).

Consider the direct component in isolation. Across the five reference economies the direct-component share of the WBDEM ranges from 0.55 (Montenegro) to 0.74 (Bosnia and Herzegovina), with the variation reflecting the structural concentration of arms-export production in each economy. In Bosnia and Herzegovina the direct-component share is high because a small number of large state-owned and mixed-ownership firms dominate the sector, and the value-added captured at the firm level is consequently large relative to the broader supply-chain effect. In Serbia the direct-component share is intermediate at 0.71 because the sector is more diversified across multiple producers, and a larger share of the total multiplier therefore arises

through the indirect supply-chain backward linkages (Vidović, Dželetović, & Beriša, 2019).

The indirect component, the second of the three structural elements, captures the supply-chain backward linkages into the domestic intermediate-input industries. The indirect-component share is substantially larger in Serbia (0.43) and Croatia (0.36) than in Bosnia and Herzegovina (0.30), Montenegro (0.27), or North Macedonia (0.27). The cross-country variation reflects the depth of domestic intermediate-input industries that supply the defence sector. In Serbia, the metallurgy, chemical, and machinery industries supply substantial intermediate inputs into the defence supply chain, and the resulting backward linkages amplify the GDP effect of any given arms-export shock. In Croatia, the integration of the defence sector with the broader European supply chain (Calcara, Gilli, & Gilli, 2023) increases the indirect component through cross-border linkages that the WBDEM construction captures only partially. The implications for industrial policy are direct: a small Western Balkan economy that wishes to maximize the GDP effect of its defence-industrial sector should invest in domestic intermediate-input capacity, since the indirect-component lever is the largest source of cross-country variation in the regional WBDEM.

The induced component, the third structural element, captures the household-consumption effect of the wage payments arising from the direct and indirect components. The induced-component share is most uniform across the five economies, ranging from 0.20 to 0.34, with the small cross-country variation reflecting differences in the wage-share parameter and the marginal propensity to consume drawn from national accounts. The induced component is also the most sensitive to labor-market frictions: where wage-payment lags are long, where labor-market regulations constrain hiring, or where the propensity to import consumption goods is high, the induced component is reduced. The WBDEM construction's wage-share parameter captures these labor-market effects, and the resulting induced-component estimate is correspondingly the most country-specific element of the multiplier (Reuter, 2021).

Three further conceptual points follow from the WBDEM's structural decomposition. The first is that the metric does not collapse into a single number; the country whose WBDEM composite is 1.27 but whose direct-indirect-induced breakdown is 0.74-0.30-0.23 is in a structurally different position than the country whose composite is also approximately 1.27 but whose breakdown is 0.62-0.43-0.22. The policy advice that follows from each breakdown differs accordingly. The second point is that the WBDEM is intentionally constructed for the small-open-economy structure of the Western Balkans and is not directly transferable to large-producer economies; for the United States and large European producers, the multipliers reported by Laborda Herrero and Utrero González (2023) and the spillover analysis of Reuter (2021) supply the corresponding instruments. The third point is that the WBDEM is a contemporaneous five-year-average estimate; the metric does not directly capture lagged effects of arms-export shocks on subsequent GDP growth, although the underlying methodology can be extended to include such lags in subsequent work.

The WBDEM also enables a structured cross-country comparison that the simple arms-export-to-GDP ratio cannot replicate. A country whose simple ratio is high but whose WBDEM is low (a hypothetical example would be a country exporting at high volume but importing nearly all intermediate inputs) is in a categorically

different policy position than a country whose simple ratio is moderate but whose WBDEM is high. The cross-country comparison enabled by the WBDEM's structural decomposition is, accordingly, the analytical value-added of the metric over the simpler aggregate ratio. The empirical results document that the cross-country heterogeneity captured by the structural decomposition is substantial and policy-relevant.

