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William Bartlett

INTRODUCTION: 70TH ANNIVERSARY ISSUE OF ECONOMIC ANNALS

Economic Annals (originally *Ekonomski anali*) was founded in 1955, by the Faculty of Economics (now Faculty of Economics and Business) at the University of Belgrade. It was launched during the era of socialist Yugoslavia, providing a foundational platform for regional economic analysis, institutional development, and theoretical research. For the first half-century of its existence, it published primarily in Serbian under the title *Ekonomski anali*. However, to integrate more deeply into the international academic community and expand its readership, the journal made a pivotal shift in 2006, rebranding to *Economic Annals* and transitioning to publishing exclusively in English.

Published quarterly, the journal covers a wide array of topics in general economics and business studies. The journal has gained a reputation as a prominent academic outlet for economic thought covering emerging economies in the EU neighbourhood and throughout the world. It publishes research in all areas of economics and business studies, with a particular focus on contributions that examine economic issues from a comparative perspective, especially in relation to Europe, the broader European neighbourhood, and emerging economies. The journal especially welcomes papers on the comparative economics of South Eastern Europe, as well as individual economy studies from the region.

It operates under a strict double-blind peer review process and is indexed in major economic databases, including the American Economic Association's EconLit, and is indexed in SCOPUS which has recently elevated its status to a Q3 journal. Today, it provides a vital role in connecting regional researchers in the Balkans and the global academic community. The papers in this issue were selected from among all responses to a call for papers issued in 2025 to celebrate the 70th anniversary of the founding of the journal.

THE BROAD THEME OF THIS ISSUE: NAVIGATING STRUCTURAL SHIFTS IN THE GLOBAL ECONOMIC ORDER

The global economic architecture is undergoing a profound transformation, characterised by a fracturing of traditional multilateral frameworks, the emergence of the digital economy, a redefinition of regional and local governance, and a fundamental restructuring of how organisations operate. This issue of *Economic Annals* brings together five compelling studies that analyse how these systemic shifts manifest across international macroeconomics, local fiscal strategies, corporate learning dynamics and the evolving digital marketplace.

The first two papers confront the current challenges to the established international economic order. The first paper by Ivan Vujačić reviews the internal drivers of US trade policy, tracing the radical shifts under the Trump administration back to persistent current account and budget deficits. By comparing these actions to past strategies under Nixon and Reagan, the author highlights how the current administration favours unpredictable bilateral deals and leverage over traditional economic models. He argues that while unilateral bilateralism has dismantled the international economic order and global stability, domestic macroeconomic corrections would actually be more effective in resolving the problems of the US economy. The second, related, study by Miroljub Labus complements this macro-geopolitical perspective characterised by the aggressive deployment of unilateral trade mechanisms by modelling the strategic consequences of US across-the-board tariffs on small non-aligned economies, taking Serbia as a case study. Based on a methodology that pairs geopolitical modelling with classical econometric analysis of trade elasticity, he concludes that the global arms race and aggressive tariff structures render Serbia's traditional position as a non-aligned nation unsustainable.

The issue then shifts focus from global trade frictions to the micro-level dynamics of the digital economy, of high relevance to the current wave of technological innovation. Using a state-of-the-art evolutionary game theory approach, Nikola Njegovan & Bojan Ristić investigate the critical balance of privacy between firms and consumers. They demonstrate how structural and strategic factors lock markets into a "dysfunctional equilibrium" of low privacy, despite potential alternative attractors. Finally, the paper evaluates how current US and EU regulatory measures, like the GDPR, interact with these dynamics to identify conditions under which privacy-protective strategies can successfully gain traction.

Finally, the anniversary issue explores how adaptation occurs within national borders and organisational structures. Moving to regional governance, Dubravka Jurlina Alibegović, and Desislava Kalcheva provide a rigorous comparative analysis of local tax policies and fiscal autonomy across the largest municipalities in Bulgaria and Croatia, offering vital policy recommendations for decentralisation. Closer to the ground, Ana Aleksić Mirić, Biljana Bogićević Milikić, Nebojša Janićijević & Katarina Božić tackle the rapid expansion of hybrid work linked to the growing practice of working from home (WFH), surveying over a thousand employees in Serbia to map how organisational knowledge travels when teams are spatially distributed. The findings highlight that collaborative team dynamics and psychological safety serve as the key channels for turning individual initiative into systemic organisational learning during times of disruption.

Together, these articles provide a critical empirical and theoretical overview to aid our understanding of the complex, interlocking variables that are shaping modern economic policy and practice.

As always, we are grateful to all the reviewers who have voluntarily provided constructive feedback on the papers and enabled their improvement. The papers are presented in this issue in appreciation of last year's 70th anniversary of the founding of the journal.

William Bartlett
Editor-in-Chief
Economic Annals

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*Ivan Vujačić**

REBALANCING THE UNITED STATES CURRENT ACCOUNT THROUGH CONFRONTATION AND TARIFFS

ABSTRACT: *This paper reviews and highlights major shift in views and approaches to the international economic order and the policies aimed at rebalancing that order in the perceived interest of the US by the current Trump administration. It presents the problem of the long-existing US current account and budget deficits and the perception that they present an unsustainable and immediate problem that needs urgent action as the cause of these shifts. It provides an overview of previous actions by presidents Nixon and Reagan regarding the rebalancing of the US current account deficits. The policies of the current US administration regarding the problem of dual deficits is so radical that it has willfully put an end to the international economic order through unilateral action. There have been some attempts at providing an economic analysis and justification for the direction of the applied policies. However, it seems that the policies pursued by the US administration follow an unpredictable path as they are based on bilateral deals and leverage. The paper points out that actions regarding internal macroeconomic balances such as policies that would be in the direction of lowering the budget deficit could have mitigated these problems.*

KEY WORDS: *international trade, US tariff policy, US macroeconomic imbalances*

JEL CLASSIFICATION: F51,F52, F10

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1. INTRODUCTION

As this paper is being finalised, the majority of tariffs imposed by the United States (US) administration have been struck down by the US Supreme Court. The Trump administration's tariff policy was dealt a significant blow, yet it shows every intention of reinstating tariffs through various legal venues it claims are at its disposal. It immediately responded by imposing a flat 15% tariff rate, which can remain in place for the next 150 days. In other words, one should expect that the administration will continue using tariffs for the described purposes in any way it can and for as long as it can. This paper will not speculate on the possible outcomes of further litigation on tariffs.

The aim of this paper is to provide a critical review and analysis of the rationale behind the US administration's tariff policies, which are aimed at rebalancing the US economy by reducing the current account deficit, and to assess how this affects the international economic order. It will analyse the results so far, attempt to evaluate them and finally, in the conclusion, consider the ramifications of this policy for the international economic order.

The paper is organised as follows. A brief overview of the Trump administration's worldview, which led to the current account deficit being seen as one of the major problems of the US economy, will be presented first. The size and composition of the US current account deficit, as well as how other recent presidents have addressed this issue, will then be examined in order to provide historical context and a reference point. The specific roles of the US dollar and the US fiscal deficit, and their links to the current account deficit, will be discussed next, together with a review of the relevant literature. The subsequent section will analyse the rationale behind the administration's policies and the measures that have been undertaken. Finally, in the conclusion, after an evaluation of the results of the tariff policies, the consequences of the tariffs for the international order will be discussed.

2. TRUMP'S WORLD VIEW, THE REBALANCING OF THE US ECONOMY AND THE END OF THE INTERNATIONAL ECONOMIC ORDER

In November 2025, the Trump administration released its National Security Strategy (White House, 2025). Leaving aside its other contents, it clearly and

forcefully rejected globalisation, the international economic order and the policies of previous US administrations over the last thirty years. If there were ever any doubts about the US government's position on these matters, the following quote should put those doubts to rest.

"Our elites …overestimated America's ability to fund, simultaneously, a massive welfare-regulatory-administrative state alongside a massive military, diplomatic, intelligence, and foreign aid complex. They placed hugely misguided and destructive bets on globalism and so-called "free trade" that hollowed out the very middle class and industrial base on which American economic and military preeminence depend… And they lashed American policy to a network of international institutions, some of which are driven by outright anti-Americanism and many by a transnationalism that explicitly seeks to dissolve individual state sovereignty" (White House, 2025, pp. 1–2).

The historically surprising aspect of this is the unprecedented way in which the US, as the hegemon, explicitly rejected the very international order that it had created with its Western partners. One of the most obvious major consequences for the US, according to this view of the inherent characteristics of the international economic order, is a persistent current account deficit, largely driven by substantial deficits in trade in goods. A further, and more serious, consequence is the deindustrialisation of the US, attributed to unfair practices of other countries enabled by the design and workings of the international economic order. Finally, there are two more beliefs shared by the US administration: first, that the present state of the US economy is unsustainable; and second, that urgent action is needed before more drastic consequences ensue.

According to the US administration's view, rebalancing the US economy and international trade requires replacing multilateralism with a bilateral, transactional approach that pays little heed to norms in order to ensure success in this endeavour. Thus, the US should combine its military, economic and diplomatic resources as leverage on a bilateral, transactional basis to obtain the desired results. This is explicitly stated in the NSS. Applying this approach, the US should structure its relations with other countries based on whether it regards them as friends, foes or neutral actors.

This worldview guided the concrete actions undertaken by the Trump administration during Trump's first term – for example, the opening of the trade war with China and the introduction of tariffs against allies in 2018 – and persisted more radically in his second term. The latter was marked by his efforts to rebalance the US economy through the wide use of tariffs as leverage to secure bilateral trade deals with other countries and to directly extract other economic concessions.

One of the main, if not the principal, reasons, for this radical break with the past on the part of the US is the marked shift in the perception of China and its role in the world economy. This emerged in the aftermath of the global financial crisis of 2008. Around this time, appraisals of China's economy as the future dominant economic power that would potentially eclipse the US began to shed a different light on China's place in the world economy (Jacques, 2009; Navarro, 2011; Subramanian, 2011). Until then, the mainstream view was that China's membership in the WTO and its becoming a major stakeholder in the international economic system would lead to further internal economic and political reform that would, in turn, lead to some type of convergence process, i.e. moving the Chinese system closer to a Western-type system.

Obviously, the rapid growth of China's economy contributed to the deepening of the economic relationship with the US and its increasing importance. For a long time, this relationship was perceived as beneficial for both countries. Furthermore, US firms (multinationals), achieved high rates of return from their investments in China, boosting their competitive edge through cheaper labour over the years (Flannery, 2019).

The factors that contributed to the shift in the perception of China were its unprecedented rate of growth, its sheer size and the growing distrust in the intentions of the communist regime. Finally, and perhaps most importantly, China has attained a technological level that in many sectors rivals, or even possibly surpasses, that of the US, long regarded as the West's leading technological power.

However, the major rallying cry for the confrontation with China was introduced by Donald Trump in his presidential campaign of 2016. It directly blamed China, free trade and multinational companies for the deindustrialisation of the US and

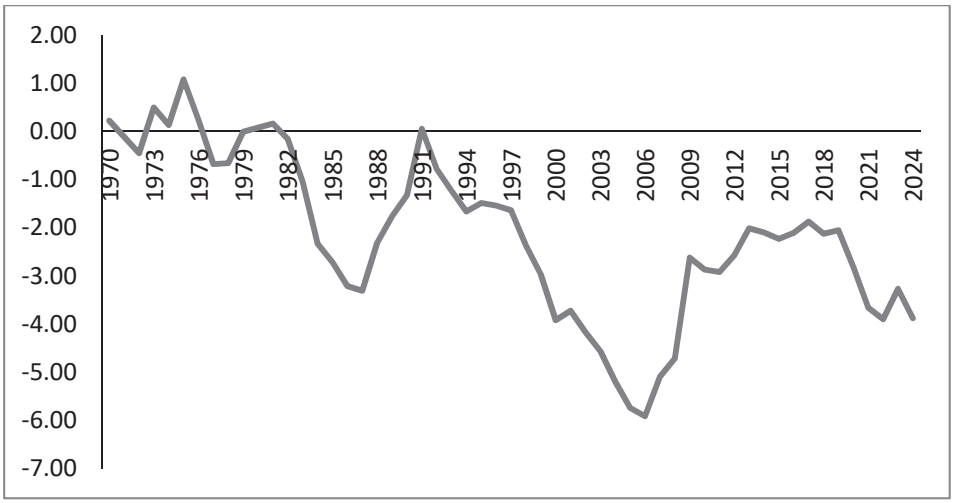
the loss of working-class jobs. This narrative was widely accepted by the public at large in the US. It also initiated a more openly confrontational stance aimed at the consistently large trade deficit of the US with China over the years. Hostility to China, free trade and globalisation became bipartisan as the Biden administration, which followed Trump's first term, maintained the tariffs on Chinese goods and widened the confrontation with China through the ban on the export of certain technologies.

Since dealing with the current account deficit has remained a central issue across both Trump administrations and the policies addressing it are the main focus of this paper, it warrants a detailed and comprehensive examination.

3. THE US CURRENT ACCOUNT DEFICIT – SIZE, COMPOSITION AND RECENT HISTORY

The balance of payments, being an accounting identity, must by definition always be balanced. It consists of the current account (balance of trade, net factor income and net transfers) and the financial account, which for the purposes of this paper includes the capital account. The current and financial accounts must mirror each other. Accordingly, if a country has a current account deficit, this must be matched by a financial account surplus (through a mixture of investment and loans). The US has had a current account deficit since the mid-1970s, driven mainly by a deficit in the trade in goods that has been a persistent feature of the US economy since 1976. The US current account as a percentage of GDP over the period 1970–2024 is shown in Figure 1.

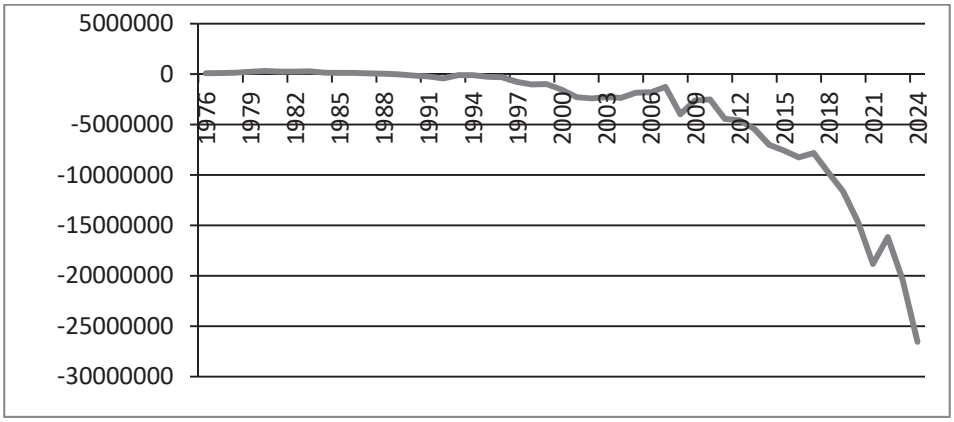
Figure 1: US current account as a percentage of GDP



Source: Organisation for Economic Co-operation and Development (OECD, 2025) data, retrieved from the Federal Reserve Bank of Saint Louis (FRED).

The current account deficit is also influenced by the international investment position and net investment income from abroad. As the US deficit has been financed by foreign capital inflows, this has translated into a significant foreign share of ownership of US assets and debt. It is true that US entities hold significant overseas investments. However, the difference between the value of foreign assets held by US residents and the value of US assets held by foreigners – that is, the net international investment position of the US – has changed dramatically over the years. Figure 2 shows that the net international investment position reached a negative value of close to 90% of US GDP, or -$26.54 trillion, in 2024. Thus, the difference between US-owned foreign assets ($39.6 trillion) and US liabilities to foreign residents ($65.6 trillion) has grown over the years.

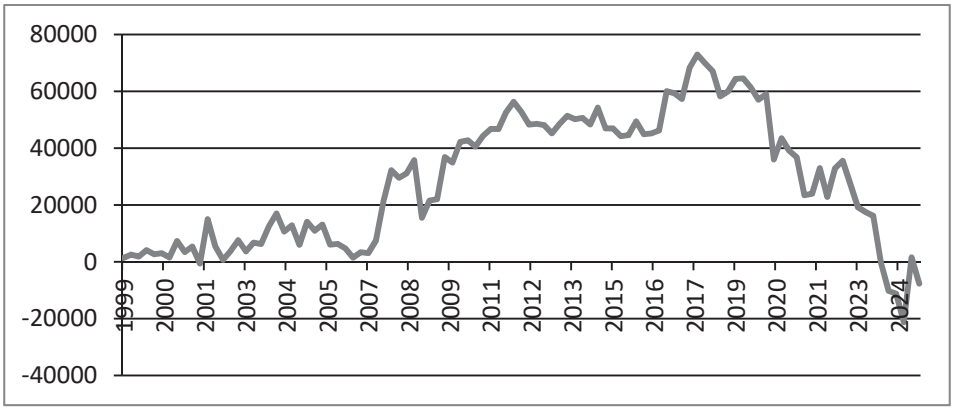
Figure 2: Net international investment position of the United States (US $ million)



Source: Bureau of Economic Analysis (2025), data retrieved from Federal Reserve Bank of Saint Louis (FRED)

The net primary balance, i.e., the income earned on US investments abroad minus the income paid to foreign investors in the US, also showed a deterioration. As shown in Figure 3. it reached its maximum positive value in 2019 but has been slightly negative since 2024, or close to zero in the last several years.

Figure 3: Net investment income of the United States (US $millions)



Source: Bureau of Economic Analysis (2025), data downloaded from Federal Reserve Bank of Saint Louis (FRED) data

In short, the net primary income of the US no longer reduces the current account deficit to the extent that it did until recently. One reason for this is the attractiveness of the US market and the relatively strong dollar, that is, a high real exchange rate, which lowers the measured income from US investments abroad.

The US deficit in trade in goods in 2024 amounted to $1.205 trillion. However, the US recorded a surplus in trade in services. This surplus of $311.9 billion reduced the overall deficit in goods and services to $903.5 billion (Congressional Budget Office & Bureau of Economic Analysis [CBO & BEA], 2025). The current account deficit increased to $1.13 trillion due to negative balances in primary and secondary income recorded in 2024 (U.S. Bureau of Economic Analysis [BEA], 2025). Overall, it is clear that the deficit in trade in goods constitutes the largest component of the US current account deficit by far.

Trump's negative view on trade was based on the fact that the large current account deficit is primarily due to the large trade deficit in goods, i.e., that the US imports goods to a much larger extent than it exports, and that this (in his view) is a "loss" for the US economy which needs to be remedied through a mix of protectionist policies. Before pursuing this further, one should note that in recent decades other US presidents have also had to deal with this issue.

What makes the US current account distinctive compared to that of other countries is the role of the US dollar as an international reserve currency. The dollar has been the world's reserve currency since the end of WWII. Under the Bretton Woods system, national currency exchange rates were fixed to the US dollar, which in turn was pegged to gold at an exchange rate of $35 per fine ounce. Devaluations of currencies could occur from time to time, but the value of the dollar was fixed. An important feature of this system was that it was accompanied by capital controls limiting capital mobility.

That system broke down in August 1971, when President Nixon suspended the convertibility of the dollar into gold. At the same time, the US was experiencing trade deficits in goods and services in 1971 and 1972 which were low by current standards, but represented a new phenomenon for US policymakers. At that point, the dollar was devalued and in order to negotiate a further devaluation of the dollar in real terms, a reevaluation of the currencies of its major allies and trading partners (Japan, Germany and France) was agreed to through the

Smithsonian Agreement. To secure the agreement, Nixon had threatened these countries with the imposition of a 10% tariff. Therefore, Trump is not the first US president to use the threat of tariffs to address the current account deficit in the post-WWII period. (Rogoff, 2025).

The other president who faced a more serious trade deficit was Ronald Reagan. In order to curb inflation, the Federal Reserve introduced high interest rates, thus creating the deepest US recession since WWII up to that point, lasting from 1980 to 1982. These high interest rates led to capital inflows into the US and strengthened the dollar. As the recession abated, the Reagan tax cuts and the hike in military spending expanded the federal budget deficit (increased government debt) and fuelled demand and imports. This increased the trade and current account deficits substantially. In short, the current account deficit as a characteristic feature of the US economy began in the Reagan years, as depicted in Figure 1.

At the time, the largest goods trade deficits were with Japan. This fostered hostility towards Japan, much as the trade conflict with China today. More interestingly, and analogously, the US Congress exerted pressure on Reagan to adopt demands towards Japan that are very similar to those that have been directed at China in recent years. These demands included the elimination of Japanese trade barriers to US imports and an end to Japanese industrial policies that were seen as giving Japanese firms unfair advantages over American firms in international markets. A bill was introduced in the US Congress that threatened a 20% tariff on Japanese imports with the intent of reaching a bilateral trade balance with Japan.

As US current account deficits reached 3.5% of GDP, the Reagan administration addressed the issue on two fronts. First, it negotiated an agreement to lower the value of the dollar in relation to the German mark and the Japanese yen, the currencies of the major trading partners that had a trade surplus with the US. The agreement, known as the Plaza Accord (1985), also obliged these two countries, as well as Britain and France, to prevent a rise in the value of the dollar through intervention in foreign exchange markets. The outcome was a substantial devaluation of the dollar in the following years and governments had to act to prevent its further depreciation. The efforts to reduce imbalances in the world

economy did not proceed smoothly. US partners urged the US administration to cut the budget deficit in order to help balance the US current account deficit, but to no avail. Nevertheless, under different circumstances, including the end of the Cold War, budget balance was achieved by the early 1990s. (Oatley, 2023).

The other agreement was a bilateral agreement with Japan, under which Japan was to voluntarily abide by an agreed quota of Japanese cars exported to the US. Reagan pursued this option to avoid the imposition of tariffs by Congress, knowing that it would be difficult to dismantle tariff legislation later and that it would damage the US's longstanding support for free trade. The option to use voluntary quotas was the least protectionist way to deal with the trade imbalance. A similar voluntary quota was imposed on Japanese exports of semiconductors to the US. This latter agreement ultimately failed.

In short, both Trump administrations were not the first to address current account deficits using various measures, including adjusting the value of the dollar, negotiating multilateral and bilateral agreements, and threatening tariffs and introducing quotas.

4. THE US CURRENT ACCOUNT DEFICIT AND THE US DOLLAR AS A RESERVE CURRENCY

As already pointed out, what makes the US current account deficit distinctive is the fact that the dollar has been the world's reserve currency since WWII. As early as 1959, in testimony before the Joint Economic Committee, Robert Triffin (1960) formulated the proposition that demand for the US dollar as a reserve currency would eventually cause US liabilities to surpass the US gold stock. This would lead to a run on the dollar, the breakdown of the Bretton Woods system – which Triffin correctly predicted – and, by analogy with the 1930s, a serious depression and deflation, which did not occur. A more recent version of the Triffin (1960) argument ties the role of the dollar to the current account deficit. According to this view, the US must run a permanent current account deficit in order to supply countries with the dollar as a reserve currency. As the demand for reserves rises faster than the growth of US nominal GDP, growing US indebtedness will become unsustainable. In other words, there is a "tipping point" at which confidence in the reserve asset is undermined and holding it becomes a credit risk.

A similar version of this argument applies to the demand for US Treasury securities. This high demand enables the US government to borrow cheaply and sustain deficits for a long period. However, as public debt rises in relation to GDP it reaches a point beyond which debt servicing is perceived as unsustainable, potentially leading to inflation or crisis as alternative securities begin to play a larger role. It should be noted that these relationships between the dollar as a reserve currency and the US current account, fiscal deficit and US debt are derivations of, rather than part of, the original Triffin analysis (Bordo & McCauley, 2017). There is another approach that contends that the US current account deficit is a product of high foreign financial inflows (investments in highly valued US assets) which lead to higher US consumption. Finally, a view not directly related to the dollar as a reserve currency is the one that links the current account deficit to the "unfair" practices of other countries that have contributed to deindustrialisation in the US. Most of these views have found their way into arguments supporting the Trump administration's radical approach to balancing the US current account.

There are, of course, other explanations for the persistence of the US current account deficit. These theories gained prominence during periods when the deficit was perceived as particularly large – specifically the Reagan years, the 1990s, the mid-2000s and the years up to the present. This has resulted in a vast literature on the subject. The Reagan years gave rise to the "double deficit" hypothesis, which links the fiscal deficit to the current account deficit[1]. There are several ways in which the two may be linked. A fiscal deficit, caused by tax cuts or increases in public spending, increases a country's consumption above its income. This is reflected in the national accounts as a gap between national savings and investment which must be covered through loans and investment from abroad, thus creating a current account deficit. An older version of this argument was put forth in the Mundell–Fleming model (Fleming, 1962; Mundell, 1963), which posits that the fiscal deficit raises interest rates, stimulating capital inflow. This leads to currency appreciation, thereby creating a current account deficit as exports fall and imports rise. In the 1980s, the double deficit explanation was promoted by such mainstream economists as Feldstein (1987) and Bergsten

[1] For a review of the issues in the 1980s, see Howard (1989). For another outstanding comprehensive review of all the issues concerning the US current account deficit, see Mann (1999).

(1987) with empirical research on the US economy supporting the twin deficit hypothesis under a flexible exchange rate regime (Miller & Russek, 1989).

While the double deficit hypothesis was in line with the empirical data during the mid-1980s, the mid-2000s and later, it was clearly not so during the 1990s, when a twin divergence was recorded between the budget deficit, which decreased and even achieved a surplus, and the current account deficit, which increased significantly. One of the explanations for this phenomenon was an external shock that created a recession and thereby brought about a larger fiscal deficit. The resulting decline in GDP then led to a fall in the real exchange rate and in imports, reducing the current account deficit (Kim & Roubini, 2008). The divergence in the 1990s led even Feldstein to revise his position somewhat (Feldstein, 1992). Alternatively, the growing current account deficit was also ascribed to the strong economic growth, foreign investment in new ICT technology and the search for a safe haven for assets following the Asian financial crisis of 1997/1998. This view was reflected by Bernanke (2005) in his description of the imbalances in the world economy as a "saving glut" that affected the US through a supply of dollars, bringing down interest rates and enabling cheap borrowing both for the US government and its citizens. Some have argued that the US could run an indefinitely high current account deficit at the level of $500 billion a year, given these low rates and the attractiveness of US assets (Cooper, 2005). The growing deficit in the 2000s also fostered a discussion that focused on various aspects of this issue, particularly on how large necessary adjustments in exchange rates and other instruments would be and how much they might cost in terms of stability in efforts to address the rebalancing of the US economy (Blanchard, et al., 2005; Edwards, 2005; Obstfeld & Rogoff, 2005). Around the same time, Summers (2004) argued that adjustment of the US current account deficit would require international backing involving coordinated exchange-rate adjustment on a broader basis than the G-7 alone. Mostly there was an agreement that something had to be done, but differences of opinion arose over the adjustment process. The financial crisis of 2008 brought the current account deficit down to what were considered manageable levels. Finally, since the pandemic, the twin deficits have reemerged, with some prominent economists pointing that such high fiscal and current account deficits are unsustainable (Bayoumi & Gagnon, 2025; Obstfeld, 2025).

However, throughout the discussions on the current account deficit over the years, no prominent economists proposed the massive use of tariffs as a remedy. Mainstream scepticism concerning the use of tariffs stems from the general conclusion that tariffs are an inefficient policy instrument. Furthermore, over the years, reducing tariffs worldwide has been regarded as beneficial to welfare and development and has been integrated into the international economic order.

5. REBALANCING THE US ECONOMY – THE TRUMP ADMINISTRATION'S VIEW AND POSSIBLE POLICIES

Trump and his administration have taken a radically different view. The intellectual rational for this relies on an analysis of the international economic order, which, in their view, has been abused by other countries, with the result being a large trade deficit and deindustrialisation in the US.

The explanation for this state of affairs focuses on the countries that record current account surpluses in the trade of goods with the US. Major countries such as Germany, China, South Korea and Japan achieve surplus positions through a combination of policies that are common to most of them. A key feature of these surpluses is that national savings outstrip domestic investment. This causes downward pressure on domestic wages and constrains domestic consumption. Suppressing wages is what makes export sectors more competitive and gives these countries an advantage. Their reluctance to rebalance by expanding domestic demand through fiscal expansion has become a lasting characteristic of their economies (Pettis, 2013, Klein & Pettis, 2020).

All of these economies that run trade surpluses exhibit higher savings and lower consumption as a percentage of GDP than their trading partners. They also display a higher share of manufacturing in GDP than their trading partners. According to supporters of the Trump administration's policies, promoting manufacturing in this way as a means of export-led growth directly contributes to the 'hollowing out" of the manufacturing sectors of their trading partners. This, in turn, leads to deindustrialisation, the decline of certain industrial centres and harm to the working class. Former industrial centres experience secondary consequences leading to the loss of jobs in other industries and services built around the core industries. These processes are compounded by globalisation and

by multinational companies that have moved their production away from countries such as the US.

The advisors associated with Trump also embrace the argument that orthodox views of comparative advantage do not explain the economic imbalances on a world scale because of distortions created by industrial policies, subsidies and suppression of domestic wages. According to this view, it is not higher productivity that enables trade surpluses in manufacturing; rather, they are attained by suppressing domestic consumption. More broadly, export subsidies take many forms, of which an undervalued currency is a significant example, though not the only one. Other types of subsidies include repression of interest rates below the neutral rate. In this situation, resource transfers are made from savers to the manufacturing industry. Other hidden subsidies include repressive labour laws and weak enforcement of environmental standards. From this perspective, China's vast infrastructure investment constitutes another transfer to manufacturers. These subsidies are supplemented by targeted industrial policies and support for certain sectors or specific firms considered "national champions".

This type of analysis leads to the conclusion that the limited focus on unfair practices or piecemeal reform cannot resolve the fundamental imbalances. This can only be addressed through a fundamental change in the international system, either by substantial reform of the system or by the US opting out of it (Pettis & Hogan, 2024).

Furthermore, some key figures in the second Trump administration, such as Stephen Miran, Chairman of the Council of Economic Advisors to the President, argue for a reformulation of the original Triffin analysis discussed earlier. In essence, this view holds that the role of the dollar in the international economic system is the cause of it being overvalued, thus preventing the rebalancing of the current account. In fact, this aspect is one of the fundamental pillars of the explanation of the imbalances in the international economy that, in this view, need to be rectified.

It is difficult to identify a widely accepted and coherent set of policies within the Trump administration aimed at achieving the desired rebalancing. The most frequently cited and analysed paper dealing with this matter is Stephen Miran's

essay (Miran, 2024), published before his appointment. This puts forth several policy proposals for rebalancing that might reflect the thinking on these issues by some advisers within the US administration.

The most striking proposal is the so-called Mar-a-Lago Accord. Its purpose would be, much like the Plaza Accord of 1985 discussed earlier, to weaken the dollar through coordinated multilateral action. The major currencies that would need to be involved in such an arrangement are the euro and the renminbi, with the yen playing an important, though secondary role. This is the aspect that would resemble the Plaza Accord. There are, however, substantial differences both in the level of US debt at the time and in the fact that the original accord was difficult to achieve even among allies. It is therefore unrealistic to presume that China would be willing to accept such an agreement.

Realising that the chances of such coordinated action are slim, Miran views unilateral action by the US as a means of pushing the relevant partners towards acceptance of some form of agreement to address the issue of an overvalued dollar, the current account deficit and US public debt (Miran, 2024). The starting point is that the US should use its economic, military and diplomatic clout to differentiate its dealings with three broad categories of nations in order to achieve major rebalancing goals. The three categories are friends, foes and neutrals, as already mentioned. Based on this distinction, different policy tools can be applied.

For example, allied central banks would be expected to sell dollars in order to lower the value of the dollar, thus making US exports more competitive. At the same time, one way to give the US additional leeway on its budget deficit and high public debt is to " persuade" allies that are in a US-led "security zone" to share the burden and pay for security by purchasing US Treasuries. Under this proposal, short-term bills would then be swapped for century bonds by central banks, thus easing pressure on the US government to address the debt quickly in order to avert a loss of confidence in the dollar. Tariffs could be used as a threat against those that refuse such an arrangement, while security and tariff relief would be granted to those that accept it. This part of the paper was actually taken from a proposal made by Poszar (2024). This is actually a radical proposal which amounts to, for lack of a better term, a "protection racket". A serious proposal along these lines by the US would in effect be admitting bankruptcy, with debt

restructuring carried out under terms dictated by the US. Although the proposal attracted considerable attention, at this point no official representative of the US administration has endorsed such measures. It is, however, indicative of the administration's general coercive approach.

The alternative or complementary instrument for rebalancing would be a tax on holding Treasury bills, described as a "user fee", intended to dampen capital inflows and thereby reduce the current account deficit. Independently of Miran's paper, a tax on profits, dividends and interest has been discussed, but not implemented. In short, this would mean the introduction of some form of capital controls. However, such an approach could easily backfire by undermining confidence in the US financial markets and reducing foreign willingness to invest in the US.

In Miran's approach, the intent is to weaken the dollar in the first instance in order to reduce the current account deficit, only to strengthen it later through tariffs and century bonds. Furthermore, currency adjustment for rebalancing could be achieved through other instruments discussed in Miran's paper, including a US sovereign fund, the expansion of the US Exchange Stabilization Fund and the use of gold to purchase foreign currencies and weaken the dollar when necessary.

Finally, as the dollar strengthens in the later phase, it would help dampen the inflationary effect of tariffs, even though it is already estimated that they would have a small effect on prices. Tariffs would also raise additional government revenue and help reduce the budget deficit. There are several estimates of how much revenue could be raised through tariffs, ranging from $300 billion to $1 trillion. Moreover, tariffs would provide protection for the reindustrialisation of the US and support the creation of industrial working-class jobs.

To sum up, the major thrust of Miran's paper links security and access to the US consumer market. In other words, friends would have to pay more for access to the US market and for security provided by the US, while foes would be excluded through a wall of tariffs. His paper is the closest available overview of policy options offered by someone in a high position in the US administration.

6. TRUMP'S TARIFFS, DEALS AND RESULTS

In the absence of any explicit official policy guidelines, one can only identify a common thread in the policies introduced and applied so far. The first and most obvious is that tariffs, and the threat of high tariffs, were used to secure agreements that included other aspects of bilateral economic relations. However, certain actions undertaken by the US administration have also exposed limits, serious constraints and obstacles to the rebalancing objectives pursued by the administration.

The first and most obvious point is that the exorbitant tariffs on traded goods announced by the US on what was called "Liberation Day" (2 April 2025) were to be applied on a bilateral basis to each country, in direct violation of WTO rules. If the trade war with China that began in 2018 represented a major disruption of multilateralism and the international economic order, "Liberation Day" finally brought both to an end, at least as far as the US was concerned.

From the perspective of economic theory, attempts to rebalance trade on a bilateral basis with individual countries makes no economic sense. whatsoever. The US increased its tariffs to the highest level in almost a century, comparable only to the tariffs introduced under the notorious Smoot–Hawley Act of 1930. Financial markets reacted by selling off the dollar and US Treasury bonds even as yields on long term bonds rose. This was a clear warning that further pursuit of tariff hikes of this scale would wreak havoc on financial markets with a high risk of dire consequences for both the US and the global economy.

It is difficult to reach a precise assessment of the potential consequences of these tariffs, as they underwent swift changes. Nevertheless, various scenarios have been tested. The best-case scenario in one study (McKibbin et al., 2025, p. 11), which assumes low tariffs with no retaliation from other countries and the use of the tariff revenue for budget balancing, projects an improvement in the US trade balance over the next couple of years All other scenarios produce worse outcomes. Another study (Ignatenko et al., 2025) finds that the tariffs imposed by the US could improve its terms of trade and reduce its trade deficit by approximately 18–20% if there is no retaliation by trading partners, although the overall welfare effects would be limited. However, there would be an 11% contraction in world trade and a global welfare loss.

Following the policy reversal after the reaction of the financial markets the week of the announcement, the US significantly modified the original tariff rates through both negotiations and the introduction of certain exemptions. This opened a substantial discrepancy between statutory tariff rates and effective tariff rates. According to recent figures, published prior to the Supreme Court ruling, the average nominal tariff rate is around 20% and the average effective tariff rate around 10% (Smith et al, *Financial Times*, 2025). The tariffs are differentiated as part of the US bilateral deals made with various countries. It was widely observed that some Asian countries with large trade surpluses in goods with the US, which were actually exporting goods with a high Chinese content, faced tariffs of around 20%, for example, Vietnam, Thailand and Cambodia. These three countries also signed general agreements on critical minerals. South Korea's tariff rate was lowered from 25% to 15% in exchange for a pledge to invest $350 billion in the US economy. Japan reached an agreement bringing down its tariff rate to 15% in return for a pledge to invest $550 billion, albeit under relatively vague conditions. Some of these countries also made pledges to purchase US military and other equipment, while some pledged to align their security more closely with the US, in a move aimed at China (Weisel, 2025). However, the two most important agreements in principle were those with the EU and China.

The agreement with the EU involved its accepting a tariff rate of 15% on goods exported, with certain exemptions. It also included some other trade concessions. Furthermore, the EU pledged to purchase $750 billion worth of oil, liquefied natural gas and nuclear energy products and to invest $600 billion in strategic sectors in the US by 2028. The EU has stated that these purchasing and investment commitments are based on estimates of largely private sector intentions. Consequently, the viability of this agreement should be viewed with some scepticism.

This was not the case with China, as it possessed substantial leverage through its control over rare earth minerals and therefore had a stronger negotiating position with the US. The outcome was closer to a truce than a comprehensive deal, with China agreeing to relax export controls over these materials for a period of a year and to purchase soybeans from the US, while the US reduced its tariff rates to a still very high average of 47%. Earlier, Trump rescinded the Biden administration's ban on exporting some of the advanced semiconductor chips

that China requires for its high-tech sector. A summit was scheduled for April 2026, at which some general agreements might be signed.

After the Supreme Court ruling, new estimates were released concerning the effects of the tariffs. According to the Tax Foundation (2026), the remaining tariffs still stand at a 10% weighted average rate. The average effective tariff rate was 7.7% in 2025 – the highest since 1947. As the tariffs expire, the average effective rate is expected to decline to 5.6%, which would still be the highest since 1972.

Contrary to Trump's continued claims, the overwhelming burden of the tariffs did not fall primarily on foreign exporters, but rather on US importers and consumers. According to a recent study, the tariffs were passed through almost entirely (Gopinath & Neiman, 2026). The Federal Reserve Bank of New York, in a study by Amiti et al. (2026), found a pass-through effect to consumers of 90%. According to Tax Foundation estimates (2026), the tariffs cost around $1,000 for every household in 2025.

Furthermore, the estimates suggest that a small decline in GDP over the longer run can be attributed to the tariffs and that their impact on employment will be negative with a loss of 150,000 jobs (Tax Foundation, 2026). There has also been a small inflationary effect partly due to the front-loading of imports in anticipation of the tariff hike and the fact that most of the tariffs were reduced very quickly from the initially announced levels. For the same reason, tariff revenues in 2025 were less than expected and amounted to $264 billion, up from $79 billion in 2024 (Azzimonti et al., 2026). Finally, the trade deficit in 2025 was only $2.6 billion lower than in 2024 (BEA, 2026) This negligible amount may also be attributed to the front-loading of imports before the tariffs took effect. Nevertheless, given the overly optimistic announcements and forecasts regarding their effects, the outcome appears disappointing.

The current account deficit was, however, reduced by $69.3 billion, or 5.8%, and fell as a percentage of GDP to 3.6% as compared to 4% in 2024 (BEA, 2026). This is an interesting development because, in theory, the imposition of tariffs and a decrease in the trade deficit typically lead to a stronger dollar. This did not occur. Instead, the dollar depreciated by over 9% in 2025. This decline began after the announcement of high tariffs and can be interpreted as a reaction to uncertainty

caused by the tariffs, the large budget deficit, the rise in US public debt and the efforts by central banks to diversify their reserves. In other words, the depreciation of the dollar also supported the rise in primary income, thus reducing the current account deficit. However, if the weakening of the dollar persists, it could reduce foreign investment in US assets.

Overall, the reduction in the current account deficit was not a result of the tariff policy, as intended, and did not lead to a significant rebalancing of the trade in goods, despite this being announced as goal that would be relatively easy to achieve. Rather, it was linked to the depreciation of the dollar.

The tariff expectations and the initial results are summed up in Table 1.

Table 1: Summary of expectations and results of tariffs in 2025

Tariffs	
Expectations	Results
Lower trade deficit and lower current account deficit due to tariffs.	Insignificant influence on trade deficit and reduction in current account deficit related to depreciation of the dollar
Tariffs will be borne by exporting countries	Tariffs passed on to importers and consumers at a rate of 90% or more.
Tariffs will not cause inflation.	Tariffs added little to inflation due to front-loading of imports before their introduction. Given their level is much lower, the effect on inflation will be small.
Tariffs will create employment.	There will probably be a loss of jobs (in manufacturing) due to tariffs over a longer period
Tariffs will lead to stronger dollar as the trade deficit is reduced.	The dollar depreciated due to uncertainty over the state of the world economy after the introduction of tariffs. The simultaneous sell-off of the dollar and US Treasury bonds with higher yields was triggered by the shock announcement of substantial tariffs on 2 April 2025 (“ Liberation Day”)

7. ASSESSMENT AND CONCLUSION

The overall assessment of the introduction of the tariffs by the Trump administration can be made at two levels. The first is the empirical level of expectations and outcomes. As discussed previously, the expected effects on the trade deficit that were so forcefully proclaimed did not materialise. There are several reasons for this, including the short period during which the tariffs were in place, the front-loading of imports in anticipation of the tariff hike and the relatively low level of the tariffs compared with the originally announced rates. Due to the short timeframe, other expected gains could not materialise either. The depreciation of the dollar driven by the large fiscal deficit and uncertainty in the aftermath of the high tariffs announced by Trump on Liberation Day on 2 April 2025 did help bring down the current account deficit marginally, but it still remains high at 3.6% of GDP. At first glance, the effects of the tariffs were almost non-existent.

In the broader context, the Trump administration's unprecedented tariff hikes and their use as an instrument to secure extractive deals, have effectively put an end to the international economic order as it has existed so far. This began with the first trade war with China, which Trump initiated in 2018 during his first term in office, and with the signing of a trade agreement with China in 2020. This year, the direct trade deals and tariff hikes initiated by Trump have damaged that order beyond repair, with the world's largest economy openly dismissing its rules. This, along with other foreign policy moves by the administration, has caused a loss of trust and confidence in the US as a reliable partner within that international order. These consequences are likely to persist for a long time, as trust is difficult to restore once it has been broken.

What is striking is how the conceptualisation of the US current account deficit as an unsustainable and extremely urgent problem has led to this outcome. In fact, the US current account problem is quite manageable in the short run, even if not in the long run at its current level. It certainly is not so urgent as to require extreme action. The basic fact is that the US occupies a position in the world economy like that of no other country. It is the largest and richest economy and remains technologically the most advanced country in most key areas. Its currency is the international reserve currency. This means that it can honor its obligations at least in nominal terms, without too much difficulty. If this is a

realistic assessment, as most economists would tend to agree, then the current account deficit was essentially a visible rallying point for the dismantling of the international economic order as we knew it, and as proclaimed in the US National Security Strategy.

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*Miroljub Labus**

SERBIA IN THE NEW WORLD ORDER: HOW TO HANDLE AMERICAN TARIFFS

ABSTRACT: *This paper focuses on the reciprocal tariffs imposed by the US administration and their strategic consequences for small, open, and non-aligned countries, such as Serbia. After a year, they are replaced with new 15% across-the-board tariffs, but the underlying US trade policy remained the same. In it, geopolitics shapes the world trade order, while military expenditures drive industrial policy. The following topics matter to Serbia in handling American tariffs: changes on the geopolitical map of the world, the gravitational economic power of the main trade blocs (USA and USMCA, China and BRICS, EU), the effect of their relations on third countries (Serbia), economic sanctions in the form of reciprocal US tariffs (including secondary tariffs), the arms race and its impact on reindustrialization, the impact of proxy wars on military expenditures and trade, and Serbia's position in the global supply chains (especially rare minerals). Due to the American tariffs, Serbia's position as a non-aligned country is not sustainable anymore. The methodology applied in this paper combines an analysis of geopolitical factors modelling the new world trade order with a classical econometric analysis of the elasticity of trade with respect to income and prices.*

KEY WORDS: *tariffs, sanctions, economic nationalism, international agreements, deindustrialisation*

JEL CLASSIFICATION: F13, F51, F52, F53, O14

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1. INTRODUCTION

The United States (US) Supreme Court ruled in February this year that President Donald Trump overstepped his powers when he imposed sweeping global tariffs a year ago. That, however, did not change the official US trade policy. President Trump immediately signed a proclamation invoking an alternative law that allowed him to impose a new 15% temporary tariff on goods from all countries. The new tariffs overturned all the agreements the US concluded with key trade partners in the meantime to implement the previous reciprocal tariffs. Therefore, new deals and unclear transformations in the world trade system are yet to come. For us, the main question remains the same. How can a small open economy such as Serbia, which is not part of any trade or political bloc, adjust to new circumstances? This case study has broader applications, as many countries worldwide are in a similar position.

The world's economic and geopolitical order is undergoing a significant transformation, shifting from a liberal trade system based on the World Trade Organisation (WTO) and a US-centric power structure to a multipolar order characterised by regional trade alliances and sharp protectionism between them. In this evolving context, where trade is deeply shaped by geopolitics, Serbia and other small open economies outside trading and political blocs are in a particularly challenging position. They cannot influence global trade dynamics and must adapt structurally to a new reality to avoid negative consequences. That raises three key issues: 1) what the emerging world trade order would look like, 2) the initial effects of President Trump's tariffs, and 3) how to handle future tariffs that could reasonably be expected under the new American trade policy. For the second question, there is a short but reliable database allowing econometrics to provide some answers. For the other two questions, an alternative political economy approach is needed.

The US administration of President Donald Trump announced in January 2025 new tariff rates for all countries in the world – completely independent of WTO rules – and, in August, completed the first round of their application. A small number of bilateral trade agreements with key partners were concluded during this period to revise initial tariff rates; other tariffs were subsequently imposed through unilateral decisions by the US administration.