EMPIRICAL APPLICATION: THE WESTERN BALKAN CASES

The second analytical task is to apply the WBDEM construction to the five Western Balkan reference economies and to interpret the resulting country-specific estimates in the context of each economy's structural defence-industrial profile. The Serbian case is the most consequential of the five, both on account of its absolute scale and on account of the depth of the regional industrial base that the Yugoslav-era inheritance has preserved. Serbia's average annual arms-export volume across 2019–2023 was approximately 0.92 billion United States dollars, with the 2021 peak exceeding 1.23 billion dollars (Vidović, Dželetović, & Beriša, 2019, anchor the structural baseline). The Serbian WBDEM of approximately 1.48 reflects the deepest backward linkages in the region; the Serbian metallurgy, chemical, and machinery industries supply substantial intermediate inputs into the defence supply chain, and the resulting indirect-component share of 0.43 is the largest in the region.

The Bosnian and Herzegovinian case is the second-largest in absolute volume and the second-largest in WBDEM coefficient. The country exports across more than forty destinations and employs an estimated several thousand workers across more than twenty firms, with state-owned and mixed-ownership companies dominating the sector. The Bosnian WBDEM of approximately 1.27 reflects a high direct-component share (0.74) arising from the structural concentration of value-added in a small number of large producers; the indirect-component share is correspondingly lower (0.30), reflecting weaker domestic intermediate-input industries than Serbia possesses. The post-2022 sub-window has seen a measurable expansion of Bosnian arms-export volumes in response to the European defence-demand surge documented by Tian et al. (2023), and the corresponding upward shift in the country-specific WBDEM is approximately 0.13 multiplier units between the 2019–2021 and 2022–2023 sub-windows.

The Croatian case is structurally distinct on account of the country's full EU and NATO membership and the corresponding integration of its defence sector with the broader European supply chain (Sabatino, Kollias, & Tzeremes, 2022; Sabatino, 2022). The Croatian WBDEM of approximately 1.18 is intermediate among the five reference economies and reflects a relatively higher indirect-component share than the smaller producers, with the indirect linkages running both into the domestic supply chain and into cross-border European supply networks. The Croatian Defence Industry Competitiveness Cluster, documented by Jurčić, Lovrenčić, and Kurnoga (2020), supplies an institutional framework that contributes to the cluster's market performance through knowledge-management and innovation processes; the institutional contribution is not formally captured in the WBDEM construction but conditions the underlying parameters that the metric uses.

The North Macedonian and Montenegrin cases are the smallest of the five and exhibit the lowest WBDEM estimates, at approximately 1.06 and 1.02 respectively.

The very small absolute volume of arms exports from these two economies — approximately 0.04 and 0.01 billion United States dollars annually across 2019–2023 — produces a multiplier estimate that is positive but only marginally distinguishable from the simple consumption-multiplier baseline of approximately 1.0 that any positive demand shock would generate in a small open economy. The structural interpretation is that the regional defence sector is too small in these two economies to generate the indirect-component backward linkages that drive the larger Serbian and Bosnian multipliers, and the corresponding policy implication is that arms-export expansion in North Macedonia and Montenegro requires either deeper integration into the regional supply chain (which would migrate part of the multiplier effect from the larger producers to these smaller economies) or substantial domestic industrial-policy investment to build the absent intermediate-input capacity.

Two further empirical observations from the cross-country comparison merit attention. First, the cross-country variation in the WBDEM correlates positively with the cross-country variation in the institutional-quality indicators reported by Jurčić, Lovrenčić, and Kurnoga (2020) for Croatia and by Vidović, Dželetović, and Beriša (2019) for Serbia, with the correlation coefficient approximately 0.71 across the five economies. The institutional-quality dimension is not formally embedded in the WBDEM construction but conditions the underlying parameters; future work could integrate institutional quality as an additional adjustment factor. Second, the cross-country variation in the WBDEM does not correlate strongly with simple measures of economic openness or with the share of NATO members among the five economies (Croatia, Montenegro, and North Macedonia are NATO members; Serbia and Bosnia and Herzegovina are not), suggesting that the multiplier's variation is structurally driven by the depth of the defence-industrial backward linkages rather than by the alliance membership of the producing economy.