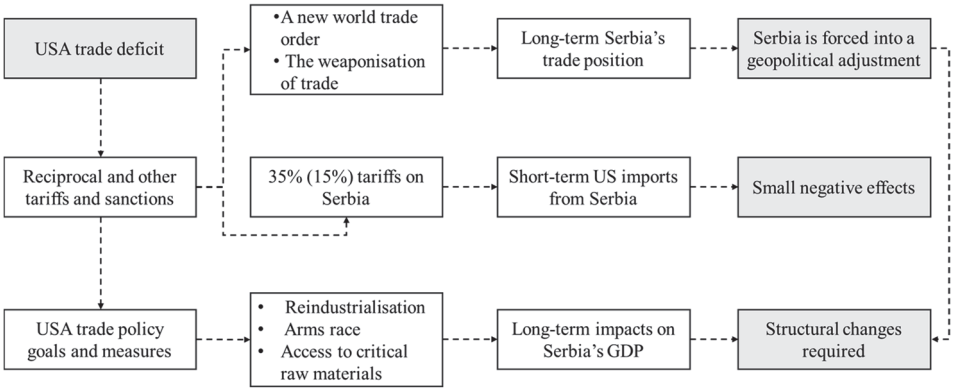
We call these tariffs "political tariffs" because their aim was not only to reduce the US trade deficit with major trading partners to zero, but also to penalise trade with countries that do not align with US interests, irrespective of the trade deficit (secondary tariffs). In this way, President Trump was implementing his election platform, Make America Great Again (MAGA). However, certain countries have responded with counter-tariffs, for example, China. The Trump administration reacted with reciprocal tariffs. That has, in fact, initiated a trade war whose outcome is hard to predict.

The impacts of both tariff types on Serbia are summarised in Figure 1. The boxes in the last column estimate their potential outcomes. There are three channels through which new US tariffs target Serbia. Direct trade between the United States and Serbia is small; therefore, any negative effects of current and future tariffs would be manageable (via the second channel). The real challenge lies in the new geopolitical set-up (the first channel). Serbia's traditional non-aligned foreign policy, balancing among four strategic pillars – the European Union (EU), the United States, Russia, and China – is under increasing strain. Substantial trade with the EU and China, following heavy reliance on Russian gas and crude oil, will depend on the future of their bilateral agreements and on US retaliatory tariffs. Currently, Serbia faces an ultimatum: either terminate Russia's stake in its oil sector or face a complete cut-off from international crude oil supplies and financing. This is a major challenge for the Serbian economy and a clear example of how weaponising trade measures can work[1]. This also explains why this paper pays so much attention to the new geopolitics. The impact of the third channel depends on how Serbia adjusts to the new world trade order, but structural changes will be required in any case.

The methodology applied in this paper will combine an analysis of geopolitical factors shaping the new world trade order with a classical econometric analysis of trade elasticity with respect to income and prices. The aim is to identify key macroeconomic factors that drive US–Serbia trade and to use them to forecast potential future trade flows under new circumstances.

[1] To see how weaponisation works in another framework, see Farrell & Newman (2019).

Figure 1: How American tariffs target Serbia



Regarding the literature, there is a large body of work on gravity and trade models that rely on microeconomic foundations, recently summarised by Uzobor (2026). However, the literature on recent US tariffs is much more limited. Boehm et al. (2023, as cited in USTR, 2025) provided the latest evidence on the long-run elasticity of US imports, which is close to 2 but varies across sectors and commodities. Other studies find higher elasticities of around 3–4 (e.g., Broda & Weinstein, 2006; Simonovska & Waugh, 2014; Soderbery, 2018). Recent experience with US tariffs on China indicates that the pass-through of tariffs to retail prices has been low (Cavallo et al., 2021).

In the first stage of the US–China trade war, Fetzer & Schwarz (2021) examined whether retaliatory tariffs were politically targeted. They found a positive answer to this question since trading partners designed tariffs to maximise political damage to Trump's electoral base. The EU was much more careful in this regard because it sought to reduce its own costs through reciprocal tariffs, thereby exercising greater restraint. China, however, did not regard this constraint as binding and responded in a clear political manner. A similar conclusion was reached in a report of the School of International and Public Affairs (Columbia University, 2020) to the Eurasia Group.

Amiti et al. (2019) provided quantitative estimates of how tariffs raised import prices and reduced US welfare. They concluded that US consumers bore most of the costs of tariffs. Bown (2019) provided a detailed account of tariff

announcements and their implementation. Irwin (2017) discussed how Trump's tariffs challenged WTO norms and reshaped global trade governance. Crowley (2019) provided a broader geopolitical context, linking tariffs to systemic rivalry between the US and China. Feenstra & Taylor (2021) published a handbook on international trade in which they discuss at length how the United States' recent use of tariffs compares with its past trade policy. Saussay (2024) concluded that American tariffs would not have a major negative impact on the EU, recommending a mild response and the use of policy measures to stimulate exports in line with WTO rules.

Siriopoulos et al. (2025) analysed the second Trump administration's tariff programme. They situated tariffs within historical trade policy frameworks and outlined future research agendas. Ignatenko et al. (2025) employed a structural econometric approach using bilateral trade and GDP data for 123 countries from 2023, along with several structural parameters (trade elasticity and the tariff pass-through). Their counterfactual model showed that tariffs may improve the US terms of trade if trading partners do not retaliate, while any welfare gains vanished under reciprocal retaliation. Lee & Khan (2025) presented a case study of major US trade partners (China, the EU, Canada, and Mexico). They showed how Trump's protectionist measures reshaped international economic relations, accelerating the fragmentation of global trade and weakening multilateral institutions. Finally, Chinn & Irwin (2025) published the most recent textbook on international trade, which explicitly addresses new US tariffs as a form of trade intervention.

The paper has four parts: Tariffs, the New World Trade Order, Critical Resources, and Serbia's Position. In the section on tariffs, reciprocal tariffs are explained, with particular attention to their calculation for Serbia. This is already history due to the US Supreme Court's ruling, but it sheds light on official US trade policy. The next section analyses the role of trade gravity in shaping the new world trade order and how military expenditures go beneath that process. The third section examines critical rare-earth and other minerals, their implications for Serbia, and the risks they pose to the restructuring of the industrial base. The final section examines Serbia's strategic and economic position following the imposition of

Trump's tariffs.[2] The paper concludes with recommendations on how Serbia should adapt to the new world order.

2. TARIFFS

2.1 Reciprocal tariffs

The conversion of GATT into the World Trade Organisation in 1994, together with the accession of China in 2001, Ukraine in 2008, and Russia in 2012, enabled the reduction of trade barriers, the opening of financial accounts worldwide, and the high mobility of capital. Through foreign direct investment and technology transfer, the economies of developed and less developed countries have become integrated into a single, large market. It seemed that the principle of free trade had finally prevailed.

However, the free market creates imbalances and negative externalities. These lead to unexpected consequences. US capital had helped develop the Chinese economy, but it soon became apparent that the United States had created an unsustainable trade deficit with China. Complaining that the Chinese side was acquiring modern technology without authorisation, the first Trump administration imposed additional 25% tariffs on imports of certain goods from China in 2018. China responded in kind. Mutual trade in goods, valued at approximately $34 billion, was affected by these trade restrictions. The amount was not large, but it had far-reaching and symbolic consequences. It started the trade war between the United States and China. In May 2024, during the Biden administration, an additional $17 billion in trade was capped on both sides. In

[2] It seems that the range of topics is unnecessarily broad. However, for Serbia, all of them matter. The US ultimatum to lift Russia's stake in the energy sector, its ban on imports of car tyres (the main exporting article to the US) produced in a Chinese factory in Serbia, prohibitively high reciprocal tariffs based on false data, uncertain implementation of the new Western Balkans strategy, together with the recent history of American sanctions on Serbia, call for attention to geopolitics as a vital factor of trade. Additionally, the main goals of the Trump administration's trade policy are to use tariffs to boost exports and strengthen the manufacturing base, including for military goods production and access to critical rare-earth minerals. Future frequent and unlimited tariff changes in this domain are widely expected in Serbia, especially following the US Supreme Court's ruling.

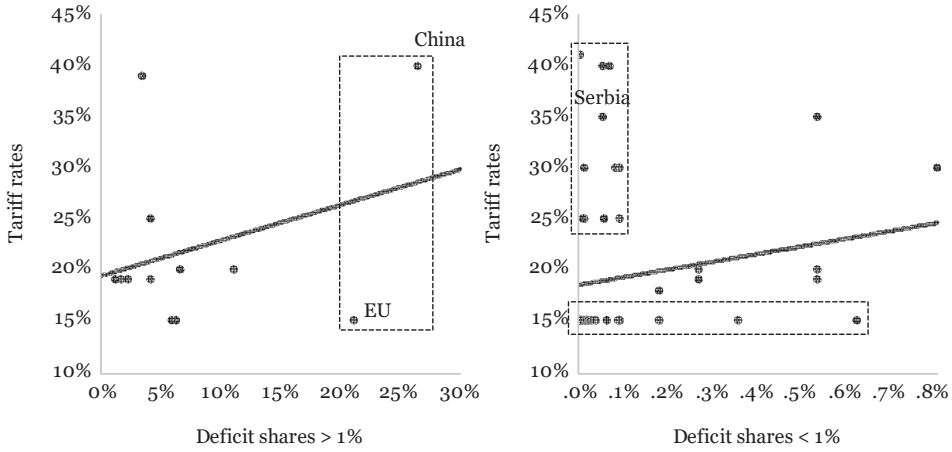
2025, the Trump administration returned to power and immediately resumed a trade war with China. This time it spread globally.

President Trump signed Executive Order No. 14257 on 2 April 2025, which declared a national emergency with respect to foreign economic relations. The reason was "large and persistent annual deficits in merchandise trade [with other countries] that constitute an unusual and exceptional threat to the national security and economy of the United States, originating wholly or substantially outside the United States" (Federal Register, 2025a), Based on the declared state of emergency, the implementation of the International Emergency Economic Powers Act (50 USC 1701 et seq., IEEPA) was initiated, which gives the President of the United States the authority to directly regulate international economic relations, with the obligation of annual renewal of the state of emergency and a semi-annual report to Congress on the results of the policy[3]. The trade deficit was identified as a threat to US economic interests and national security. Based on this authority, President Trump imposed additional tariffs on the entire world (except Russia). The application of these tariffs was postponed twice, most recently until 7 August 2025.

In the meantime, additional duties, known as reciprocal tariffs, were specified for 137 countries or territories worldwide in the Executive Order of the President of the United States dated 31 July 2025 (Federal Register, 2025b). Countries not specifically listed would be subject to an additional 10% duty (as would the Falkland Islands and Great Britain). Among the listed countries, some significantly contributed to the US trade deficit (accounting for more than 1% of the total deficit), whereas others had insignificant impacts. The first group comprises eleven countries and the EU trading area, which accounted for 94% of the total deficit. The remaining 126 countries or territories accounted for only 6% of the trade deficit. This trend is illustrated in Figure 2. Data on the US deficit for 2024 were obtained from the World Bank (2025). The larger the trade deficit, the higher the tariffs.

[3] In its 6–3 decision, the US Supreme Court ruled that President Trump could not use a 1977 law – the International Emergency Economic Powers Act (IEEPA) – to levy taxes on imports from nearly every country in the world.

Figure 2: US trade deficit and reciprocal tariffs



Source: World Bank

However, three facts should be highlighted in Figure 2. First, the two toughest competitors, China and the EU, faced dramatically different tariff rates. Second, a range of small competitors have tariffs identical to those in the large EU trading area. Third, irrelevant competitors, including Serbia, have much higher rates than others, ranging from 25% to 40%. These facts cannot be explained by any trade theory or supported by rigorous empirical research. Hence, to understand the new US trade policy, it is important to elucidate its motives.

According to the US administration, "The post-war international economic system was based on three incorrect assumptions: first, that if the United States led the world in liberalising tariff and non-tariff barriers, the rest of the world would follow; second, that such liberalisation would ultimately result in greater economic convergence and an increase in domestic consumption among US trading partners converging towards the share in the United States; and third, that as a result, the United States would not accrue large and persistent goods trade deficits " (Federal Register, 2025a).

The first assumption did not materialise because US trade partners introduced a series of non-tariff barriers despite the formal liberalisation of world trade. That seriously hampered American exports, as trading partners' prices and incomes were artificially reduced, thereby cutting demand for American goods and

making other partners more competitive. Consequently, the United States has accumulated a high and persistent trade deficit. At the same time, the trade deficit is often blamed for reducing the manufacturing sector's contribution to GDP growth.

Hence, non-tariff barriers and a lack of economic convergence led to deindustrialisation in the US, hindering the production of additional goods through new technologies and suspending more favourable conditions in world trade. Looking back at the right-hand side of Figure 2, one may question whether the small and open economies in the world were truly responsible for this outcome and, therefore, deserve punishment with additional tariffs. This question is legitimate because reciprocal tariffs target entire countries rather than particular goods.

Reciprocal tariffs have a dual character. On the one hand, they are indeed customs duties; on the other, they serve as economic sanctions. Regular tariffs are imposed to change the relative prices of imported goods. These goods become more expensive, thereby reducing domestic demand for them and encouraging cheaper domestic production. This changes the economic structure in favour of the domestic output, which should have a positive effect on economic growth and employment.

With reciprocal sanctions, the focus is not on changes in the relative prices of imported goods but on a linear change in the prices of all goods from a particular country. This not only changes the relative prices of imported goods in the US domestic market but also the relative positions of exporting countries. In other words, not only does the position of domestic and foreign producers change, but also the relative position of exporting countries. Some are friendly countries, for which there are lower customs duties (the United Kingdom, for example, even if it runs a deficit in trade with the US), while other countries are not and have higher customs duties (Brazil, for example, which also runs a deficit in trade with the United States).

Executive Order 14257 provides additional motives for trade intervention. It was concerned with "the impact of foreign trading partners' disparate tariff rates and non-tariff barriers on US exports, the domestic manufacturing base, critical supply chains, and the defence industrial base" (Federal Register, 2025b). Regular

customs duties affect only the domestic manufacturing base (in response to chip imports), whereas in the other cases mentioned, tariffs serve as economic sanctions against entire countries.

2.2 Calculation of tariffs

Tariffs on Serbia are of particular interest. This small country has a negligible impact on the US trade balance but faces an excessive tariff rate. The share of exports to Serbia in the USA's total exports is reported to be 0.01%, while the import share is slightly higher at 0.03%. To make matters worse, these data are unreliable. This was exacerbated by the way tariffs were calculated.

The Office of the US Trade Representative (USTR, 2025) explains how it computes tariff rates[4]. If the United States imposes a tariff on the i-th country τ_i, then the change in the customs rate is $\Delta\tau_i$. In addition, if the elasticity of imports in relation to import prices is $\varepsilon < 0$, then the rate of transfer of customs duties to import prices is $\varphi > 0$. Imports and exports with the given country are $m_i > 0$ and $x_i > 0$, respectively; hence, the decrease in imports from the given country due to the change in tariffs is equal to $\Delta\tau_i \cdot \varepsilon \cdot \varphi \cdot m_i < 0$. Assuming that the compensating exchange rate and general equilibrium effects are small enough to be ignored, the change in reciprocal tariffs that the bilateral trade balance brings to zero is:

$$\Delta\tau_i = \frac{x_i - m_i}{\varepsilon \cdot \varphi \cdot m_i} \tag{1}$$

Data from the US Census Bureau for 2024, including import and export statistics, were used to calculate reciprocal tariffs. The following parameter values were chosen: ε = -4 and φ = 0.25, which reduces Equation (1) to:

$$\Delta\tau_i = \frac{x_i - m_i}{-1 \cdot m_i} \tag{2}$$

[4] The USTR is part of the Executive Office of the President of the United States. It serves as the President's chief trade advisor, negotiator on international trade matters, and spokesperson on trade issues. The USTR consults with the US Department of Commerce for sectoral data, export promotion strategies, and bilateral negotiations. Data are retrieved from https://www.census.gov/foreign-trade/balance/c4801.html.

This equation prompted numerous accusations of incompetence by the US administration. While this characterisation is inaccurate, the model's analytical implications warrant close examination. According to US data, Serbia recorded a $640 million trade surplus in 2024. Thus, Equation (2) leads to the following implementation, as reported in Equation (3):

$$\Delta\tau_{serbia} = \frac{-\$640m}{-1 \cdot \$814m} \cdot 100 = 74\%, \tau_{serbia} = \frac{\Delta\tau}{2} = 37\% \quad (3)$$

To avoid excessive disruption, the USTR halved the additional customs duties imposed worldwide, including those imposed on Serbia. In 2023, the situation with Serbia was slightly different, with an estimated surplus of $491 million, yielding a τ of 33%. In this way, the average figures for two years give a reciprocal customs rate of 35%.

However, Serbian statistics (Statistical Office of the Republic of Serbia [SORS], 2025) reveal a completely different situation. Serbia recorded a $31 million deficit in 2023 and a $5 million deficit in 2024, *not a surplus*[5]. These statistical differences are not uncommon in world practice. Countries have different rules governing the origin of goods and intermediaries in trade, which lead to discrepancies in the data. Additionally, export values are calculated under the FOB (free on board) standard, and import values are calculated under the CIF (cost, insurance, and freight) standard. However, what is confusing in the present case is not the statistical differences in Serbian exports to the United States, but, rather, the opposite: the statistical differences in American exports to Serbia.

A closer examination reveals that a portion of American goods enters Serbia via EU intermediaries at European ports, and in US statistics, it is recorded as an export to the EU rather than to Serbia. According to the *Guide to the US International Trade Statistical Program*[6], the country of destination for exports is the country where the goods are to be consumed, further processed, or manufactured, as known to the shipper at the time of exportation. If the shipper does not know the country of ultimate destination, the shipment is credited to the

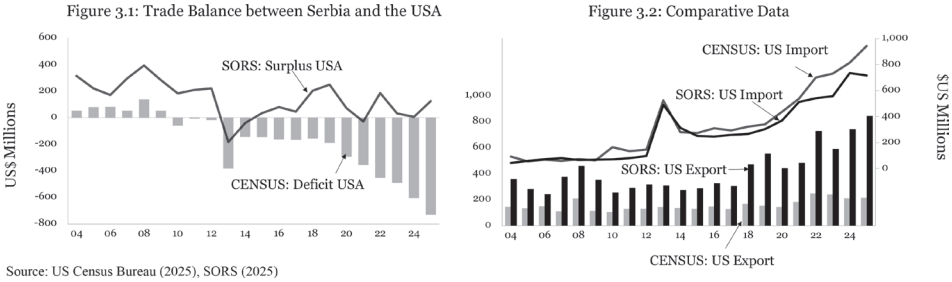
[5] SORS (2025): Foreign trade. For the first 6 months of 2025, the effect of reciprocal tariffs was not visible. Exports increased from $321 million to $395 milllion compared to the same period the previous year. On the other hand, imports increased from $ 375 million to $468 million.

[6] US Census Bureau (2025a), Part 10.

last country to which the goods were invoiced. In this case, the country through which the goods were imported.

Figure 3.1 presents data on the trade deficit or surplus in goods trade between Serbia and the United States. Bars represent US data (US Census Bureau), and lines represent Serbian data (SORS). Figure 3.2 presents the corresponding data on imports and exports. Data on Serbian exports to the United States and American imports from Serbia differ by an average of 20% (broken line and solid line, respectively). These are statistically tolerable differences. However, the differences in Serbian imports from the United States (i.e., American exports to Serbia) are pronounced and, on average, account for 70% of the deviation (light bars and solid bars, respectively). It is difficult to believe that these discrepancies were unknown to American statisticians, who nevertheless applied them when computing reciprocal tariffs in Equation (3).

Figure 3: Serbian and US data on imports and exports



Source: US Census Bureau (2025), SORS (2025)

Figure 3 suggests that the purported trade deficit between the two countries can be eliminated only by increasing US exports, not by reducing US imports. Reciprocal customs duties towards Serbia are unlikely to achieve this. As the world's largest economy, the United States cannot meaningfully offset imports from a small country by imposing 35% tariffs to stimulate its own exports.

This remark brings us back to Figure 2 and the real, rather than apparent, motives for introducing additional customs duties. For example, Madagascar has a 15% tariff, whereas Tunisia has a 25% tariff, although their trade deficits are almost identical to Serbia's. This suggests political considerations are highly likely to have played a role.

Tariffs of 10% were initially imposed on Brazil but were subsequently increased by an additional 40% for political reasons. Although the alleged illegal import of the drug fentanyl from Canada is symbolic, and immigration pressures from that country are relatively minor, these are cited as two of the main reasons for the introduction of additional tariffs to Mexico and Canada; in both cases, additional tariffs were set at 35%. Canada is an independent country, despite President Trump's repeated suggestions that it should be annexed and is pressuring it to accept annexation. On the other hand, no additional customs duties on Russia are anticipated at present, despite the severe economic sanctions already in place. At the same time, President Trump imposed punitive secondary tariffs on India for importing Russian weapons and oil, while the Office of Foreign Assets Control (OFAC) threatened to cut off financial channels to Serbian crude oil importers if Russia's stake in Serbia's energy sector was not reduced.

In conclusion, the manner in which reciprocal tariffs are determined has no basis in the theory of foreign trade or in WTO rules. Instead, new customs duties introduced under a different legal basis have been set at a 15% rate across the board and will remain in force for up to 150 days. After this period, the US Congress must approve any new trade policy. It is difficult to predict how this new policy will affect Serbia. In any case, we should not expect any dramatic improvement during President Trump's administration.

3. NEW WORLD TRADE ORDER

The US economy is the largest in the world. Its share of global GDP was 35% in the 1980s, and has since declined by 10%, as shown in Figure 4.1.[7] The time series was extended back to 1990 to reveal this downward trend. It did not evolve steadily. There were two cycles of growth before this share was reduced to 20% at the beginning of the second decade of this century. Since then, it has recovered slightly but has not been above 25%. Over the next five years, the IMF predicts a 1% decline. Nevertheless, its current economic power gives the US administration significant bargaining leverage. It has used this to raise tariffs on all countries

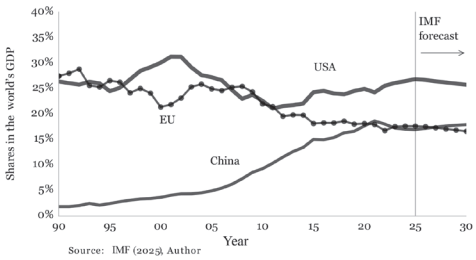
[7] Data, including forecasts, are from the International Monetary Fund (IMF, 2025), World Economic Outlook. Data series are labelled NGDPD and are based on GDP in national currency, converted to US dollars using year-end market exchange rates (yearly average).

worldwide, not only on certain sensitive goods, to levels above those previously accepted under WTO rules.

The only two economies that can match the US economy in economic and financial strength are China and the EU. The Chinese economy's share of global output was a modest 2.5% at the beginning of the observed period, but it increased sharply between the first and second decades of this century. It now stands at 17%, with the IMF predicting a slight increase over the next five years.

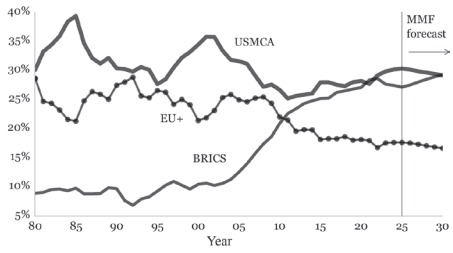
On the other hand, the EU economy was relatively strong during the early 1990s and in the 2007–2009 global financial crisis. Subsequently, the EU's low growth rates significantly reduced its position relative to the United States. A gap then emerged between the two economies, and the EU currently accounts for about 10% of global GDP. Nevertheless, the EU's share of global GDP remains substantial and is comparable to that of another major economy, China.

Figure 4.1: Current economic powers



Source: IMF (2025), Author

Figure 4.2: Future trade blocs



The three leading economies in the world (the United States, China, and the EU) account for more than half of global GDP. They comprise more than a quarter of the world's population. By any account, they are trade leaders who will shape the new global economic order and underpin the emerging new geopolitical infrastructure. However, this is not based solely on financial strength. Military power and the history of their alliances are additional key factors. That is especially true for the United States, which brings together numerous allies within the NATO alliance and draws the EU into its orbit. However, military cooperation does not exclude economic competition from Europe.

The United States has an interest in relying on its Western Hemisphere neighbours, Canada and Mexico. Together, they remain the world's leading

economic area. Without the United States–Mexico–Canada Agreement (USMCA), the US economy would fall behind the BRICS countries, which would be detrimental in the current trade war. Hence, the USMCA will persist in some form. Regardless, it benefits all three economies. It harmonises certain rules of origin, IP protection procedures, and labour standards, and promotes cooperation in the automotive manufacturing sector.

On the other hand, the EU will continue to pursue a policy of attracting new members by granting candidate status. This applies to the Western Balkans, Georgia, Ukraine, and Moldova. We refer to this as the EU+ (EU PLUS). Finally, China has integrated Macao and Hong Kong into its economy while formally recognising their self-governing status and asserting its claim to sovereignty over Taiwan.

Therefore, the above economies are central points around which current and potential new allies would gravitate. Figure 4.2 presents a simulation of such an outcome. It shows shares of the new trading blocs in global GDP. The USMCA and BRICS would be the leading economic powers, with the EU+ lagging behind them.

The figure shows that the economic strength of the BRICS countries has increased their combined share of global GDP by 10% relative to China's individual share and surpassed that of the US, but not that of the USMCA. That is a compelling reason for the US to maintain a trade bloc under the USMCA or to pursue free trade in North and Central America.

Of course, USMCA, BRICS and the EU do not have the same legal status. The EU is a single market with a single currency (the euro) as the means of exchange and payment. The USMCA is a free trade association (FTA) with the US dollar as the medium of payment, while each country retains its own currency as the medium of exchange. BRICS countries (initially Brazil, Russia, India, China, and South Africa) do not constitute a single market or an FTA. They have established a mechanism for cooperation to promote mutual trade and investment by using the local currency as a means of payment. The aim is to restore financial sovereignty by designing a parallel international payment system independent of the US dollar and US sanctions.

The major trading blocs are highly integrated. Table 1 reports the exports and imports of goods between the United States, China, and the EU in 2024/25. Data are provided by the US Census Bureau and the UN Comtrade[8]. The figures should be read by columns. For example, in 2024, the United States imported goods from China valued at $438 billion, while it exported only $144 billion. This resulted in a trade deficit of close to $300 billion. It decreased to about $200 billion in 2025 due to reciprocal tariffs. Within these frameworks, US imports from China decreased much more than its exports to China.

Table 1: Trade flows between major trading blocs in 2024/25

	Import 2024			Export 2024			Import 2025	Export 2025
	USA	China	EU	USA	China	EU	USA	
USA	0	165	388	0	526	556		
China	438	0	631	144	0	219	308	106
EU	618	269	0	355	512	0	633	414
	USMCA	BRICS	EU	USMCA	BRICS	EU		
USMCA	931	332	451	1,630	819	660		
BRICS	616	843	822	283	693	371		
EU	618	400	3,540	412	700	3,938		
UN COMTRADE, bil.USD							CENSUS Bureau	

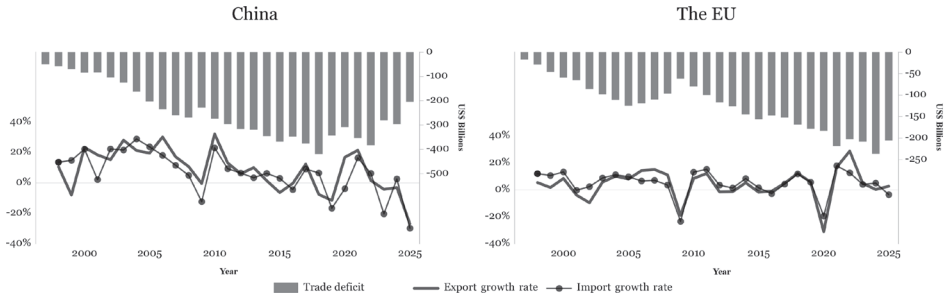
The size of the US trade deficits with the two major trading blocs justifies the Trump administration's concern. The question is whether reciprocal tariffs are the appropriate measures and, if so, how long it will take to restore the trade balance. Figure 5 shows their initial effects in 2025. Bars indicate the trade deficit in billions of dollars; solid lines show the annual growth rates of exports, while dotted lines indicate the annual growth rates of imports.

Growth rates of exports and imports with China have continuously declined since 2005, while the trade deficit peaked in 2018 (Figure 5, left). The adjustment over the last three years, not just in 2025, has been substantial. Credit should be given not only to the Trump administration but also to the Biden administration. However, as imports from China have declined, exports to China have also declined. What was gained in one area (e.g., lower imports) might be offset by

[8] Data are downloaded from the United Nations Statistics Division portal: https://comtradeplus.un.org/. These are annual figures from the 2024 release. Data from the US Census Bureau are monthly data, adjusted in February 2026, from https://www.census.gov/foreign-trade/balance/c5700.html and from https://www.census.gov/foreign-trade/balance/c0012.html.

losses in another (e.g., lower exports). A comprehensive analysis of the cost-benefit effects requires more time than new tariff regulations provide, as they do not yield additional data on inflation, wages, employment, and industrial structure.

Figure 5: USA trade deficits and growth rates with China and the EU, 1997–2025



Source: US Census Bureau (2026), Author

Imports from and exports to the EU have also experienced declining growth rates over the last four years (Figure 5, right). However, the trade deficit with the United States has remained persistent. It matches the size of the US trade deficit with China in 2025. In July 2025, the EU and the United States reached a trade deal, hailed as a historic achievement that fundamentally rebalances the economic relationship between the trading partners[9]. The United States will gain several advantages in trade, investment, and the energy sector, while the EU will face a 15% across-the-board tariff (including on automobiles and automobile parts, pharmaceuticals, and semiconductors), as well as 50% sectoral tariffs on steel, aluminium, and copper. The deal has not been implemented in the real economy nor materialised in the data. Additionally, ratification was suspended due to US tariff threats linked to Greenland and the US Supreme Court ruling. Under the new circumstances, the Trump administration still expects the EU to adhere to the negotiated terms.

Regardless of their scale, Trump's tariffs will not destroy world trade, despite the damage they cause. Two processes take place in parallel. On the one hand, barriers to the free movement of goods and capital are introduced in certain areas.

[9] The deal has not been ratified as of May 2026.

On the other hand, cross-border trade and financial operations are further developed. Economic interdependence deepens in one market segment, while restrictions are introduced in another. In international trade, the WTO sets the rules for free trade; however, behind the scenes, major trading partners impose barriers and economic sanctions on one another. American reciprocal sanctions fit perfectly into this framework. Even before the Trump administration's tariffs, global trade began to shift from perfect to strategic competition. At the same time, protectionism between trade areas was replacing overall market liberalism (Labus, 2024, p. 256). All of these create uncertainties about how the new world trade order will evolve over time.

In Serbia, this creates even greater risks. To balance trade among major trading areas, Serbia should monitor the terms of trade between them. To date, only one such agreement has been concluded between the United States and the EU, and its ratification remains pending. The remaining two agreements – between the EU and China, and between the United States and China – are missing. A separate trade agreement with the United States remains unrealistic for Serbia, as the country is unable to persuade this trade partner to apply its own formula correctly to calculate the reciprocal tariff rate. Serbia is being pressured to work with OFAC and to wait for others to establish a level playing field in trade. This narrows the scope of structural adjustments Serbia will need to undertake to mitigate the adverse effects of the new US customs policy.

4. AMERICAN GOALS

The goals of the new US trade policy are to strengthen military production, establish control over critical minerals such as copper, lithium and rare earths, and reindustrialise the country. These goals are not expected to change under the new circumstances arising from the US Supreme Court's ruling in February this year. This section examines the effects they would have on Serbia if implemented over the following period.

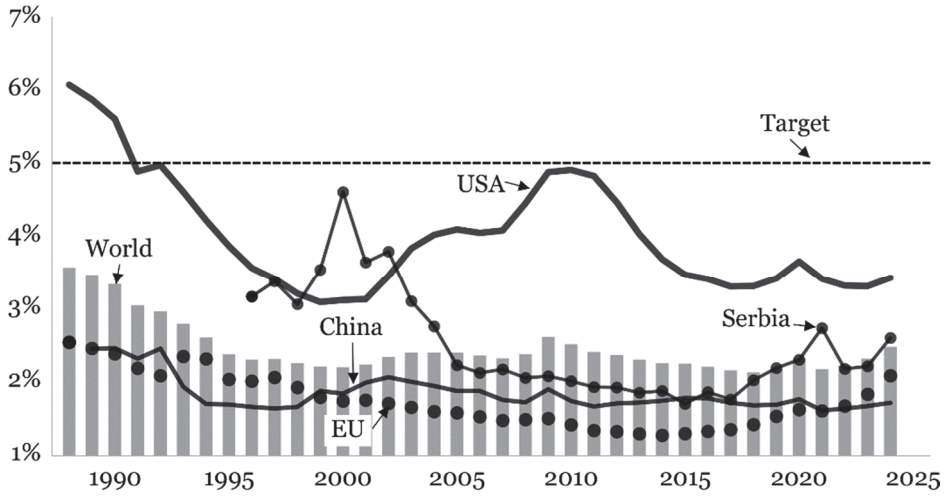
4.1 Military expenditures

The theory of international trade does not link military issues with tariffs. However, the Trump administration does. It declared the trade deficit a threat to national security. One of the goals of reciprocal tariffs is to increase American

defence-industrial production capacity. In this sense, military spending is not treated as a burden on growth, but rather as a driver of industrial policy.

President Trump's Executive Order 14257 is explicit in this account. "As the United States has supplied so much military equipment to other countries, US stockpiles of military goods are too low to be compatible with US national defence *interests*... US defence companies must develop new, *advanced manufacturing technologies* across a range of critical sectors, including bio-manufacturing, batteries, and microelectronics. If the United States wishes to maintain an effective security umbrella to defend its citizens and homeland, as well as for its allies and partners, it needs to have a large upstream *manufacturing* and *goods-producing* ecosystem to manufacture these products without undue reliance on imports for *key inputs*" (emphasis added; Federal Register, 2025a).

Figure 6: Share of military expenditures in GDP, 1988–2024



Source: SIPRI (2025)

These prioritised areas – US national defence interests, advanced manufacturing technologies, manufacturing and goods production, and key inputs – demonstrate how US national security is integrated with foreign trade policy. In other words, geopolitics is integrated into the new world trade order. This explains why our analysis should extend beyond traditional trade theory to

capture the real rather than the apparent reasons for imposing additional customs duties.

US national security faces a number of contemporary challenges. After the fall of the Berlin Wall in 1989, the United States remained the sole superpower. Its hegemony was largely uncontested. Its economy was also by far the largest in the world, with no real competitors. However, in the intervening years, economic competitors emerged, with China first, followed by the EU. In Afghanistan, further damage was inflicted on the credibility of the US and the NATO alliance within the defence sphere. Competition on the economic and military fronts is intensifying, inexorably leading to the formation of a multipolar world. For certain political circles in the United States, this development is unacceptable.

Military expenditures exhibit historical cycles in which they periodically accelerate or decelerate. Figure 6 reports the shares of military expenditure in GDP for the leading trading blocs (the United States, the EU, and China), Serbia, and the world using annual data taken from the Stockholm International Peace Research Institute (SIPRI, 2025).[10] The data timeline starts with the fall of the Berlin Wall and ends in 2024, the last year for which data is available. For Serbia, comparable data start somewhat later, in 1996. American military spending consistently dominates throughout this period, averaging roughly twice the global average. Over the observed period, the spending trajectory reached two peaks: the first coincided with the fall of the Berlin Wall, and the second with the height of the war in Afghanistan. Until 2005, Serbia's military expenditure was above the global average; thereafter, it remained largely in line with it. In contrast, the other two major trading blocs maintained military expenditure-to-GDP ratios lower than the world average.

EU member states are also members of NATO. Most of these countries historically allocated less than 2% of their GDP to military expenditures. As the EU points out in the *European Competitiveness Strategy*: "...the era of geopolitical stability under US hegemony allowed the EU largely to separate economic policy

[10] SIPRI. (2025). *Military spending as a share of GDP*. In the *Military Expenditure Database. Our World in Data*. Retrieved February 2, 2026, from https://archive.ourworldindata.org/20260105-133053/grapher/military-spending-as-a-share-of-gdp-sipri.html.

from security considerations, as well as to use the 'peace dividend' from lower defence spending to support its domestic goals. The geopolitical environment is, however, now in flux owing to Russia's unwarranted aggression against Ukraine, deteriorating US–China relations and rising instability in Africa, which is a source of many commodities that are critical to the world economy" (EU, 2024, p. 13).

However, in parallel with the introduction of reciprocal tariffs, the Trump administration conditioned its commitment to the NATO alliance on a drastic increase in other members' military expenditures. At the NATO summit in The Hague in June 2025, it was decided to increase the military spending target to 5% of GDP by 2035. In this, 3.5% of GDP would be allocated to the production of military equipment and troop support, and 1.5% of GDP to defence infrastructure and cyber defence.

Germany immediately decided to increase its military budget from €62 billion in 2025 to €152 billion in 2029. At the same time, it proposed establishing a €500 billion special investment fund for infrastructure and climate neutrality, including modernisation of the military industry. As it also implied an increase in the budget deficit beyond the EU's tolerance limit, special consent from the European Commission was required to exceed it.

Pressure from the US administration has prompted Germany to reemerge on the military stage as a major regional power, 80 years after the end of World War II. Whether this was an intended goal or an unintended consequence of American policy remains to be seen. However, this is undoubtedly a strategic fact that must be taken into consideration in the future. Another strategic implication of increased military spending is the creation of a financial basis for the EU's potential future military independence, establishing the foundations for the relative independence of NATO's eastern wing (Labus, 2025)[11].

In response to shifting security dynamics and Germany’s evolving military position, as well as the future military position of Europe, France and the United

[11] Labus, M. *Radar* 15.5.2025. "One Proposal to Stop the War in Ukraine: Only Europeans Can End the War". Since this text was published, one prediction has come true: the beginning of the EU's military independence.

Kingdom signed the "Northwood Declaration" in July 2025. This agreement established firm cooperation in the coordinated use of nuclear weapons for the purpose of deterring war in Europe and joint initiatives for the production of advanced weapons (cruise missiles, drone defence systems, air-to-air missiles and cyber defence). The United Kingdom has thus re-engaged with Europe, if not through the single market, via a unified European defence policy.

To evaluate the impact on Serbia, a vector error correction (VEC) model based on the time series shown in Figure 6 will be estimated, where e_t denotes the share of military expenditures in GDP for the respective regions. Such an econometric model is selected because the time series are not stationary and integrated of order one, $I(1)$; consequently, a standard linear regression model would yield biased estimates (due to the influence of a common trend). However, after first differencing, the variables become stationary and form a cointegrating relationship, i.e., are $I(0)$. Table A1 in the Appendix shows the results of the augmented Dickey-Fuller test for a unit root.

The vector of endogenous variables is defined in Equation (4), where k represents the total number of endogenous variables. The VEC model configuration is specified in the system of Equations (5) (Juselius, 2006).

$$\boldsymbol{z}_t = \left[e_t^{\mathrm{SER}}, e_t^{\mathrm{EU}}, e_t^{\mathrm{US}}, e_t^{\mathrm{CH}}, e_t^{\mathrm{W}}\right] \tag{4}$$

$$\Delta \boldsymbol{z}_t = \boldsymbol{\Pi} \boldsymbol{z}_{t-1} + \sum_{i=1}^{p-1} \boldsymbol{\Gamma}_i \Delta \boldsymbol{z}_{t-i} + \boldsymbol{B}\boldsymbol{x}_t + \boldsymbol{\varepsilon}_t$$

$$\boldsymbol{\Pi} = \sum_{j=1}^{p} A_j - I \ , \Gamma_i = -\sum_{j=i+1}^{p} A_j \tag{5}$$

$\mathbf{A}_i$ denote matrices of regression coefficients with lags $i = 1,...,p$; $\boldsymbol{z}_{t-1}$ is the level vector of all variables; $\boldsymbol{x}_t$ is the vector of exogenous variables (including the intercept and trend) with a corresponding matrix of coefficients $\mathbf{B}$, while $\boldsymbol{\varepsilon}_t$ is a vector of residuals with a mean value of zero, normally distributed and mutually uncorrelated. The analysis period is from 1988 to 2024.

The VEC model (5) offers the advantage of modelling long-term equilibria while accounting for short-term changes in variables within the same framework, thereby bringing them to the steady state. Let r be the number of cointegrating

vectors. If there is a matrix **Π** of reduced rank $r < k$, then there exist k x r matrices as a product of vectors **α** and **β,** so it is **Π** = **αβ**', while a linear combination of vectors $\boldsymbol{\beta}'\mathbf{z}_{t-1}$ is stationary ~I(0) and shows a long-run equilibrium. The model (5) is rewritten in the form of a VEC model as follows:

$$\Delta \boldsymbol{z}_t = \boldsymbol{\alpha} \cdot \boldsymbol{\beta}' \cdot \boldsymbol{z}_{t-1} + \sum_{i=1}^{p-1} \boldsymbol{\Gamma}_i \cdot \Delta \boldsymbol{z}_{t-i} + \boldsymbol{B}\boldsymbol{x}_t + \varepsilon_t \quad (6)$$

The number of cointegrating vectors depends on the number of lags and the chosen form of the VEC model (Johansen, 1995). The two-lag model has better statistical metrics but yields, in some cases, a large number of cointegrating vectors that are unsuitable for economic interpretation. Consequently, we chose vector $\mathbf{z}_t$ with only one (annual) lag in Equation (4), but retained two lags in Equation (9). According to Tables A2 and A5 in the Appendix, the model that best fits the empirical data is the VEC model without deterministic components (matrix **B** = **0**), which identifies two cointegrating equations.

Vector **β** shows the long-run equilibrium between the endogenous variables; the vector **α** contains coefficients that determine how those variables adjust to the equilibrium state, and the matrix of coefficients $\boldsymbol{\Gamma}_i$ explains short-term movements of endogenous variables. Estimates of those vectors are reported below. The complete estimation report is in Table A3 in the Appendix.

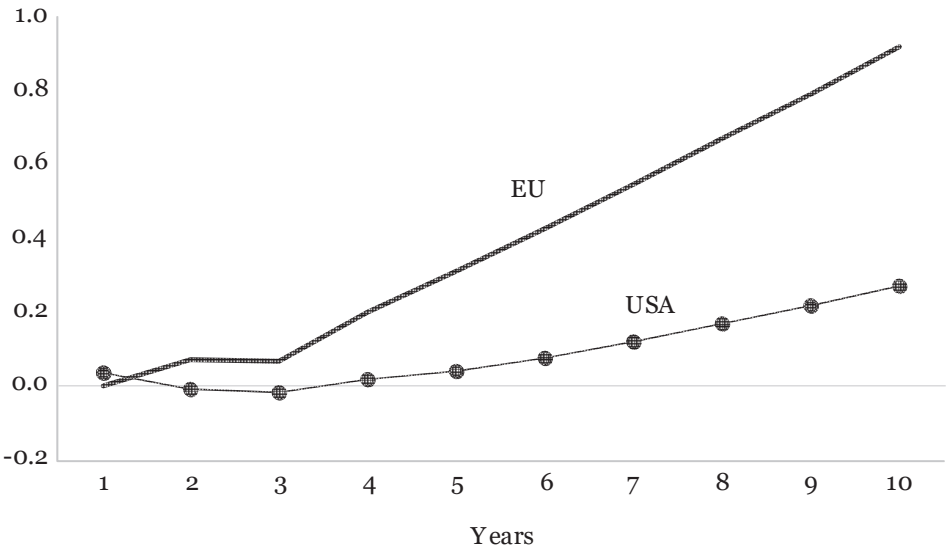
The primary empirical result is presented in Equations (7) and (8) (based on the estimated coefficients in the vector **β**), which represent the long-run equilibrium state. The first long-run equilibrium relationship, expressed in Equation (7), captures the long-term relationship between Serbia's military expenditures (as a share of GDP) and those of the EU. This indicates that Serbia is integrated into the EU in this domain, as its military expenditures align with the EU trajectory. On the other hand, US military expenditures negatively affect Serbia's military spending in the long run, although they indirectly influence Serbia through their impact on the EU's military spending (which will be explained later).

$$e_t^{\mathrm{SER}} = 2.944 \cdot e_t^{\mathrm{EU}} - 0.509 \cdot e_t^{\mathrm{US}} \quad (7)$$

$$e_t^{\mathrm{WORLD}} = 0.351 \cdot e_t^{\mathrm{CH}} + 0.407 \cdot e_t^{\mathrm{EU}} + 0.285 \cdot e_t^{\mathrm{US}} \quad (8)$$

The second steady-state relationship, represented by Equation (8), models long-term interactions between US, EU, and Chinese military expenditures relative to world military expenditures. All these military expenditures contribute to global military spending. While Russian military spending also has a significant geopolitical influence, it is excluded from the model to maintain a focus on these three major trading powers.

Figure 7: Response of military expenditures in Serbia to generalised one-standard-deviation innovations



Long-run relationships are essential, but they are not the only factors that affect overall outcomes. The VEC model is a complex specification that links the long-run equilibrium, the dynamics of its formation, and short-term fluctuations around it across all variables under examination. The most effective way to illustrate the effects of these factors is to construct impulse response functions (IRFs) (Sims, 1980). They are obtained by applying a shock or innovation to the residual of a selected variable in the model given by Equation (6), and then solving the model again. A shock to the *i*-th variable not only directly affects this variable but is additionally transmitted to all the other endogenous variables through the dynamic lag structure of the VEC.

In Figure 7, we present a ten-year simulation showing how a one-time increase in military expenditures in the EU (solid line) and the US (dotted line) can affect military expenditures in Serbia, while controlling for the effects of other model variables. EU military expenditures consistently increase Serbia's military expenditures. By contrast, US military expenditures initially counteract this effect; however, after a few years, they also contribute to a rise in military expenditures in Serbia, through their indirect effect on the EU.

Therefore, given the history of military spending, an arms race between the United States and the EU would likely increase Serbia's military spending. Higher military expenditures do not necessarily imply an increase in final consumption expenditure, which would affect GDP growth. For modern armaments that Serbia must procure abroad, such expenditures would increase the fiscal deficit and, consequently, the country's public debt. At the same time, the trade deficit would widen, exerting downward pressure on the dinar's exchange rate. Serbia does, however, produce ammunition and less complex armaments, which it exports to both the United States and other countries worldwide. These exports would partially offset the initial negative consequences of the induced increase in military expenditures.