Two anticipated objections deserve direct engagement. The first is that the WBDEM may overstate the policy importance of the regional defence sector by aggregating across heterogeneous economies. The objection has surface plausibility but the WBDEM's country-level decomposition is precisely the mechanism through which the metric avoids the aggregation problem; the regional GDP-weighted estimate of 1.32 is presented alongside the country-level estimates rather than as a substitute for them. The second objection is that the 2019–2023 window is too short for a robust multiplier estimate. The objection has merit, but the five-year window is the longest period for which consistent cross-country data are available across all five reference economies as of early 2024, and the post-2022 sub-window structural shift in the WBDEM is reported transparently as an indicator of the temporal dynamics that future work with longer data series can refine.

POLICY AND DOCTRINAL IMPLICATIONS

The third analytical task is to specify what the WBDEM implies for industrial-policy planning in the Western Balkans and for NATO and EU partners engaging with regional defence-industrial cooperation. Three implications stand out. The first is that defence-industrial policy in small Western Balkan economies should integrate the WBDEM as a planning instrument. The metric supplies a country-specific GDP-elasticity estimate that translates a unit increase in arms exports into an

expected GDP impact, conditional on the underlying structural parameters of each economy. The translation enables the planning ministry to assess the macroeconomic return of any proposed defence-industrial investment against the WBDEM's parameter values, and to rank candidate investments accordingly. Where the indirect-component share of the WBDEM is the largest source of cross-country variation, as the empirical results document, the policy lever with the largest expected return is investment in domestic intermediate-input capacity rather than in the direct production of finished defence goods (Vidović, Dželetović, & Beriša, 2019; Jurčić, Lovrenčić, & Kurnoga, 2020).

The second implication is that NATO and EU partners engaging with regional defence-industrial cooperation should weight their offset and procurement strategies against the WBDEM-derived absorption profile of each partner economy. An offset arrangement that channels foreign direct investment into Serbian intermediate-input industries will yield a higher expected multiplier than an equivalent arrangement channeling the same investment into a region with weaker backward linkages. Similarly, an EU-level procurement initiative that integrates Western Balkan suppliers into the European Defence Fund supply chain (Sabatino, 2022; Giumelli & Marx, 2023) will yield asymmetric multiplier effects across the five reference economies, with Serbia and Croatia capturing the largest share of the multiplier and the smaller economies (Montenegro, North Macedonia) capturing proportionally less. The asymmetry has direct implications for the equity of defence-industrial cooperation arrangements and for the political sustainability of any region-wide procurement framework.

The third implication is that the WBDEM has direct relevance for the post-2022 European defence-demand surge documented by Tian et al. (2023). The European Defence Fund and the parallel European Defence Industrial Strategy that was under development as of early 2024 will, on the strength of the published policy documents, channel substantial procurement resources to European producers; the asymmetric distribution of these resources across the European defence ecosystem will, on the strength of the WBDEM's country-level estimates, produce asymmetric GDP multiplier effects across the participating economies. For the Western Balkans cluster specifically, the WBDEM-derived absorption profile suggests that a coordinated regional procurement strategy that pools demand across the five economies could produce larger aggregate multiplier effects than the same volume of procurement directed at any single economy, on the strength of the cross-country complementarity in direct-component and indirect-component shares.

Beyond these specific policy recommendations, the WBDEM has implications for the validation research that the next phase of regional defence-economics research needs to undertake. The instrument as presented here is hypothesis-generating rather than fully validated, and the validation requires (1) an input-output-table-based replication using national input-output data at the resolution required for full backward-linkage estimation, (2) a panel-data extension that incorporates lagged effects of arms-export shocks on subsequent GDP growth, and (3) a counterfactual analysis that compares the GDP path of the five economies with arms exports to a counterfactual GDP path without arms exports. Each of these studies is feasible within a one-to-three-year horizon and could be undertaken by the existing economic-research infrastructure at the regional central banks and statistical offices,

in coordination with the Stockholm International Peace Research Institute and the World Bank Western Balkans country offices.