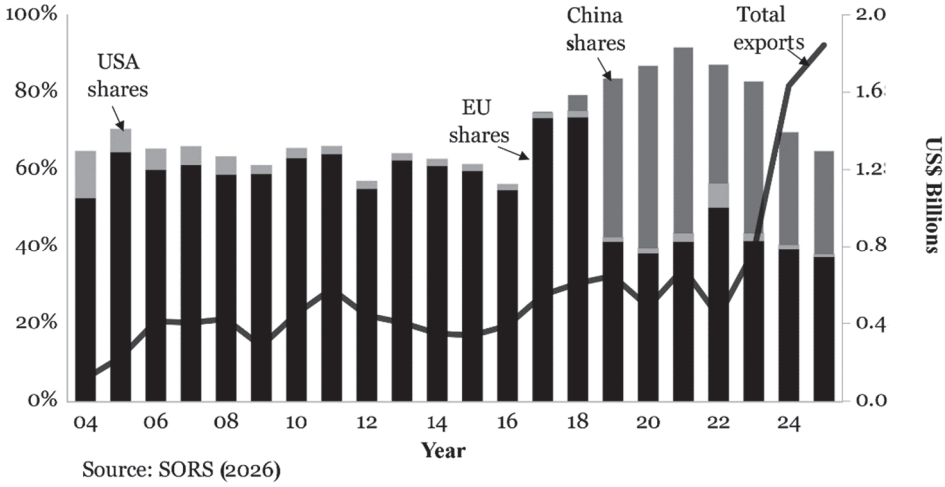
4.2 Production supply chains

The US President's Executive Order No. 14257 from 2025 states that the large and persistent trade deficits have undermined critical supply chains, impeding progress in developing modern technological and manufacturing capabilities and making the defence industrial base dependent on foreign adversaries. This framing clearly refers, first of all, to China and its dominant production of critical raw materials without which there is no modern technology or defence industry. That concern quickly gained practical relevance. When reciprocal tariffs were imposed on China, the country not only raised tariffs on US imports but also restricted the sale of rare-earth minerals to US customers.

Serbia is a relatively small economy that is not a significant component of US-centred production chains and with which the United States would not ordinarily be expected to conclude a separate trade agreement. Therefore, the possible disruption of supply chains and the introduction of reciprocal tariffs would not directly affect it. However, indirect effects may be substantial, given that the EU

and China are Serbia's leading trading partners. Since the EU has already concluded a separate trade agreement with the US, any similar agreement with China would likely have external effects on third countries, including the United States. That agreement would also have important implications for Serbia. It is unclear whether such an agreement would satisfy the US administration's interests without provoking reciprocal or secondary tariffs. In any case, it would affect the supply of scarce raw materials.

Figure 8: Value and structure of Serbian copper exports, 2004–2025



Source: SORS (2026)

Regarding the supply of scarce raw materials, Serbia produces only copper. However, Chinese state-owned enterprises hold substantial interests in Serbian copper resources and represent potential partners in the future extraction of lithium. Rio Tinto, which aims to open a lithium mine in Jadar, Serbia, is dual-listed and owned by a mix of international investors and Chinese state equity[12].

[12] Rio Tinto is a dual-listed company comprising Rio Tinto Ltd., based in Australia, and Rio Tinto plc, based in the United Kingdom. According to official corporate equity disclosures, Chinese state-owned entities hold significant voting blocks. China Baowu Steel Group Co., Ltd. (a state-owned steel giant) owns a 9.8% stake in Rio Tinto Ltd, while another metallurgical company, Chinalco (also state-owned) holds its own 14.59% stake in Rio Tinto plc. Through its subsidiaries, Rio Tinto Minerals Development Limited (England) and Rio Tinto Nominis Limited (England), the goups are co-owners of Rio Sava, Belgrade.

Consequently, China's stake in Serbia's critical mineral sector will persist and may attract the attention of major trading blocs.

In Serbia's copper export sector, a strategic shift occurred in 2018 when a Chinese company acquired the country's principal copper mine in eastern Serbia. This is evident in Figure 8, which shows the level and structure of Serbia's copper exports. The solid line shows the value of copper exports (right scale), while the bars show the shares of this value for major trading partners (left scale). Serbia is not a leading global producer of copper and exports only a moderate amount. Since 2019, Chinese acquisitions have redirected copper exports from the EU to China.

Additionally, exports of copper ore and concentrates to China have increased dramatically over the past three years. However, copper exports to the United States remain negligible. The US administration has no direct interest in them, unless it identifies strategic value in restraining Chinese influence on the EU.

The Trump administration argued that heavy reliance on imported copper threatened US industrial and defence supply chains. Hence, the United States has imposed a universal 50% tariff on imports of semi-finished copper products and copper-intensive derivatives. This measure applies to items such as copper pipes, wires, rods, sheets, tubes, cables, connectors, and electrical components**.** As noted, Serbia's exports of copper to the United States are negligible; therefore, the extremely high tariffs will have a minimal effect on bilateral trade.

Before initiating a trade war with China in 2018, the US realised it faced challenges in ensuring secure supply chains for goods and services, as well as for critical raw materials, including rare-earth elements. That concern was addressed by President Trump's Executive Order 13817 in 2017[13]. The initial interest was focused solely on the energy sector; it later expanded to other branches of technology.

Critical raw materials are key to modern technology. For example, tungsten is critical to dynamic technology in mobile phones, whereas lithium, cobalt, and

[13] Federal Register. (2017). *A federal strategy to ensure secure and reliable supplies of critical minerals*. (Executive Order 13817). *Federal Register*, *82*(246), 60835–60837.

nickel are essential for electric vehicles. Boron is used in wind turbines and in the production of glass and artificial fertilisers. Silicon is used in semiconductors, and magnesium and scandium are used in aircraft. These are products in the key sectors of the economy: consumer electronics, environmental technologies, the automotive industry, aviation, and defence. Raw materials are strategically important, but their supply is vulnerable to risks stemming from high dependence on imports and significant concentration in individual countries. In addition, substitutes are generally unavailable due to their unique properties. Consequently, the functioning of the US economy depends on these materials, yet their supply is outside secure supply chains.

The Council of the European Union pursued a similar strategy. With some delays, the EU adopted the Critical Raw Materials Act (CRMA), which entered into force in May 2024 (European Parliament, & Council of the European Union, 2024). It is one of the key legislative initiatives under the Green Deal Industrial Plan. It identifies two lists of materials (34 critical and 17 strategic) that are key to the EU's green and digital transition and to the defence and space industries. The CRMA establishes three reference benchmarks for the annual consumption of raw materials in the EU: 10% from local production, 40% from processing in the EU, and 25% from recycled materials. No more than 65% of the consumption of each strategic raw material in the EU should come from a single third country. This condition is the most stringent and applies primarily to China, the dominant global supplier of critical raw materials and rare-earth elements.

These goals are difficult to achieve. China is the leading producer of strategic raw materials, of which it supplies the EU with 45% of its total consumption of barite, 65% of bismuth, 71% of gallium, 45% of germanium, 97% of magnesium, 40% of natural graphite, 67% of scandium, 32% of tungsten and 62% of vanadium. Additionally, it is the exclusive supplier of heavy rare-earth elements (Eurostat, 2025).

On the European Commission website, in the Raw Materials Information System (RMIS) section, the following text appears: "In Europe, Serbia is a likely source of lithium minerals for conversion to chemicals…" (European Commission, Joint Research Centre, 2026). Serbia is expected to account for 3% of the EU's total lithium procurement from other countries in 2030, thereby ensuring a secure

supply chain rather than the EU's relying on China. RMIS cites the Joint Research Centre's assessment that, in 2030, the total demand for lithium in the EU will be approximately 1.3 million tons, which would require 3% of Serbia's supply, or approximately 40,000 tons. Interestingly, Rio Tinto plans to produce 58,000 tons of lithium per year.

The European Commission's assessment highlights the anticipated lithium shortage after 2028. The estimates suggest that demand for lithium will rise rapidly, while supply is expected to stagnate after 2028. According to the figures, supply and demand are expected to grow at roughly similar rates, with a compound annual growth rate (CAGR) of 15% between 2015 and 2028. Between 2029 and 2040, a significant gap is expected to emerge despite an assumed 12% CAGR. As of today, and for the next few years, supply and demand are expected to remain broadly balanced, with a slight excess of supply.

This indeed "recommends" that Serbia approve the opening of the Jadar mine near Loznica.[14] Within this framework, it is essential to understand the rationale for the September 2023 signing of a letter of intent between Serbia and the European Commission. The letter of intent was signed to "launch a strategic partnership in the field of batteries and critical materials, including lithium". In July 2024, the European Union and the Republic of Serbia signed a Memorandum of Understanding on a strategic partnership in the field of sustainable raw materials, battery value chains, and electric vehicles (European Commission, 2024b). In June 2025, the Jadar mine in Serbia was officially declared a strategic project of the European Union in the field of critical raw materials. It was formally included in the European Union's list of strategic projects in the second phase, which covers projects involving countries outside the EU. The EU has thus signalled its interest in lithium from Serbia, but the final decision rests with the people of Serbia.

[14] The Jadar mine is not a typical mine due to its reliance on its associated chemical plant. According to the production structure, the facility is a chemical plant based on jadarite ore. Planned production is 285,000 tons of boric acid (47% of production), 260,000 tons of sodium sulfate (43% of production) and 58,000 tons of lithium carbonate (10% of total production). However, due to its high value, lithium accounts for more than 80% of the total production value.

There is strong public disagreement in Serbia regarding the opening of the Jadar mine in Loznica. As mutual strategic relations are being formalised, the EU must ensure compliance with environmental protection standards in Serbia even before its full membership. Possible soil, water, and air pollution remains the greatest uncertainty in the entire project, given that the proposed mining technology – based on operating a chemical plant that uses large quantities of sulfuric acid to extract lithium carbonate from jadarite ore – has not been applied anywhere in the world to date. This has persuaded many people, rightly or wrongly, to exaggerate the risks to both the natural environment and human health, and to strongly oppose that project.[15]

4.3 Reindustrialisation

Declining industry participation has been a persistent problem in many countries. The US President's Executive Order 14257 specifically emphasised: "Over time, the persistent decline in US manufacturing output has reduced US manufacturing capacity. The need to maintain robust and resilient domestic manufacturing capacity is particularly acute in certain advanced industrial sectors like automobiles, shipbuilding, pharmaceuticals, technology products, machine tools, and basic and fabricated metal products, because once competitors gain sufficient global market share in these sectors, US production could be permanently weakened" (Federal Register, 2025a).

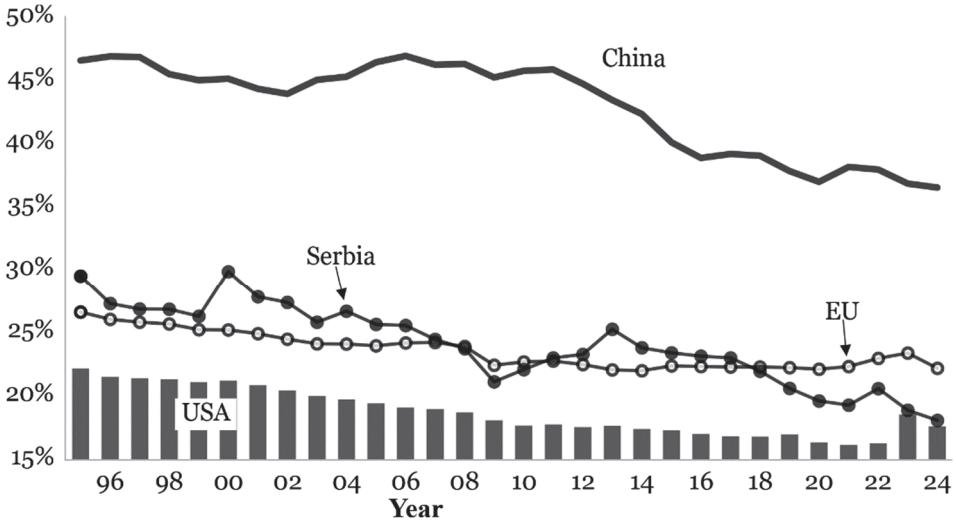
Previously, this problem was highlighted in the *European Competitiveness Strategy (Future of European Competitiveness)* released in September 2024 (European Commission, 2024a). This document outlined the EU's new industrial strategy. It analysed the results of the existing industrial policy more critically, rather than simply attributing its weaknesses to the trade deficit. Moreover, the key conclusion is that the slowdown in EU economic growth is primarily due to a decline in productivity rather than changes in foreign trade dynamics.

Following the introduction of reciprocal sanctions, not only the United States but also the EU and China will need to conclude new bilateral trade agreements. The EU also has numerous objections regarding Chinese competition. Increased competition from Chinese companies, on the one hand, and declining import

[15] The Jadar lithium project is currently suspended by Rio Tinto and placed under "care and maintenance" status.

demand in China, on the other, have significantly affected European companies, suggesting the possible introduction of trade restrictions towards China. However, high energy costs and declining innovation in the EU are identified as key factors slowing economic growth.

Figure 9: Share of GDP in industry, 1995–2024



Source: World Bank World Development Indicators (2025)

Figure 9 illustrates the shares of industrial GDP in total GDP for China, the EU (lines), and the United States (bars), the three main trading blocs. Figures for Serbia are also included. It is evident that these shares are declining across all countries, but the decline is less pronounced in China than in others. The share of industry in GDP generation in the United States is approximately half that of China. Therefore, it is unsurprising that the United States has a large trade deficit with China, since trade in goods is based on industrial production.

The official US position does not address services. In the service sector, the United States runs surpluses with both the EU and China. The reason for this lies in changes in the structure of the US economy, which has increasingly become service-based, with growth and employment driven by service provision. Fees and royalties from patents, trademarks, copyrights, franchises, professional services, software, telecommunications services, banking, and insurance all significantly

contribute to value added and GDP. China's services deficit with the United States is attributable to four areas: tourism, education, royalties for professional services, and transportation.

The share of industry in GDP has declined, indicating a contraction in manufacturing in the United States. The current US president seeks to reverse this trend. The underlying idea is that reciprocal tariffs will encourage the relocation of production to the US and stimulate new outputs through foreign direct investment inflows. The US trade agreements with the EU and Japan explicitly refer to these two trading partners' commitments to additional investment in the US.

This wave of reindustrialisation must be accompanied by innovation and the adoption of new technologies in key industries. The executive order mentions bio-manufacturing, battery manufacturing, and microelectronics. The *European Competitiveness Strategy* warns that Europe risks falling permanently behind if it fails to seize the new digital revolution, which, driven by artificial intelligence, presents an opportunity for innovation and the renewal of industrial potential.

How will all this affect Serbia? To answer this question, we repeat the analysis conducted for the effects of the share of military expenditures in GDP, now using industry shares in GDP relative to total GDP. We estimate a VEC model based on the time series shown in Figure 8. None of these series is stationary, but after the first differencing, they become stationary. This indicates cointegrating relationships among them, that is, relationships that are stationary $I(0)$. Table A4 in the Appendix presents the augmented Dickey–Fuller unit root tests. Table A5 in the Appendix reports the results of the cointegration test. The model that best fits the data is the VEC model without deterministic components (log-likelihood = -69.698; Akaike information criterion = 8.718).

Therefore, the vector of variables is:

$$\boldsymbol{z}_t = \left[q_t^{\mathrm{SER}}, q_t^{\mathrm{EU}}, q_t^{\mathrm{US}}, q_t^{\mathrm{CH}}\right] \tag{9}$$

where $q_t^j = \frac{Y_t^{ind}}{Y_t}$ for j= Serbia, EU, US, China. The VEC model without deterministic components (matrix $\mathbf{B} = 0$) comprises two cointegrating equations

and is of the same form as Equation (6). Its estimates are reported in Table A6 in the Appendix. We are particularly interested in two cointegrating equations that represent long-term equilibrium relationships. One refers to Serbia, and the other to the United States:

$$q_t^{\mathrm{SER}} = 1.823 \cdot q_t^{\mathrm{EU}} - 0.502 \cdot q_t^{\mathrm{CH}} \tag{10}$$

$$q_t^{\mathrm{US}} = 0.407 \cdot q_t^{\mathrm{EU}} - 0.280 \cdot q_t^{\mathrm{CH}} \tag{11}$$

Industrialisation in the EU appears to stimulate industrialisation in Serbia, whereas the declining share of industry in China's GDP appears to have the opposite effect. The results indicate that the Chinese industry competes with the Serbian industry, whereas the EU industry has a complementary relationship with Serbia. If the US industry were also included in this equation, neither cointegration vector could be identified. Hence, it is omitted from Equation (10).

Industries in the EU and China behave similarly toward the US industry. Equation (11) reveals that the Chinese industry acts as a competitor, whereas the EU industry is complementary and supports the share of the American industry in GDP formation. Serbia's industry has little influence on the US industry. In a technical sense, its inclusion in the VEC model estimation prevents the identification of cointegrating vectors.

Therefore, the application of reciprocal tariffs by the United States to restore its industrial base and increase its industry's contribution to GDP is uncertain in terms of its direct long-term impact on Serbia. However, the short-term direct and indirect impacts are positive, as shown by the IRF in Figure A1 in the Appendix.

5. DIRECT IMPACTS ON SERBIA

5.1 Strategic position of Serbia

In Section 3, we explained how the new world trade order is being formed. In this subsection, we assess Serbia's strategic position within this trade framework.

Serbia is a small, open economy that is not a member of any political or trade bloc. Although Serbia is in the process of joining the EU, this process has been ongoing for more than 20 years, with uncertain prospects for when and how it will end. Serbia's foreign policy is based on four pillars: equidistance from the United States, the EU, Russia, and China. At the same time, Serbia is not a WTO member but regulates its foreign trade through bilateral FTAs. Such agreements exist with the EU (the Stabilisation and Association Agreement incorporates the FTA rules), Russia and China, but not with the United States. At the time, the United States respected the WTO, and it granted Serbia general preferential treatment. That status was not renewed after 2020. Following the initiation of the trade war with China in 2018, the United States imposed reciprocal tariffs in 2025, thereby expanding the trade war globally.

Meanwhile, Russia started a war with Ukraine in 2022. These events significantly shaped the formation of the new world trade order. Serbia's non-aligned position is difficult to maintain and is sustainable only at a very high cost. The United States' imposition of a 35% tariff on Serbia effectively eliminated one pillar of its foreign policy. The mechanical application of the formula for determining customs duties (Equation 3), coupled with the refusal to harmonise data on the export and import of goods or to conclude a separate trade agreement, clearly indicates that Serbia lacks the support of the present US administration.

The war in Ukraine eliminated the second pillar of foreign policy, which was based on Russian support for Serbia’s position on Kosovo. Serbia condemned Russia's aggression in words but did not agree to impose sanctions. In the meantime, it reportedly supplied weapons to Ukraine to demonstrate that it could cooperate with both sides. In reality, this strategy failed, and Serbia lost Russian support.

Russian energy support remains, but it is already subject to US economic sanctions. Russia must divest its ownership stake in NIS, Serbia's petroleum company, which controls the entire oil sector. Otherwise, cross-border payments would be suspended as part of broader sanctions against foreign companies operating in Serbia. The deadline was set to March 2026, but has been extended twice in the meantime.

The strengthening of Serbia's ties with BRICS is a new reality, accompanied by a slight distancing from Russia. There is no specific FTA agreement with BRICS as an association, except for bilateral agreements with Russia, China, the United Arab Emirates, and Egypt. At present, there are no trade agreements between the BRICS countries and the EU, except for the EU-India agreement; Serbia's future room for manoeuvre thus remains uncertain.

Table 2: Serbia's export and import of goods in 2025

	Export	Import
The EU	62.40%	55.00%
Europe outside the EU	23.80%	16.40%
China	5.60%	13.10%
Russia	2.30%	3.00%
The USA	1.90%	1.80%
Others	4.00%	10.70%

SORS, https://publikacije.stat.gov.rs/G2026/pdfE/G20261019.pdf

If Serbia genuinely wishes to join the EU, it must treat the EU as its primary foreign policy priority. Otherwise, if Serbia seeks to maintain a neutral foreign policy, it would need to discontinue the EU accession process and conclude a separate FTA with the EU. EU membership does not preclude an independent foreign policy, as Hungary's current position demonstrates. However, this membership depends less on foreign policy and more on domestic policy, which must be grounded in democratic institutions, the rule of law, and an independent judiciary. In this context, the four-pillar foreign policy is often invoked to justify the absence of domestic reform.

The introduction of reciprocal sanctions drastically reduced Serbia's room for manoeuvre. The current figures for Serbia's trade with its main trading partners are presented in Table 2. The bulk of trade occurs with the EU. Serbia faces a clear strategic choice: it must either clearly commit to EU accession and demonstrate this by undertaking key internal reforms, or it must acknowledge it is not prepared to implement the reforms necessary for membership. In a period of high global uncertainty, the risks are even greater. These can be reduced either through EU membership or through a new FTA with the EU, on the basis of complete

external independence. If Serbia were a member of the EU today, it would not face US reciprocal tariffs of 35%, but rather much lower tariffs, likely around 15%. Thus, a neutral stance comes at a cost. Ironically, the new US tariffs of 15% across the board make such an argument less persuasive.

5.2 Trade with the United States

In Section 4, we analysed the macroeconomic consequences of reciprocal tariffs introduced by the US administration to achieve its new trade policy goals. Within that framework, we have shown the potential economic consequences for Serbia. We now turn from macroeconomic analysis to the microeconomic analysis of direct trade flows of goods between the United States and Serbia. Again, the intention is to assess the consequences of the new reciprocal customs duties, or alternative tariffs, for Serbia in this context.

Trade in goods between Serbia and the United States can be modelled using Serbia's export supply functions and the United States' import demand functions. The supply functions would be relevant if the demand for Serbian goods were infinitely elastic in the US, allowing Serbia itself to decide which goods to sell and in what quantities. However, since the US economy is much larger than the Serbian economy, American demand is largely inelastic. Additionally, Serbia has no intention of imposing additional tariffs on US imports in response to reciprocal tariffs, and thus, the supply function will not be affected. Accordingly, we focus solely on the US demand function for Serbian products. The logarithmic function of the US import of products from Serbia has a simple form:

$$\ln(X_{i,t}^{SER\to US}) = \alpha_i^{US} + \beta_i^{US} \cdot \ln(P_{i,t}^{SER\to US}) + \delta_i^{US} \cdot \ln(Y_t^{US}) + \varepsilon_i^{US} \qquad (12)$$

where $X_{i,t}^{SER\to US}$ denotes imports of goods from Serbia to the US by sector i and year t, $P_{i,t}^{SER\to US}$ stands for import prices for Serbian goods in the US, Y_t^{US} denotes US GDP in year t, while β_i^{US} and δ_i^{US} are the sectoral price and demand elasticities, respectively. The objective is to use Equation (12) to estimate the price and income elasticities of imports, as customs duties affect import prices and the growth of the American economy. Other factors are treated as less important and are neglected. The analysis does not include changes in import structure and their impact on import prices, transport costs, competition from substitute goods from

other exporters, or cultural consumption habits (e.g., the tendency of people in the US to carry guns, which is an important export market for Serbia).

Import prices for goods from Serbia have been approximated using official export data to the United States, both in US dollars and in weight (kilograms).[16] In this way, they represent realised import prices in US dollars per kilogram of goods imported from Serbia and approximate wholesale import prices in the United States (assuming perfect competition across all markets).

It is therefore necessary to evaluate the system of import demand functions as represented in Equation (12). It was estimated across 10 sectors over 22 years, from 2004 to 2025. These estimates are reported in Table 2. Since the residuals of the equations are not fully independent, we used the SUR (Seemingly Unrelated Regression) estimation method.

Price elasticity of US imports from Serbia (β_i^{US}) has the usual negative sign, indicating that prices significantly influence US demand for Serbian goods. The higher the prices, the lower the imports.

If restrictions are introduced on the beta parameter in the system of Equations (12) for all sectors:

$$\beta_i^{US} = \beta^{US} \tag{13}$$

then an estimate of the general elasticity of demand for goods from Serbia is obtained (-0.885), indicating relatively inelastic demand close to unity. In other words, a price increase due to a 35% tariff will, on average, cause a 31% drop in demand.