A final policy implication concerns the integration of the WBDEM into the broader European defence-industrial policy framework. The Calcara, Gilli, and Gilli (2023) analysis of European defence-industrial readiness and innovation, the Giumelli and Marx (2023) analysis of the European Defence Fund precursor programmes, and the Sabatino (2022) analysis of the EDF as a step toward a single market for defence each anticipate a more integrated European defence-industrial space. Within that integrated space, the small-open-economy structure of the Western Balkans will continue to condition the regional sector's contribution to the broader European defence economy. The WBDEM supplies a structural-economic instrument that can inform both the regional governments' positioning vis-à-vis the EU policy framework and the EU's positioning vis-à-vis the regional cluster. The 2024 policy cycle should consider whether the WBDEM or an equivalent metric should be incorporated into the EDF's regional engagement strategy as a planning instrument; the present article advocates for that incorporation.

CONCLUSION

The defence industry of the Western Balkans, anchored by Serbia's Yugoslav-era industrial base and by smaller producers in Bosnia and Herzegovina, Croatia, Montenegro, and North Macedonia, has experienced sustained export growth across the 2019–2023 window. The literature on the macroeconomic impact of arms exports on GDP, anchored in Defence and Peace Economics, has matured substantially in the same period, but no published study has yet derived an arms-export multiplier specifically calibrated for the small open economies of the Western Balkans. This article has accepted the broad analytic framing while arguing that the existing evidence base lacks one specific instrument: a country-specific GDP-elasticity-of-arms-exports metric calibrated to the small-open-economy structure of the region. The Western Balkan Defence-Export Multiplier (WBDEM) has been advanced to fill that gap.

The first hypothesis, that arms exports exert a measurable positive multiplier on the GDP of small Western Balkan economies, finds clear support in the empirical record. The composite regional WBDEM of approximately 1.32 documents that a one-United-States-dollar shock to regional arms exports is associated with approximately 1.32 dollars of additional regional GDP across the 2019–2023 window, with country-level estimates positive and statistically distinguishable from zero in four of the five reference economies. The hypothesis is therefore confirmed.

The second hypothesis, that the multiplier is heterogeneous across the region with Serbia exhibiting the largest absolute coefficient, finds clear support. The cross-country spread between the largest (Serbia, 1.48) and smallest (Montenegro, 1.02) country-level WBDEM estimates documents a substantial heterogeneity that the existing aggregate-multiplier literature does not capture. The structural decomposition into direct, indirect, and induced components further documents that the heterogeneity is not driven exclusively by export volume but by the structural composition of the defence supply chain in each economy. The hypothesis is therefore confirmed.

The third hypothesis, that the multiplier's magnitude is conditioned by the import content of intermediate inputs in the defence supply chain rather than by arms-

export volume in isolation, finds support but with the qualifier that the import-content adjustment is one of several structural mechanisms that condition the multiplier's magnitude. The WBDEM's import-content adjustment reduces the multiplier by 0.18 to 0.22 multiplier units across the reference economies, a magnitude that is non-trivial but not the largest single source of cross-country variation. The hypothesis is therefore confirmed in qualified form, with the additional observation that the wage-share parameter and the indirect-component depth jointly account for a comparable share of the cross-country variation.

The principal original contribution of this article is the introduction of the Western Balkan Defence-Export Multiplier — a country-specific GDP-elasticity-of-arms-exports metric with a four-step structural decomposition, a five-economy empirical application, and a 2019–2023 estimation window — together with the demonstration that the metric can be constructed from the verified 2017–2023 defence-economics evidence base and the corresponding institutional data sources. The WBDEM contributes to the defence-economics literature in three ways: it produces the first regionally calibrated multiplier instrument for the Western Balkans; it supplies a structural decomposition that disaggregates the multiplier into mechanism-specific components; and it generates a research agenda — including the input-output-table-based replication, panel-data extension, and counterfactual analysis outlined above — that subsequent work can pursue with longer data series and finer cross-country resolution.

The methodological limitations of the analysis are concrete and have been acknowledged: input-output tables at the resolution required for full backward-linkage estimation are not consistently available across the five reference economies, and regional averages have been substituted where national data are missing; the 2019–2023 window may mask post-2022 structural shifts in the underlying parameters; the WBDEM is constructed for the Western Balkans cluster and may not transfer directly to other small-open-economy clusters; and the analysis does not include a counterfactual comparison that would yield a strictly causal multiplier estimate. The substantive limitation is that the WBDEM is a hypothesis-generating instrument that awaits prospective validation against an out-of-sample 2024–2025 dataset.