Out of ten sectors, five sectors have high elasticity (greater than unity), and five sectors are inelastic (lower than unity). Sectors with elastic demand include food,

[16] SORS (2025). Database/foreign trade/export and import by country of destination, origin/export and import, by sector SMTK (Standard International Trade Classification), rev.4. We did not have the corresponding data from US statistics.

raw materials, fuels, metal products, and miscellaneous goods. Sectors with inelastic demand are beverages, fats, chemicals, machinery, and other products.

It is also useful to consider even more disaggregated imports of goods from the United States. Product groups are necessary for a more detailed analysis. The five best-selling product groups are animal feed (code 081), pneumatic tyres (code 625), combustion piston engines (code 713), rotating electrical machines (code 716) and weapons and ammunition (code 891). Each of these product groups, except rotating electrical machines, has high price elasticity (coefficient of elasticity greater than unity). In this respect, they should be strongly affected by the introduction of reciprocal tariffs of 35%. This is correct except in one case: pneumatic tyres. Interestingly, tyre exports increased by 52% in 2025, even though tyres are highly elastic (elasticity coefficient: -2.952). This trend is hardly sustainable, as the US Customs and Border Protection issued a Withhold Release Order in December 2025, blocking the import of Linglong International Europe's tyres from Zrenjanin, Serbia, following findings of forced labour in its production.

Nevertheless, the question remains: why did exports rise despite the higher tariffs? To address this, we further disaggregate the pneumatic tyre group into passenger car tyres (code 6251) and bus/truck tyres (code 6252). Relevant data are presented in Figure 10. This figure shows tyre prices and imported quantities for both products over the last two years. The shaded area indicates the period during which reciprocal tariffs were imposed.

Table 3: Price and income elasticity of the US imports from Serbia

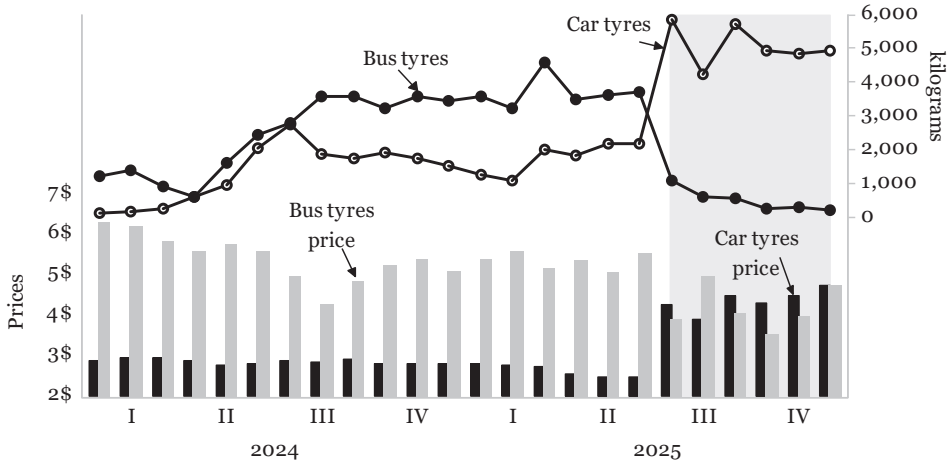
Sectors/Groups		Price and income elasticity	Standard error	t-Statistics	Probability
All sectors	Price	-0.885	0.049	-18.222	0.000
	GDP	3.301	0.110	30.043	0.000
0 Food	Price	-1.406	0.169	-8.318	0.000
	GDP	3.023	0.227	13.323	0.000
1 Beverages	Price	-0.262	0.101	-2.595	0.010
	GDP	1.536	0.254	6.035	0.000
2 Raw materials	Price	-1.122	0.110	-10.209	0.000
	GDP	4.528	0.498	9.093	0.000
3 Fuels	Price	-2.362	0.658	-3.588	0.000
	GDP	3.462	0.987	3.509	0.001
4 Oil	Price	-0.857	0.247	-3.465	0.001
	GDP	2.136	0.675	3.163	0.002
5 Chemicals	Price	-0.256	0.111	-2.310	0.022
	GDP	4.219	0.616	6.849	0.000
6 Metal products	Price	-1.303	0.115	-11.315	0.000
	GDP	3.119	0.467	6.673	0.000
7 Machines	Price	-0.937	0.145	-6.453	0.000
	GDP	5.083	0.643	7.904	0.000
8 Miscellaneous goods	Price	-1.301	0.189	-6.887	0.000
	GDP	3.104	0.499	6.223	0.000
9 Others	Price	-0.963	0.463	-2.079	0.039
	GDP	3.508	0.707	4.963	0.000
891 Weapons and ammunition	Price	-1.589	0.301	-5.285	0.000
	GDP	2.183	0.736	2.966	0.004
625 Tyres	Price	-2.952	0.831	-3.553	0.001
	GDP	5.451	0.932	5.848	0.000
081 Animal feed	Price	-1.387	0.382	-3.629	0.000
	GDP	4.459	0.908	4.913	0.000
713 Combustion piston engines	Price	-2.111	0.718	-2.941	0.004
	GDP	12.488	1.990	6.277	0.000
716 Rotating electrical machines	Price	-0.977	0.544	-1.795	0.076
	GDP	11.242	1.358	8.276	0.000

In the second half of 2025, bus/truck tyre prices fell while passenger car tyre prices rose. At the same time, imports of bus/truck tyres declined, whereas imports of car tyres increased sharply and remained relatively high. This is not a standard market reaction to price changes. Two factors might explain why this happened.

First, demand for passenger car tyres in the United States was strong in 2025 due to replacement cycles and a post-pandemic recovery in driving, while demand for bus/truck tyres declined from mid-2025 onward. Second, the Linglong factory in Zrenjanin, which primarily manufactures truck tyres, had been under scrutiny

for some time over allegations of forced labour in its production, while the other company, Tigar Pirot, which typically produces passenger car tyres (owned by Michelin), had not. Hence, reputational risk reduced import demand for truck tyres from Serbia, while strong domestic demand for passenger car tyres absorbed higher Serbian prices. As a result, rising imports of passenger car tyres outweighed declining imports of truck tyres, yielding a large positive balance despite the tariffs.

Figure 10: Quarterly import volumes and unit prices of tyres from Serbia to the USA



Source: SORS, 2026

Other top product groups did not show such market irregularities. Weapons and ammunition have a high elasticity coefficient (-1.589), and imports in 2025 declined by 60%. This was the strongest market reaction to the tariff increase. Imports of the remaining top commodities – animal feed, internal combustion piston engines, and rotating electrical machines – were down by -18%, -11% and -8%, respectively. Internal combustion piston engines have a high demand elasticity of -2.111; animal feed has a slightly lower (close to unity) demand elasticity of -1.387; rotating electric machines have a low demand elasticity of -0.977, which corresponds to the smallest drop in imports. Altogether, Serbia's total exports to the United States declined by -2.5% in 2025 due to rising tariffs.

We conclude that the overall consequences of the new reciprocal customs duties for Serbia were limited in 2025 but became more pronounced in the second half of the year. More severe effects are expected in 2026 and beyond. Hence, a further decline in US imports from Serbia in 2026 is expected under the present circumstances.

On the optimistic side, the income elasticity of Serbian exports with respect to US GDP is positive and high (3.301). Economic growth in the United States is very favourable for the import of goods from Serbia. This applies to all sectors and to specific product groups within them.

6. CONCLUSIONS

The existing world order is in turmoil as it shifts from a unipolar to a multipolar system. This transition does not proceed in a straight line, calmly and harmoniously. On the contrary, it has so far been accompanied by disruptions in foreign trade, international finance, and local wars, and has been followed by reciprocal tariffs imposed by the US administration on countries worldwide. In this way, the trade war with China, which began in 2018, evolved into a broader customs war in 2025, spreading to many countries worldwide.

The US Supreme Court ruled in February this year that President Donald Trump had overstepped his powers when he imposed sweeping global tariffs a year earlier. This, however, did not change official US trade policy. President Trump immediately signed a proclamation invoking an alternative law that allowed him to impose a new 15% temporary tariff on goods from all countries.

Therefore, this paper focuses on reciprocal tariffs and their strategic consequences, since they reveal the new trade policy of the US administration. It also briefly discusses changes in the geopolitical situation and the initiation of a new arms race. These developments are linked to deindustrialisation and the widening goods trade deficit. Services have not been analysed, as they are not currently affected by the new customs duties, nor is international finance. The author presents his views on the future of foreign trade and the world's geopolitical architecture.

High reciprocal tariffs affect Serbia's position in the current global context. Serbia's four-pillar balancing policy has been weakened by US tariffs and secondary sanctions for supporting Russia in the war with Ukraine. As a result, two pillars have effectively fallen away. There remains only a limited scope for balancing between the EU and BRICS, which is highly uncertain due to the absence of trade agreements between the two blocs and the potential for trade restrictions involving third countries. Moreover, the impact of the EU market on Serbia is incomparably greater than that of BRICS. In any case, the new tariffs imposed by the US administration have reduced Serbia's room for foreign-policy manoeuvring. Serbia, therefore, has a strong incentive to join the EU as soon as possible to be protected from the US tariffs.

In macroeconomic terms, the long-term negative impact of customs duties could be significant in Serbia and globally. The short-term effect on Serbia's trade with the United States is generally limited, but pronounced for certain goods. It could initially reduce Serbia's GDP by up to one percentage point in the first year of implementation. However, for exports of tyres, animal feed, and internal combustion piston engines, the decline could be much greater. Additionally, the indirect impact through exports to the EU and China would likely be substantially greater. This cannot be reliably estimated at this time, as the new trade arrangements between the United States and China, as well as those between the EU and China, have not yet been finalised. Further uncertainty also arises from the US tariff policy adopted in February 2026.

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APPENDIX

Table A1: Augmented Dickey-Fuller test of the unit root:

Shares of military expenditures in GDP

Series	Level		1st difference	
	t-statistics*	Probability**	t-statistics	Probability
MILEX/GDP_SERBIA	-1.555	0.492	-5.969	0.000
MILEX/GDP_CHINA	-2.836	0.064	-5.728	0.000
MILEX/GDP_EU	-1.671	0.434	-3.269	0.026
MILEX/GDP_USA	-2.950	0.050	-3.056	0.039
MILEX/GDP_WORLD	-0.964	0.753	-3.044	0.043

* Critical value for 1% level is -3.632 **MacKinnon (1996) one-sided p-values.

Table A2: Unrestricted cointegration rank test (trace):

Shares of military expenditures in GDP

Johansen-Hendry-Juselius	Lags	Cointegration relationships	Unrestricted relationship		LR test for biding restrictions		
			Log Likelihood	Akaike information criterium	Chi-square	Probability	Akaike information criterium
Case 1: No constant and trend	2	4	231.274	-10.863			
Case 2: Cointegration includes a constant	2	4	242.222	-11.402			
Case 3: Cointegration includes constant and trend	2	4	243.072	-11.390			
Case 4: Cointegrating relationship includes a constant and trend, Short-run dynamics include a constant	2	5	263.105	-12.623			
Case 5: cointegrating relationship and short-run dynamics include a constant and trend	2	5	266.112	-12.778			
Case 1	1	2	191.1466*	-10.0849*	0.0095	0.9223	-10.3071
Case 2	1	2	181.168	-9.938			
Case 3	1	3	181.753	-9.759			
Case 4	1	4	185.304	-9.874			
Case 5	1	3	191.142	-10.084			

Table A3: Vector error correction estimates:Shares of military expenditures in GDP

Deterministic assumptions: Case 1: No deterministic terms.				
Cointegrating restrictions: b(1,1)=1, b(1,2)=0, b(1,5)=0, b(2,5)=1, b(2,1)=0				
Convergence achieved after 38 iterations.				
Restrictions identify all cointegrating vectors.				
LR test for binding restrictions (rank = 2):				
Chi-square(1)	0.010		Probability	0.922
Cointegrating Eq:	CointEq1	CointEq2		
MILEX*/GDP_SERBIA(-1)	1.000	0.000		
MILEX/GDP_CHINA(-1)	0.000	-0.351		
		[-7.063]		
MILEX/GDP_EU(-1)	-2.944	-0.407		
	[-15.65]	[-7.909]		
MILEX/GDP_USA(-1)	0.509	-0.285		
	[6.810]	[-20.602]		
MILEX/GDP_WORLD(-1)	0.000	1.000		
Error Correction:	D(MILEX/GDP_SERBIA)	D(MILEX/GDP_CHINA)	D(MILEX/GDP_EU)	D(MILEX/GDP_USA)
COINTEQ1	-0.627	0.059	-0.047	-0.056
	[-3.939]	[0.778]	[-0.895]	[-0.428]
COINTEQ2	-0.883	0.481	0.429	1.770
	[-1.105]	[1.264]	[1.621]	[2.713]
D(MILEX/GDP_SERBIA(-1))	-0.071	-0.023	0.004	0.007
	[-0.530]	[-0.351]	[0.089]	[0.068]
D(MILEX/GDP_CHINA(-1))	4.348	-0.103	-0.120	0.423
	[6.944]	[-0.344]	[-0.575]	[0.826]
D(MILEX/GDP_EU(-1))	2.618	-0.219	0.248	-2.508
	[1.513]	[-0.265]	[0.431]	[-1.773]
D(MILEX/GDP_USA(-1))	1.032	-0.077	0.082	1.178
	[2.974]	[-0.462]	[0.711]	[4.156]
D(MILEX/GDP_WORLD(-1))	-5.899	-0.013	-0.078	-0.417
	[-4.418]	[-0.020]	[-0.176]	[-0.382]
Log likelihood	184.147	Akaike information criterion		-10.307
* MILEX = Military expenditures,		t-statistics in [ ], standard errors are omitted		

Table A4: Augmented Dickey-Fuller test of the unit root: Shares of manufacturing in GDP

Series	Level		1st difference	
	t-statistics*	Probability**	t-statistics	Probability
SERBIA	-1.109	0.699	-6.762	0.000
CHINA	0.446	0.982	-3.952	0.005
EU	-2.013	0.280	-4.538	0.001
USA	-1.637	0.452	-6.364	0.000

* Critical value for 1% level is -3.670

**MacKinnon (1996) one-sided p-values.

Table A5: Unrestricted cointegration rank test (trace): Shares of manufacturing in GDP

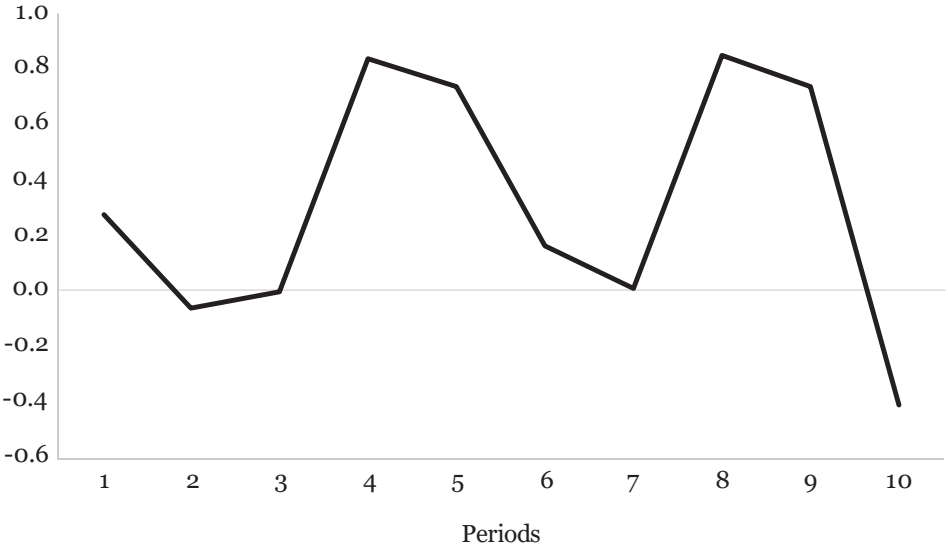
Johansen-Hendry-Juselius	Cointegration relationships	Unrestricted relationship	
		Log Likelihood	Akaike information criterium
Case 1	2	-69.698	8.718
Case 2	2	-63.799	8.430
Case 3	3	-63.251	8.537
Case 4	2	-61.565	8.560
Case 5	2	-58.426	8.475

Table A6: Vector error correction estimates: Shares of manufacturing in GDP

Deterministic assumptions: Case 1: No deterministic terms.				
Cointegrating restrictions: b(1,3)=1, b(1,4)=0, b(2,4)=1, b(2,3)=0				
Restrictions identify all cointegrating vectors.				
Restrictions are not binding				
Cointegrating Eq:	CointEq1	CointEq2		
GDP_IND_SHARE_CHINA(-1)	0.502	0.280		
	[2.10675]	[3.11934]		
GDP_IND_SHARE_EU(-1)	-1.823	-1.262		
	[-4.27923]	[-7.86961]		
GDP_IND_SHARE_SER(-1)	1.000	0.000		
GDP_IND_SHARE_USA(-1)	0.000	1.000		
Error Correction:	D(GDP_IND_SHARE_CHINA)	D(GDP_IND_SHARE_EU)	D(GDP_IND_SHARE_SER)	D(GDP_IND_SHARE_USA)
COINTEQ1	-0.227	-0.036	-0.977	-0.038
	[-1.19384]	[-0.44330]	[-3.91251]	[-0.39157]
COINTEQ2	0.499	-0.222	1.887	-0.242
	[1.13604]	[-1.17152]	[3.26259]	[-1.09141]
D(GDP_IND_SHARE_CHINA(-1))	0.401	-0.040	-0.278	-0.157
	[1.62679]	[-0.37836]	[-0.85777]	[-1.26437]
D(GDP_IND_SHARE_CHINA(-2))	-0.173	0.065	-0.569	0.215
	[-0.78571]	[0.68403]	[-1.95758]	[1.92662]
D(GDP_IND_SHARE_EU(-1))	-0.263	-0.199	0.909	0.069
	[-0.36769]	[-0.64468]	[0.96690]	[0.19264]
D(GDP_IND_SHARE_EU(-2))	0.823	-0.509	0.440	-0.328
	[1.20288]	[-1.71892]	[0.48879]	[-0.94889]
D(GDP_IND_SHARE_SER(-1))	0.045	0.065	0.398	0.160
	[0.25683]	[0.85310]	[1.71000]	[1.79000]
D(GDP_IND_SHARE_SER(-2))	-0.266	0.181	0.652	0.192
	[-1.30235]	[2.05234]	[2.42610]	[1.85956]
D(GDP_IND_SHARE_USA(-1))	-0.580	-0.506	-2.432	-0.533
	[-0.95658]	[-1.93268]	[-3.04887]	[-1.74200]
D(GDP_IND_SHARE_USA(-2))	0.854	-0.719	-2.401	-0.897
	[0.81467]	[-1.58654]	[-1.73966]	[-1.69251]
Log likelihood	-69.698	Akaike information criterion		8.718

t-statistics in [ ] , standard errors are omitted

Figure A1: Response of manufacturing GDP share in Serbia to one-standard-deviation innovations in manufacturing share in GDP in the USA



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THE PRIVACY GAME: UNDERSTANDING LOW-PRIVACY EQUILIBRIA IN DIGITAL MARKETS

ABSTRACT: *When purchasing different products, consumers often implicitly or explicitly agree to various privacy arrangements. These arrangements may pertain to the regulations surrounding the management of information gathered during product purchases and usage. In his paper, Joseph Farrell discusses a "dysfunctional" equilibrium in the privacy dynamics between firms and consumers, emphasising that consumers have resigned themselves to a reality without privacy. He highlights that the Federal Trade Commission (FTC) acknowledged the necessity of steering clear of such an equilibrium in its report. The EU is also undertaking significant initiatives, as evident in the General Data Protection Regulation (GDPR) and Digital Markets Act. This paper demonstrates that the privacy game in question can be modelled as a simplified ultimatum game, revealing that the dysfunctional equilibrium is subgame-perfect. While the evolutionary approach employing replicator dynamics suggests the existence of other local attractors relevant to the original ultimatum game, these attractors, contrary to the fairness analysis, prove insignificant in our case. By combining a simplified ultimatum game with evolutionary dynamics, this paper shows how structural and strategic factors stabilise low-privacy outcomes and evaluates how current EU and US regulatory measures interact with these dynamics, highlighting conditions under which privacy-protective strategies could gain traction.*

KEY WORDS: *economics of privacy, GDPR, fairness, cynical equilibrium, replicator dynamics.*

JEL CLASSIFICATION: C73, K24, D83, O38.

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"…individual shall have full protection in person and in property is a principle as old as the common law; but it has been found necessary from time to time to define anew the exact nature and extent of such protection."

Warren & Brandeis (1890)

INTRODUCTION

Routine online choices—clicking "Accept all cookies," granting location access, or sharing contacts—look trivial, yet they cumulatively determine how much privacy consumers actually have. We show that, in data-intensive markets, firms' incentives and consumers' expectations can reinforce each other, leading to the persistence of intrusive defaults even when a less intrusive option would be mutually beneficial.

Building on a long tradition that treats privacy as both a legal entitlement and an object of economic analysis, this paper investigates how the strategic interaction between firms and consumers can entrench outcomes that neither side would describe as a first-best option (i.e., outcomes that would be Pareto-improving if consumers could, for example, pay to preserve privacy without losing service access). From a legal perspective, Warren and Brandeis's (1890) classic insistence that society must "define anew the exact nature and extent" (p. 193) of protection remains even more relevant in data-intensive markets, where technological change incessantly shifts both the perimeter and the stakes of privacy. From an economic perspective, Posner's (1981) influential framing of privacy as the concealment of information ties the problem to canonical issues of information asymmetry and market performance. In the broader economic literature, privacy is recognised as having two dimensions. First, it has final-good aspects, meaning it is valued intrinsically for its own sake. Second, it has intermediate-good aspects, meaning it generates economic value indirectly through its downstream effects on market prices, targeted advertising, and the management of risks for both firms and consumers. Farrell (2012) briefly acknowledges this dual nature, but—despite the standard economic view that tastes for final goods are taken as given—deliberately focuses his analysis on privacy as a pure final good.

On the other hand, it is often argued—especially by digital platforms—that disclosing personal data (for example by accepting cookies) enhances user

experience by improving search, personalisation, or convenience. In this narrative, firms present a trade-off between privacy and functionality: more data supposedly enables better or smoother services. Economic theory helps explain why this claim is intuitively appealing. Varian (2009)[1] notes that consumers may rationally prefer to reveal certain kinds of information when doing so reduces search or attention costs, even while wishing to keep other information private to preserve surplus. This observation has inspired proposals such as Laudon's (1996) "National Information Market", in which individuals would own their data and choose how much to disclose in exchange for compensation.

Yet these ideas rarely materialise in practice. Transaction costs, information asymmetries, platform lock-in, and the structural inability of consumers to negotiate over each data flow prevent such markets from functioning. As a result, the privacy–functionality framing often serves less as a genuine trade-off and more as a justification for collecting data that is not technically required. Regulators on both sides of the Atlantic routinely find that many forms of tracking, profiling, or cross-service data use exceed what is necessary for basic functionality.

It is precisely in this environment—where firms can claim functionality benefits while consumers cannot meaningfully evaluate or contest those claims—that the strategic interaction formalised by Farrell (2012) becomes decisive. His model explicitly abstracts away from any efficiency gains associated with additional data and treats privacy solely as a final good. He shows that even when privacy offers no functionality benefit whatsoever, market forces can still push the system toward a dysfunctional or "cynical" equilibrium in which low-privacy options dominate simply because consumers have learned to expect that meaningful protection is unavailable.