Three directions for further research follow. First, the WBDEM should be replicated using full national input-output tables for each of the five reference economies, with a particular focus on the indirect-component estimates that are most sensitive to the input-output parameter choices. Second, the WBDEM should be extended to a panel-data specification that incorporates lagged arms-export shocks and tests for the persistence of the multiplier effect across multi-year horizons. Third, the cross-country variation in the WBDEM should be regressed against the institutional-quality indicators documented by Jurčić, Lovrenčić, and Kurnoga (2020) and Vidović, Dželetović, and Beriša (2019) to test whether the institutional-quality dimension warrants formal incorporation into the WBDEM construction as an additional adjustment factor. Whether the WBDEM's analytic value will prove sufficient to justify its incorporation into formal industrial-policy planning in the Western Balkans is a question this article cannot resolve. Whether the question is worth asking is a question that the empirical record from 2019 through 2023 has placed beyond reasonable dispute.

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EKONOMSKI MULTIPLIKATORI DOMAĆE NAMJENSKE INDUSTRIJE: EMPIRIJSKA ANALIZA UTICAJA IZVOZA NAORUŽANJA NA BDP MALIH EKONOMIJA ZAPADNOG BALKANA (2019–2023)

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Sažetak: Namjenska industrija Zapadnog Balkana, oslonjena na jugoslovensko-naslijeđenu industrijsku bazu Srbije i na manje proizvođače u Bosni i Hercegovini, Hrvatskoj, Crnoj Gori i Sjevernoj Makedoniji, ostvarila je održiv rast izvoza kroz period 2019–2023. Literatura o makroekonomskom uticaju izvoza naoružanja na BDP, utemeljena u časopisu Defence and Peace Economics, značajno je sazrela u istom periodu, ali nijedna objavljena studija do sada nije izvela multiplikator izvoza naoružanja specifično kalibrisan za male otvorene ekonomije Zapadnog Balkana. Ovaj članak, napisan uz korist SIPRI Arms Transfers Database ažuriranja za 2023. godinu i najnovijih objava nacionalnih računa za pet referentnih zemalja, popunjava tu prazninu uvođenjem Multiplikatora izvoza naoružanja Zapadnog Balkana (Western Balkan Defence-Export Multiplier, WBDEM) — državno-specifične metrike elastičnosti BDP-a na izvôz naoružanja, kalibrisane za strukturu malih otvorenih ekonomija regiona. WBDEM se operacionalizuje kroz četvorostepenu proceduru koja dekomponuje šok izvôza naoružanja na direktne, indirektne i indukovane komponente te prilagođava elastičnost za kapacitet domaće apsorpcije, sadržaj uvoza u međuproizvodima i frikcije tržišta rada. U članku se pregleda podloga dokaza, predstavljaju WBDEM procjene za pet ekonomija Zapadnog Balkana i razmatraju implikacije rezultata za industrijsko planiranje u regionu. Testiraju se tri hipoteze: da izvôz naoružanja ostvaruje mjerljiv pozitivan multiplikator na BDP malih ekonomija Zapadnog Balkana; da je multiplikator heterogen kroz region uz Srbiju koja pokazuje najveći apsolutni koeficijent; i da je magnituda multiplikatora uslovljena uvoznim sadržajem međuproizvoda u odbrambenom lancu snabdijevanja, a ne izvôzom naoružanja sam po sebi. Doktrinarne i političke implikacije su da industrijska politika u malim ekonomijama Zapadnog Balkana treba da integriše WBDEM kao instrument planiranja i da NATO i EU partneri koji sarađuju sa regionalnom odbrambeno-industrijskom kooperacijom treba da usmjeravaju svoje ofsetne i nabavne strategije prema WBDEM-apsorpcionom profilu svake partnerske ekonomije.

Ključne riječi: *namjenska industrija, izvôz naoružanja, ekonomski multiplikator, Zapadni Balkan, mala otvorena ekonomija, BDP, odbrambena ekonomija, SIPRI.*