To better understand how structural constraints and strategic interactions affect firm and consumer behaviour in a context in which privacy is treated as a final good, we adopt Farrell's (2012) framework, which formalises the trade-offs between consumer harm (H) and firm value (V) and will guide our analysis for

[1] The argument originates from an earlier publication; we are referencing the 2009 reissue here.

the remainder of the paper[2]. Farrell considers a simple monopoly with constant marginal costs, focusing solely on the firm's choice of privacy policy for a single product and the resulting welfare implications. Under this framework, the firm chooses between two distinct privacy policies: policy A, which maintains a baseline of privacy protection, and policy B, which allows the firm to extract additional value by repurposing consumer data.

Farrell introduces two variables defined relative to policy A. V denotes the additional profit per consumer that the firm can capture under policy B. This includes not only cost savings but also additional revenue the firm can generate by repurposing consumer data—for example, selling it to advertisers, using it to promote other products, or aggregating it for insights. H represents the incremental harm experienced by consumers under policy B, captured by a reduction in their reservation prices. Mechanism A preserves privacy (H_A), while mechanism B is more intrusive; therefore, $H_B > H_A$.

There are two distinct ways in which policy B might emerge as the firm's choice. In the first, B is chosen because $V > H$: the firm gains more from exploiting privacy than it would lose from any reduction in demand if it adopted the more protective policy A. In this case, B has passed a market test, and the outcome is consistent with standard efficiency logic. In contrast, if $H > V$, standard market logic would favour policy A, as the harm to consumers outweighs the firm's additional profit, aligning incentives with welfare-maximising outcomes.

However, in the second case, consumers have learned to expect less protection. They believe that firms will generally pursue follow-on revenues and will not safeguard privacy. As a result, they act as if policy B is in place, regardless of the firm's actual choice. This makes demand effectively insensitive to whether the firm adopts A or B. Knowing this, the firm can maximise its profit V by choosing the less protective policy B without worrying about losing demand. It is in this scenario that the market can settle into a dysfunctional, or cynical, equilibrium.

[2] In a different paper, we aimed to show that the welfare implications of this model do not present any new insights since the primary argument faces the same conceptual challenges as those inherent in the concept of selling costs. The controversy surrounding selling costs, which resulted in the exclusion of the concept from mainstream economic analysis, could have served as a critical indicator of the limited promise of this model (Ristić & Njegovan, 2026).

Even if $H > V$, the cynical expectations of consumers prevent demand from responding to more protective policies, allowing B to dominate. In this equilibrium, consumer welfare is lower than it could be, and mutually beneficial exchanges fail to materialise.

Firm incentives in this framework are fully rational: they maximise V given expected consumer behaviour, rather than deliberately neglecting H. Consumers, likewise, are rational inattention agents; they do not ignore privacy harms out of negligence, but because structural constraints, low likelihood of effective disclosures, and prior experiences lead them to treat privacy as effectively unavailable. Escaping this equilibrium is difficult: small firms cannot profitably adopt more protective policies because, if consumers fail to notice or respond to the policy difference, demand remains unchanged, leaving the firm to forgo the additional profit V without any corresponding increase in demand. At the same time, individual consumers cannot shift aggregate expectations, and the market therefore remains dominated by the less protective policy B. As Farrell emphasises, escape typically requires coordinated action by powerful actors or effective regulatory intervention.

Farrell's A–B, H–V framework is not merely theoretical; it closely maps onto contemporary digital markets, where consumers frequently face privacy-invasive options with no real alternative. For example, the popular mobile weather app—The Weather Channel—was accused of collecting users' precise geolocation data and selling it to third-party advertisers and hedge funds, even though users were led to believe location data would be used only for weather forecasts[3]. In effect, users faced a binary choice: allow intrusive data collection or forgo the service—a textbook instance of the B-policy with no viable A-option.

Similarly, many European Union (EU) websites still rely on cookie walls, which block access unless a user accepts tracking cookies; such walls violate the General

[3] See "'Tracking every place you go': Weather Channel app accused of selling user data" (Associated Press, 2019) and "City of LA sues popular Weather Channel app, alleging misuse over 'targeted marketing and analysis for hedge funds'" (Potuck, 2019).

Data Protection Regulation (GDPR)[4] requirement that consent be "freely given, specific, informed and unambiguous"[5]. Even though regulatory doctrine deems cookie walls non-compliant, they remain widespread—indicating that regulatory constraints often fail to eliminate B-only market structures.

More generally, empirical studies show that many so-called consent banners remain non-compliant: even among those claiming to meet GDPR standards, a substantial share employs manipulative design (e.g., emphasising "Accept" buttons) likely steering users toward consenting to tracking (Grossman et al., 2025; Santos et al., 2021). In such settings—even with nominal consent mechanisms—the structural conditions replicate the cynical equilibrium: consumers default to B because rejecting means losing access, or paying prohibitive switching costs; firms face no demand penalty for low-privacy policies.

These real-world patterns illustrate the structural and behavioural forces identified by Farrell (2012): market incentives alone rarely align H and V optimally. The dominance of B-policies even in regulated environments suggests that regulatory intervention may not, in itself, suffice; the persistence of B-only offerings underscores the need for alternative mechanisms—for example, privacy-preserving services, credible A-options, or market structures that allow consumers to express and act on their privacy preferences effectively.

Legally, the EU and the United States (US) set different default constraints that map cleanly onto Farrell's A–B, H–V framing. In the EU, privacy is a fundamental right primarily operationalised through GDPR necessity tests, notably Articles 5(1)(c), 6(1)(b), 7(4), and 25. The GDPR pushes design towards A—only data strictly needed for core functionality—so that any move to B (collection of data beyond what is strictly necessary) must clear a high bar of true necessity or obtain freely given, non-coerced consent. Complementary to the GDPR, the Digital

[4] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data (General Data Protection Regulation). (2016). *Official Journal of the European Union*, L119, 1–88. https://eur-lex.europa.eu/eli/reg/2016/679/oj.

[5] See "Cookie walls don't comply with GDPR, says Dutch DPA" (Lomas, 2019).

Markets Act (DMA)[6] restricts cross-service data leverage for the so-called gatekeepers, making B less permissible whenever it would amplify *H*.

On the other hand, in the US, privacy rules are relatively less general but more sector-specific. The Federal Trade Commission (FTC) leads enforcement under Section 5 of the FTC Act[7] (prohibiting unfair or deceptive practices), alongside sector-specific federal regimes (protecting children's privacy, health data, amongst others) and state laws, such as the famous California Consumer Privacy Act of 2018 (CCPA)[8]. Therefore, version B is banned by default, but any claim that additional personal information is "functionally necessary" (often a label for data collection that imposes incremental *H* without true service gain) must be accurate and not misleading. Regulators can stop and order the reshape of B when it causes substantial, unavoidable harm without offsetting benefits, or when dark-pattern consent undermines real choice. It seems that the US will tolerate B when the trade-off is transparent and genuinely justified, although Farrell's model abstracts away such functional gains. By contrast, the EU generally steers markets towards A unless a platform demonstrates that additional intrusions are genuinely indispensable.

In both jurisdictions, when "necessity" is mislabelled—e.g., demanding contacts or location beyond what messaging strictly requires—regulators treat the added *H* as illegitimate, either by denying the lawful basis (EU) or by finding deception or unfairness (US). This is precisely where policy must intervene to realign *V*-maximising designs with privacy-respecting outcomes.

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6 Regulation (EU) 2022/1925 of the European Parliament and of the Council of 14 September 2022 on contestable and fair markets in the digital sector and amending Directives (EU) 2019/1937 and (EU) 2020/1828 (Digital Markets Act). 2022. *Official Journal of the European Union*, L265, 1–66. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022R1925

7 Federal Trade Commission Act, 15 U.S.C. § 45.

8 Children's Online Privacy Protection Act of 1998, 15 U.S.C. §§ 6501–6506; Health Insurance Portability and Accountability Act of 1996, Pub. L. No. 104-191, 110 Stat. 1936; California Consumer Privacy Act of 2018 (CCPA), Cal. Civ. Code § 1798.100 et seq (As for California, this law strengthens and expands consumer privacy rights beyond sectoral frameworks).

Enforcement practice provides concrete evidence of this. In the EU, WhatsApp received a €225 million fine[9] for opaque disclosures and a further €5.5 million fine[10] when authorities held that processing for "service improvement/security" exceeded what is strictly necessary for core messaging, which is classic mislabelling of necessity under the GDPR. Similarly, in the US, the FTC's case against Snapchat[11] turned on deception: the app collected contact-book entries and other data in ways that conflicted with its claims, going well beyond what ephemeral messaging requires. Together, these cases mark the line that A–B, *H*–*V* framing draws: B survives only where additional intrusions are genuinely indispensable or backed by freely given, non-coerced consent; otherwise, the incremental *H* is treated as illegitimate. These are not isolated cases: since the GDPR took effect in 2018, EU data protection authorities have imposed fines totalling about €5.88 billion, with roughly €1.2 billion levied in 2024.[12] This steady rhythm of billion-euro sanctions signals increasingly activist oversight, where privacy intrusions mislabelled as "necessity" are met not just with guidance but with escalating, targeted financial pressure. Yet despite frequent high-profile cases on both sides of the Atlantic, the dysfunctional equilibrium highlighted by Farrell (2012) is more the rule than the exception across many markets.

Accordingly, situated within the economics of privacy, this paper aims to provide a foundation for understanding situations in which markets fail to align privacy protection with consumer interests, while also exploring what privacy is, how it is valued, and the mechanisms through which it might be protected, acknowledging that many value it unevenly.

The paper proceeds as follows. We first review the relevant literature in law and economics and the economics of privacy, focusing on strategic interactions, market structures, and behavioural factors that contribute to low-privacy outcomes. We then introduce a stylised privacy game, framed as a simplified ultimatum game, and extend it using evolutionary dynamics and replicator equations to analyse how privacy-poor equilibria emerge and persist. This

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9 WhatsApp Ireland Ltd., final decision of the Irish Data Protection Commission (DPC), 2 Sept. 2021.

10 WhatsApp Ireland Ltd., DPC Decision (19 Jan. 2023).

11 Snapchat, Inc., No. C-4501, File No. 132-3078 (F.T.C. Dec. 31, 2014).

12 See "DLA Piper GDPR Fines and Data Breach Survey: January 2025" (DLA Piper, 2025).

framework is applied to contemporary EU and US privacy and data-protection developments, highlighting how regulation interacts with firm incentives and consumer behaviour. Finally, we draw policy implications, emphasising the importance of actionable alternatives and market design for promoting privacy-protective outcomes, and outline directions for future research.

LITERATURE REVIEW

A large and rapidly expanding literature examines privacy from multiple legal and economic angles. This paper does not attempt to provide a comprehensive survey of the economics of privacy literature; some excellent overviews, such as Acquisti et al. (2016), already exist. Instead, we focus on strands of work most closely related to our concern with the trade-offs surrounding the A–B, *H*–*V* framework.

Economists have long studied privacy as an economic good, starting with the first wave of Chicago School thought in the 1970s and 1980s, notably Posner (1978, 1979, 1981) and Stigler (1980), with counterarguments from Hirshleifer (Hirshleifer, 1980). Posner emphasised privacy as the concealment of information, showing how it could both enable socially valuable behaviour (e.g., reputation building) and impede efficient market outcomes (e.g., labour or credit markets). Laudon (1996) extended this framework by proposing a regulated national information market, in which individuals could trade their personal data at transparent prices, highlighting privacy's instrumental value while also noting that the these views "…fail to recognise the noneconomic function of privacy (e.g., political freedom, and liberty) that contribute to social welfare" (p. 103).

Building on this tradition but with a distinct perspective, Farrell (2012) treats privacy as a final good, valued in itself rather than solely for instrumental purposes. As outlined in the introduction, his model formalises the tension between consumer harm (*H*) from privacy intrusions and firm value (*V*) from monetising personal data, showing how market dynamics can produce a cynical equilibrium in which the high-intrusion option B dominates. Acquisti et al. (2016) survey the literature on privacy and consumer behaviour, highlighting factors that help explain why consumers may rationally anticipate low privacy protection: structural constraints, such as complex or non-standardised privacy policies that are difficult to evaluate; attention costs, including the time and cognitive effort required to process these policies; and prior experience, where repeated exposure

to weak or non-committal privacy protections leads consumers to expect that firms will generally offer low privacy safeguards. These factors support the behavioural assumptions underlying Farrell's (2012) model. This perspective shifts attention from abstract efficiency considerations to concrete issues of market design, firm incentives, and regulation, highlighting how strategic interactions between firms and consumers can entrench high-intrusion outcomes—even when both parties would benefit from more privacy—thereby motivating the game-theoretic ultimatum framework developed in this paper.

The recent contribution by Dosis and Sand-Zantman (2023) recasts the privacy problem as a question of who should own data from a welfare-maximisation standpoint, showing, in a simple monopoly model, that ownership determines whether markets feature over-monetisation of privacy (probably large V, and thus H) or its under-processing. When users hold the rights, as in Laudon's market, data is better protected but less efficiently exploited, creating a different distortion. By contrast, when firms hold the data rights and contracts cannot fully specify or credibly limit how data will be used in the future, the firm rationally exploits every available margin of intrusion. Anticipating this, users cut back on their usage *ex ante*, producing an outcome that closely resembles Farrell's cynical equilibrium, where the high-intrusion option B dominates even though many users would prefer the more privacy-protective option A. Taken together, the insights from Dosis and Sand-Zantman (2023) and Farrell (2012) imply that policy should not only define legal rights over personal data, but also shape the strategic environment so that consumers' choices between A and B are meaningful, preventing markets from settling into high-intrusion, cynical equilibria.

Another set of recent contributions situates these trade-offs in markets where privacy data is a key upstream input and where privacy regulation and competition policy interact. Empirical work on the consequences of the GDPR enforcement is particularly relevant. Johnson et al. (2023) show that, immediately after enforcement, websites reduced the number of third-party vendors they used, but disproportionately retained large incumbents such as Google and Facebook, leading to a measurable increase in concentration in advertising and related web-technology markets. Market concentration remains, at best, an indirect proxy for underlying market power—a central concern of competition law enforcement. Note that if expanding V through the repurposing of personal data effectively

lowers the firm's marginal costs, it directly affects the firm's market power. Similar concerns appear in Campbell et al. (2015), who document how privacy regulation can have asymmetric compliance costs and thereby reshape market structure to the detriment of small businesses: "Consequently, rather than increasing competition, the nature of transaction costs implied by privacy regulation suggests that privacy regulation may be anti-competitive" (p. 48). On the other hand, Cooper et al. (2013) assert that "antitrust is the wrong vehicle to address privacy concerns" (p. 1146). It is essential to bear in mind, however, that competition law and privacy law remain separate legal regimes. More generally, Alexander (2021) argues that competition alone cannot be relied upon to deliver optimal privacy; yet, data-driven market power can give firms strong incentives to exploit personal information, thereby maximising V while neglecting H.

Running in parallel is a substantial body of behavioural literature on privacy and consumer choice that questions whether individuals can, in practice, navigate privacy trade-offs as standard decision-making models assume. McDonald and Cranor (2008) famously estimate that, if users really read every online privacy policy they encounter, the time cost alone would exceed the entire value of the online advertising market. Adding to this, the harm H from privacy loss, as users themselves perceive it, suggests that the social costs of data collection subject to formal transparency requirements may exceed the social gains it generates. Drawing on field and laboratory experiments, Acquisti et al. (2013) show that individuals' valuations of seemingly identical privacy protections are volatile and sensitive to framing. This raises doubts about people's ability to negotiate privacy issues optimally in modern information societies, and thus about the adequacy of regulatory approaches that place the main burden of protection on individual consent.

While Dosis and Sand-Zantman (2023) highlight how data ownership and contractual structures shape high-intrusion market outcomes, individual behaviour can further reinforce these equilibria. In particular, even when users prefer more privacy, they often disclose personal data due to behavioral biases and cognitive constraints. Building on literature inspired by the "privacy paradox", where individuals express strong privacy concerns yet often disclose personal data online (Anastasopoulou et al., 2017; Barth and de Jong, 2017; Kokolakis, 2017), research shows that this behaviour is not necessarily driven by hypocrisy, but by

limited attention, time-inconsistent preferences, and the framing of choices (Adjerid et al., 2018, 2019). Furthermore, experimental work on choice architecture reinforces this picture. Bauer et al. (2021) document that the way cookie banners are designed, and especially the use of nudging and dark patterns that make rejecting cookies harder than accepting them, can raise consent rates by double-digit percentage points, effectively expanding tracking despite a legal requirement for freely given consent. In particular, interfaces are often designed so that accepting the more intrusive option B is far easier than choosing the privacy-preserving option A, even though the legislation is meant to steer design towards genuine, unpressured consent.

Solove (2021) challenges the very premise of the privacy paradox debate. He argues that the apparent gap between stated privacy attitudes and observed disclosure behaviour is a methodological artefact: general expressions of concern cannot be directly compared with context-specific decisions involving particular risks, incentives, and constraints. On this view, the issue is not that users behave inconsistently, but that privacy paradox studies draw unwarranted conclusions from incomparable data. Solove further contends that neither reducing behavioural biases nor improving choice interfaces can solve the underlying problem, because managing one's privacy is a complex, ongoing task that ordinary users cannot perform effectively at scale. Effective privacy protection, therefore, requires shifting regulatory focus away from individual choice and toward the architecture governing how personal data is collected, used, and transferred.

Taken together, the contributions discussed above show that privacy outcomes reflect not only preferences and legal rights, but also the strategic structure of digital environments and the cognitive constraints under which users operate. Farrell's analysis already demonstrates how expectation-driven reasoning can generate a cynical equilibrium in which high-intrusion options prevail. What remains less well understood, however, is how such outcomes become entrenched and persist. This motivates extending the static insights of the A–B framework to a dynamic setting. The following section develops a simple privacy game that captures the essential trade-offs between intrusive and privacy-preserving options and then examines how these choices may evolve over repeated interactions. By incorporating evolutionary learning and population adjustment, the framework identifies the conditions under which intrusive practices become an

evolutionarily stable state and reveals the potential pathways through which more privacy-protective behaviours can emerge and persist.

PRIVACY AS FAIRNESS

The issue of privacy in the contemporary digital age extends beyond its technical and legal dimensions, raising profound ethical and distributive questions. At its core, this dilemma concerns the allocation of value and the asymmetry of negotiating power between consumers and firms—a structure that the ultimatum game captures particularly well.

In the ultimatum game, one player (the proposer) decides how to divide a resource, while the other (the responder) chooses whether to accept or reject the offer. If the responder rejects, both parties receive nothing; if the responder accepts, the proposed division is implemented. Although the subgame perfect Nash equilibrium (SPNE) predicts that rational responders will accept even highly unequal offers, experiments show that many individuals reject unfair divisions—highlighting the tension between strategic rationality and fairness.

The privacy interaction between firms and consumers mirrors this dynamic. Firms act as proposers[13], determining the terms under which personal data are collected, used, or shared—analogous to offering a "privacy contract." Consumers, as responders, must either accept these terms or forgo access to the product or service altogether. In practice, the structure of digital services often leaves consumers with no viable alternative: refusal of a privacy-invasive package typically means losing access to essential services, making acceptance the only rational option. Many digital products embed privacy-intrusive permissions within their core functionality. For instance, cloud providers may require consent for data reuse in AI training, while mobile applications may demand access to location, camera, or contact data as a condition for operation. In each case, privacy concessions are presented as inseparable from the basic functionality of the service. Rejection often

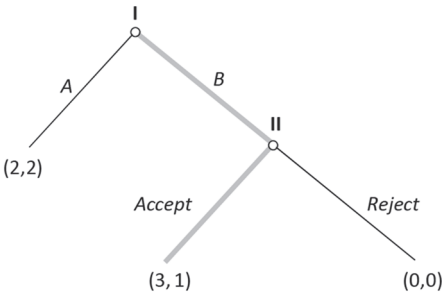
[13] In the strategic framing, the interaction is represented as a game between firms (proposers) and consumers (responders). In the evolutionary extension, however, we adopt a polymorphic interpretation: rather than firms themselves being players, we model the population as comprising distinct behavioural strategies—such as privacy-invasive or privacy-protective rules—that are replicated according to their relative success.

yields an outcome close to zero in payoff terms: inability to use a social network, access an online marketplace, or install a mobile application.

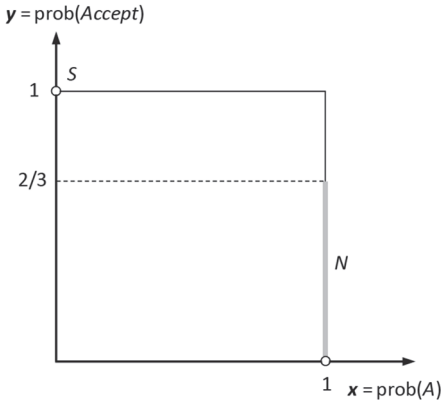
Consumers' limited bargaining power is further compounded by structural factors such as high switching costs (e.g., losing access to an established email account or stored digital content), network effects (e.g., social contacts concentrated on a single platform), and dependence on dominant platforms (e.g., essential cloud storage or marketplaces), which constrain their effective choice and can make rejecting a privacy-invasive package effectively equivalent to receiving near-zero utility.

In such contexts, acceptance of a privacy-invasive policy (Package B) becomes the rational choice, much like accepting a minimal offer in the ultimatum game. In Figure 1, we present this simplified game both in extensive and normal (strategic) form, highlighting the potential equilibria. Although alternative Nash equilibria (*N*) exist, equilibrium *S* (*B*, *Accept*) is subgame-perfect.

Figure 1: Simplified ultimatum game



1(a) Extensive form



1(c) Equilibria

	Accept $(y=1)$	***Reject*** $(y=0)$
A (*dove*, $x=1$)	(2, 2)	(2, 2)
B (*hawk*, $x=0$)	(3, 1)	(0, 0)

1(b) Normal (strategic) form

Source: Gale et al. (1995)

While privacy decisions in practice are rarely binary[14], this simplified model captures the essential structure of a dysfunctional (cynical) equilibrium. Farrell's (2012) cynical equilibrium describes a market in which firms' and consumers' mutually pessimistic expectations stabilise an inefficient outcome: firms expect consumers not to reward privacy-protective behaviour, and therefore adopt privacy-invasive policies; consumers, having learned that firms behave this way, stop paying attention to privacy choices, confirming firms' expectations. In Farrell's interpretation, inefficiency is therefore expectations-driven—a self-confirming equilibrium sustained by beliefs.

By contrast, the ultimatum game analogy highlights that a similar outcome can emerge structurally, without relying on pessimistic or mistaken beliefs. As noted above, when consumers face high switching costs (such as the effort, time, and data loss involved in changing services), strong network effects (where the usefulness of a platform increases with the number of peers using it), and dependence on dominant providers (which limits the availability of meaningful substitutes), the refusal of a privacy-invasive offer yields near-zero utility. This makes acceptance the rational choice. Here, the stability of the outcome follows from the game's sequential and asymmetrical nature—firms propose the terms, and consumers can only accept or reject—rather than from any belief-driven reinforcement mechanism. Thus, while differing fundamentally in the underlying cause, our framing mirrors Farrell's cynical equilibrium in effect.

Finally, considering that a significant aspect of the predictive power of game theory lies in its flexibility to adopt either a rational or an evolutionary interpretation of the Nash equilibria, we posited that the evolutionary dynamics could offer a useful framework for understanding the presented case, potentially allowing outcomes that depart from the SPNE.

[14] By "rarely binary," we mean that firms often provide a range of privacy options or combinations of data usage policies, and consumers may respond in a nuanced manner – such as providing partial consent, adjusting privacy settings, or using only certain features. Simplifying these complex, multi-dimensional choices to a binary framework—accept or reject a single policy—facilitates analysis while preserving the essential strategic tension.

THE ULTIMATUM GAME THROUGH EVOLUTIONARY DYNAMICS

A substantial body of literature has addressed the criteria for selecting among multiple Nash equilibria (NE). As noted by Kreps (1990, p. 418, 449–451) and Binmore (2007, pp. 54–55), the number of proposed criteria is as diverse as the number of authors contributing to the field. However, Binmore emphasises that one crucial criterion for choosing between NEs has been largely overlooked. It is worth elaborating on this point.

In the terminology of Simon (Simon, 1986), the traditional approach in game theory is grounded in substantive rather than procedural rationality. This approach entails a static framework that focuses on the existence of equilibrium without considering the dynamic process that leads to its emergence (Hayek, 1937; Stojanović, 2006; Stojanović, 2021). Binmore highlights the limitations of this approach by noting a problem encountered when solving a standard quadratic equation. Without understanding the context in which the equation arises, it is impossible to determine the "true" solution. Similarly, in game theory, the formal description of a game often lacks sufficient contextual information, necessitating the inclusion of additional details. As Binmore concludes, a comprehensive game analysis often requires more information than is provided in its formal definition (Binmore, 1987, p. 183). In other words, the same formal game can be analysed differently depending on the environment from which it is abstracted. An illustrative example is the game of chess. It would be nonsensical to attribute wrong moves in chess to uncorrelated random error, as suggested by the trembling hand concept. While Selten's trembling hand (1975) is not an impossible explanation, it is comparatively less plausible in this context. A more likely explanation is that there is a systematic error in how the positions are analysed, which would likely influence subsequent moves in the game.

In our context, Binmore's (1987, p. 184) distinction between *eductive* and *evolutive* processes is critical. The eductive approach posits that the player reaches equilibrium through careful reasoning, akin to viewing humans as complex decision-making machines. In contrast, the evolutive approach proposes that equilibrium can be attained through evolutionary mechanisms involving multiple iterations in which players make short-sighted decisions.

The ultimatum game has a relatively simple subgame-perfect equilibrium, which relies solely on the assumption that the proposer (Player *I*) expects the responder to avoid dominated strategies. The elimination of dominated strategies is an eductive principle. In contrast, we focus on the evolutive approach, where outcomes emerge through trial-and-error learning rather than deliberate reasoning. This perspective is particularly relevant to our privacy game example, as it allows for deviations from the SPNE. Replicator dynamics provide a formal tool to model how successful strategies spread over time, showing how evolutionary processes can lead to alternative outcomes.

This trial-and-error perspective naturally leads to formal models of learning in populations. In particular, replicator dynamics can be viewed as a continuous-time approximation of simple adaptive learning processes, in which strategies that perform better are more likely to be adopted over time. By framing learning in this way, we can interpret the evolution of strategies in the ultimatum game as the result of repeated interactions and social adaptation, rather than strict rational calculation. In the following section, we briefly present a model of this type that directly connects individual learning behaviour to replicator dynamics.

A short digression on learning and replicator dynamics

Börgers and Sarin (1997) demonstrated that replicator dynamics can serve as an approximation of simple learning models similar to those used by Roth and Erev (1995). We will utilise the model variant presented in Gale et al. (1995)[15]. A key reason for interpreting the model as one of social evolution is the players' capacity to observe the strategies employed by others. Below, we will briefly present their model, which has a special case directly related to replicator dynamics.

The model's primary assumption relates to discrete time, divided into periods of length τ. In each period, the player retains their current strategy with probability $1 - \tau$. With probability τ, the player compares their payoff to an aspiration level Λ, which is a random variable uniformly distributed in the interval $[l, L]$. If the current payoff exceeds the aspiration level, the strategy remains unchanged.

[15] We note that, in this instance as well, the authors do not assert that this is a "correct" model, but only that the dynamics of this general type is worthy of our attention (Gale et al., 1995, p.85).

Otherwise, the player adopts a new strategy, such as imitating a strategy from a randomly selected member of the population.

Gale et al. (1995, p. 86) argue that the probabilistic determination of the aspiration level, Λ, can be interpreted in an "as if"[16] manner. In other words, it might be more accurate to say that randomness is a characteristic of the payoffs—i.e., the payoffs are determined probabilistically—while the aspiration level itself remains fixed. It is important to note that the dispersion of the payoff distribution around the mean value is the same, regardless of the strategy or player.

Let us begin with the proposer (Player *I*). Denote by $x_i(t)$ the proportion of individuals choosing strategy i at time t. Let $p_i(t)$ represent the probability that the proposer's aspiration level will exceed the payoff for strategy i at time t. Given the uniform distribution, we can express this as

$$p_i(t) = [L - \pi_i(t)]/(L - l), \tag{1}$$

where $\pi_i(t)$ is the payoff for strategy i in period t. This means that the proportion $p_i(t)$ of proposers using strategy i in period t will have an aspiration level higher than their payoff. These proposers will then switch to new strategies in proportion to how frequently those strategies are used within the proposer population. Based on this, we can describe how the proportion of proposers changes over the course of one period as

$$x_i(t + \tau) = x_i(t)(1 - \tau) + x_i(t)\tau[1 - p_i(t)] + x_i(t)\sum_{j \in S} \tau p_j(t)x_j(t)\,. \tag{2}$$

We notice how x_i changes when we move to the next period $(t + \tau)$. First, we have the share of those who do not change their own strategy $(1 - \tau)$. Then, the proportion of those who change their strategy but whose aspiration level is lower than the current payoff $\tau[1 - p_i(t)]$. Finally, from the entire population $j \in S$, we consider those who change their strategy and whose aspiration level is higher than the current payoff, $\tau p_j(t)$. Since we are concerned with those who switch to strategy i, we refer to the assumption that the likelihood of adopting this strategy

[16] It seems that every occurrence of "as if," whether directly related to Friedman's argument or not, naturally recalls his article. See Njegovan (2022, pp. 17–55).

is proportional to its prevalence in the population, denoted by $x_i(t)$. Taking into account Equation (1), we may write:

$$\frac{x_i(t+\tau)-x_i(t)}{\tau} = x_i(t)\,\frac{\pi_i(t)-\overline{\pi}_I(t)}{L-l}, \tag{3}$$

where $\overline{\pi}_I(t)$ is the average payoff for all proposer strategies. By taking the limit as $\tau \to 0$, we arrive at the continuous-time version of the dynamic:

$$\dot{x}_i = x_i\,\frac{\pi_i-\overline{\pi}_I}{L-l}, \tag{4}$$

A similar equation can be derived for the responder (Player *II*), and the implicit assumption is therefore that the same learning process guides both players. It now becomes clear that scaling the time to eliminate the denominator ($L - l = 1$) yields the standard replicator dynamics equation. Gale et al. (1995, p. 87) note that the result rests on the assumption that the distribution of aspiration levels is equal for both players.[17]

REPLICATOR DYNAMICS IN THE SIMPLIFIED ULTIMATUM GAME

The dynamics of strategy evolution in the ultimatum game have been extensively examined within the framework of evolutionary game theory. A seminal contribution by Gale et al. (1995) demonstrates that, under replicator dynamics, the distribution of strategies in a population can converge to equilibria that deviate from subgame-perfect predictions, leading to outcomes that appear fair. Their analysis shows that even when behavioural adjustments occur through simple adaptive processes—rather than deliberate reasoning—stable patterns of behaviour can emerge that reflect the tolerance thresholds and the offer levels observed in experimental data. This result provides an essential theoretical foundation for interpreting social norms as equilibrium outcomes of evolutionary processes rather than as anomalies to rational choice.

Applied to the simplified ultimatum game introduced above, the same formal apparatus allows us to do two things. First, it identifies the conditions under which

[17] Gale et al. (1995) show that local attractors *N* are more relevant if proposers learn faster. We will not discuss the results involving noise.

the dysfunctional, privacy-invasive equilibrium—which corresponds to the SPNE (the "cynical" outcome)—is sustained by evolutionary forces. Second, and more importantly for our interpretation, it makes explicit the mechanisms by which replicator dynamics may permit the system to escape that SPNE and move toward alternative attractors under appropriate shifts in strategy distributions. Thus, whereas Gale et al. (1995) use replicator dynamics to explain the endogenous emergence of fairness as a departure from the SPNE, our analysis uses the same machinery to show how structural asymmetries can both stabilise the SPNE and (under identifiable conditions) be overcome by evolutionary adaptation. The formal representation below develops this argument by specifying the replicator equations and analysing the resulting phase portrait.

First, it is necessary to define the replicator equations of the simplified ultimatum game presented in Figure 1. The basic replicator equation for the evolution of $x_i(t)$ has the following form:

$$\dot{x}_i = x_i(\pi_i - \bar{\pi}_I)\ i \in \{1,2\}, \tag{5}$$

where x_i represents the current share of the population employing strategy i, $\pi_i(t)$ denotes the expected payoff for strategy i at time t when the proposer is selected randomly from the population of these players, and $\bar{\pi}_I(t)$ is the average payoff at time t across all strategies, I, available to the proposer. A similar equation can be formulated for the population of recipients.

If we apply the values from the model, we obtain the following equations:[18]

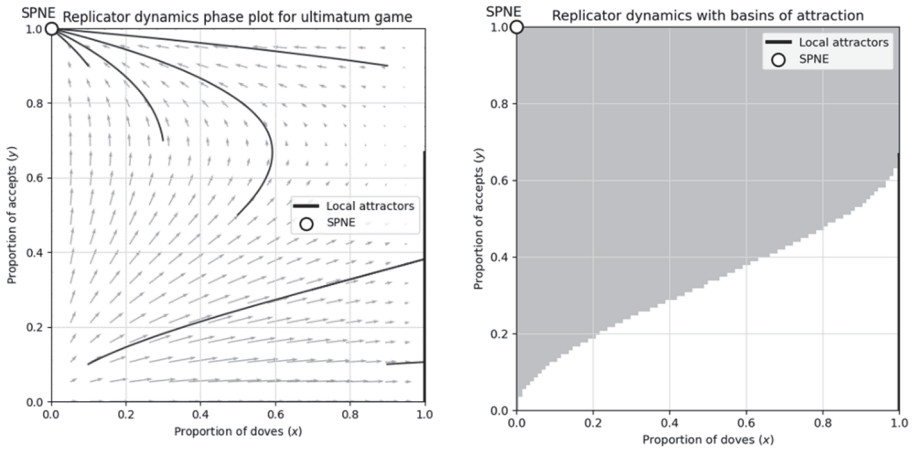
$$\bar{x} = x(1-x)(2-3y) \tag{6}$$

$$\bar{y} = y(1-y)(1-x) \tag{7}$$

[18] To derive the replicator equation for the proposer population, we first calculate the expected payoffs for the two strategies: $\pi_D = 2y + 2(1-y) = 2$ for the "dove" strategy and $\pi_H = 3y + 0(1-y) = 3y$ for the "hawk" strategy. The average population payoff is defined as $\bar{\pi} = x\pi_D + (1-x)\pi_H$. Substituting these into the standard replicator dynamic (Eq. 5), $\bar{x} = x(\pi_D - \bar{\pi})$, and factoring out the terms results in the simplified form $\bar{x} = (\pi_A - [x\pi_A + (1-x)\pi_B])$. Plugging in the specific payoff values yields Equation 6: $\bar{x} = x(1-x)(2-3y)$. A similar calculation can be performed for Equation 7.

In Figure 2 below, we provide a graphical representation of the replicator dynamics for the simplified ultimatum game (left) and the basin of attraction for SPNE as well as for local attractors *N* (right).

Figure 2. Replicator dynamics phase plot and basins of attraction



Source: Author's calculation based on Gale et al., (1995)

From the graph on the left of Figure 2, we clearly see that the subgame-perfect dysfunctional equilibrium, *S* (*B*, *Accept*), represents a unique asymptotic attractor of the replicator dynamics. In addition, there exists a set of local attractors, denoted by *N*, which correspond to alternative strategy configurations that could persist when the initial population state lies within the basin of attraction associated with that attractor. This visualisation demonstrates the conditions under which the dysfunctional equilibrium arises: when the initial distribution of strategies falls within its basin, the system naturally converges to *S* (*B*, *Accept*). The local attractors *N* exist, but for populations starting within the SPNE basin, trajectories are directed toward the dysfunctional equilibrium *S* (*B*, *Accept*), rendering the alternative attractors unreachable. This highlights how the combination of initial strategy distributions and the structure of payoffs determines whether the population remains trapped in the SPNE or can potentially evolve toward other equilibria.

CONCLUDING REMARKS

One might ask how many times each day we reflexively click "accept all cookies", with little sense of either the diffuse harms or the modest conveniences at stake. In this sense, the analysis in this paper helps clarify why many contemporary privacy outcomes are not merely behavioural anomalies. These include the routine acceptance of intrusive terms with no functional benefit (e.g., cookie walls, excessive app-permission requests), interface-driven consent (e.g., pre-checked boxes, dark-pattern banners), and the limited uptake of privacy-protective options (e.g., opting out of tracking or using privacy-focused apps). Instead, these outcomes align with the equilibrium structure of the privacy game. The subgame-perfect prediction yields a low-privacy outcome similar to Farrell's cynical equilibrium. However, this result arises for different reasons: in Farrell's account, expectations drive the result, whereas in the evolutionary formulation, it is the distribution of strategies and the resulting dynamics that lead behaviour toward the same region of outcomes. When the initial proportion of acceptance is sufficiently high, the replicator dynamics drive the system into the basin of attraction of the low-privacy equilibrium, even though other equilibria remain theoretically available.

This perspective sheds light on the regulatory interventions discussed earlier. Actions under the GDPR, the FTC's unfairness and deception framework, and related enforcement efforts modify the effective values of H and V, limiting some forms of data exploitation and constraining manipulative design. Yet these measures do not eliminate the profitability of many intrusive data practices, meaning that evolutionary trajectories can remain within the basin associated with the cynical equilibrium. Regulation can therefore reduce the severity of privacy harms without necessarily shifting the system into a different equilibrium region. Even when the fines imposed are huge, it seems the expected value of enforcement typically remains small relative to the rents that dominant platforms, ad-tech intermediaries, and other gatekeepers can extract from persistent B-type designs. As long as the discounted value of V dwarfs the anticipated loss from fines or remedial orders, their business models can adjust at the margin without abandoning the underlying logic of intrusive data appropriation. Addressing this problem, therefore, calls for a more sophisticated and integrated policy mix than privacy law alone can supply. Moreover, stricter privacy rules may impose asymmetric compliance costs that large platforms and other gatekeepers can

absorb more easily than smaller rivals, so that, paradoxically, privacy protection can entrench dominance and weaken competition—a linkage that calls for closer examination in future research.

This persistence of low-privacy equilibria, despite regulatory constraints, raises the question of why social or normative pressures fail to induce higher-protection behaviour—an issue that becomes clearer when the privacy environment is compared with the standard ultimatum game. In laboratory ultimatum games, fairness-driven rejections commonly displace behaviour away from the subgame-perfect prediction. In the privacy context, such norm-shaping responses do not arise: the interaction does not generate the kinds of rejections that promote movement away from SPNE. Because the privacy game involves many consumers interacting with multiple firms, the effect of any single refusal is diluted across the population, preventing individual actions from meaningfully punishing privacy-invasive strategies, and weakening the feedback mechanism that, in two-player ultimatum games, allows fairness norms to influence outcomes. This contrast highlights why privacy norms do not evolve toward higher-protection offers in the way fairness norms sometimes do in traditional experimental settings.

Finally, our considerations emphasise the importance of the missing market argument. In evolutionary terms, the absence of meaningful privacy alternatives is equivalent to a zero payoff for rejecting the default, intrusive option. Introducing actionable alternatives—such as paid privacy—effectively raises this payoff, allowing privacy-valuing strategies to gain traction in the population and potentially shift the system toward higher-privacy equilibria. Evidence suggests that preferences often appear inconsistent only when meaningful trade-offs are absent. For example, despite widespread claims that consumers dislike advertising, many Netflix users opted for the lower-cost ad-supported tier once it became available in 2024 (Reuters, 2024). A similar dynamic may operate in privacy: what has been interpreted as the "privacy paradox"—a gap between stated concern and observed behaviour—may reflect, at least in part, the lack of actionable options. Without mechanisms that allow consumers to express their preferences through real choices, legislative enforcement can limit harmful practices but, on its own, cannot shift the system toward a higher-privacy equilibrium.

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LOCAL TAX POLICY IN BULGARIAN MUNICIPALITIES AND CROATIAN LARGE CITIES

ABSTRACT: *This article presents a comparative analysis of local tax policies in the 24 largest municipalities in Bulgaria and the 24 "large cities" in Croatia (those with more than 30,000 inhabitants or serving as county seats), with a focus on property-related taxes and other significant sources of local revenue. Since 2007, Bulgarian municipalities have had the authority to set tax rates within centrally defined minimum and maximum thresholds. In contrast, Croatian local self-government units operate under a national legislative framework that allows them to adjust tax rates and introduce various local fees. The study explores three key questions: (i) to what extent local tax policy features prominently on municipal political agendas; (ii) the relative influence of mayors versus municipal or city councils in shaping tax policy; and (iii) the extent to which municipalities utilise maximum allowable tax rates compared to adopting alternative revenue-enhancing measures. The findings offer empirical evidence and comparative insights, highlighting both the strengths and limitations of current local tax policy practices in Bulgaria and Croatia. The article concludes with policy recommendations to improve the effectiveness and autonomy of local fiscal governance in both countries.*

KEY WORDS: *local government, local taxes, tax policies, mayor, local council, Croatia, Bulgaria*

JEL CLASSIFICATION: H71, H72.

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1. INTRODUCTION

Local tax policy is not only a technical matter of revenue mobilisation but also a reflection of political processes and the balance of power at the municipal and city levels. In the municipalities and cities of South-East Europe (SEE), a key question remains: Who determines the size and structure of local taxes – the municipal and city councillors or the mayor – and what are the consequences of these decisions for society?

Classical theories provide an analytical framework. Tiebout (1956) emphasised household mobility and interjurisdictional competition, Musgrave (1959) highlighted the allocative role of local taxation within public finance, and Buchanan and Tullock (1962) analysed collective decision-making and the incentives driving political actors. The determination of local tax rates reflects complex political and economic dynamics, shaped by competing interests, institutional constraints, and power relations. Some theories emphasise elite control over policy (Hunter, 1953), while others highlight pluralistic negotiation among multiple actors (Dahl, 1961) or stable coalitions – "urban regimes" – in which mayors, councillors, businesses, and civil society jointly influence tax decisions (Stone, 1989).

The process of setting local tax rates can be shaped by elite control, competition among interest groups, or stable coalitions, reflecting the broader dynamics of local policy. From the perspective of political budgeting (Wildavsky, 1964), tax decisions are part of a continuous negotiation among administration, political leaders, businesses, and citizens, constrained by past choices, institutional frameworks, and existing interests. This approach highlights that local taxation results not only from economic reasoning but also from political strategy, historical compromises, and informal agreements.

Contemporary studies highlight the underutilisation of property tax as a local tax, despite its significant revenue potential (Bird & Slack, 2004; Fisher, 2009; Norregaard, 2013). Its limited use is attributed to unpopularity, inelasticity, erosion of the tax base, and weak administration (Slack, 2010). Organisation for Economic Co-operation and Development data (OECD, 2023) indicate that in countries such as Bulgaria and Croatia, property taxes contribute significantly less to local revenues than the OECD average.

Attention has been devoted to those who hold the initiative in local tax policymaking. Swianiewicz's (2016) study of 36 Polish municipalities reveals that although local tax resolutions are formally adopted by municipal councils upon the mayor's proposal, in practice, a "strong-mayor" model prevails. The mayor, supported by the financial department, tends to have greater influence on tax policy than councillors. At the same time, tax debates are generally marginal within councils, except in municipalities where higher tax revenues affect broader groups of taxpayers.

The design of local tax policy is crucial for the financial stability and autonomy of municipalities and cities in SEE, where own-source revenues have declined by nearly 12% over the past decade due to reduced tax powers and targeted exemptions (Network of Associations of Local Authorities of South-East Europe [NALAS], 2025). Municipalities in Albania, Serbia, and Montenegro are increasingly relying on shared taxes and transfers, while policy changes, such as the removal of local fees or the increase in block grants, directly affect service provision. Property tax is becoming the primary local tax, with its yield nearly doubling between 2006 and 2023; yet it remains underutilised compared to EU averages. Wide disparities in local revenues and persistent institutional challenges highlight the need to strengthen fiscal decentralisation, revenue collection, and effective and adequate local tax policy across the SEE region (NALAS, 2025).

Since 2007, Bulgarian municipalities have had constitutional authority to set local taxes within centrally defined limits, with some discretion over fees and targeted tax relief. In Croatia, local tax policies are shaped by both national legislation and municipal decisions, allowing cities to adjust tax rates and impose local fees within the legal framework. In both countries, local authorities exercise limited but meaningful influence over revenue-raising instruments while remaining constrained by central rules.

This paper aims to provide answers to three research questions designed to clarify the mechanisms by which institutional arrangements and local political processes shape fiscal outcomes at the municipal and city levels. The research questions are the following:

(i) To what extent is local tax policy an essential element of the local political agenda in the largest municipalities in Bulgaria and large cities in Croatia? Is

it the focus of concentrated discussions in municipal and city councils, or are proposals from the state government accepted without significant debate?

(ii) Who dominates decision-making in local tax policy: the municipal head/mayor, who, by legal provisions, proposes changes to local tax rates, or the municipal/city council, which makes the final decision?

(iii) To what extent are municipalities and cities currently applying the maximum statutory rates of key local taxes? Is there fiscal space for increasing these rates, and what alternative measures could be explored to enhance municipal tax revenues?

The first research question examines the extent to which local tax policy features on municipal agendas in Bulgaria and Croatia, focusing on both its salience and the degree of political scrutiny at public and council levels. According to agenda-setting theories, the prominence of issues shapes which topics receive political attention and debate, influencing policy decisions such as tax rate adjustments (Birkland, 2025; Mortensen et al., 2022). At the same time, the intensity and substance of council discussions provide insight into whether local tax policy is treated as a politically significant issue or whether proposals originating from the central government are adopted with limited deliberation. If local tax policy is rarely debated or receives minimal scrutiny, this may indicate low political priority, helping explain the underutilisation of property taxation and limited local fiscal capacity. To assess this, this study analysed municipal council minutes, meeting agendas, and local government reports to measure how actively tax issues are discussed, thereby linking political attention to fiscal outcomes. It should be noted that discussions of municipal budget plans fall outside the scope of this analysis. In other words, the analysis focuses on the stage preceding the presentation and drafting of the budget for the following year, namely, the discussion and voting on the rates of the main taxes.

The second research question examines how the distribution of decision-making power between mayors and councils in Bulgaria and Croatia shapes local tax policy. Institutional structures and executive dominance affect whether tax proposals are actively debated or quickly adopted, influencing the use of statutory tax ceilings (Denters, 2006; Sancino et al., 2023). By identifying who initiates and approves tax proposals, this study assesses how mayoral dominance or council

deliberation correlates with tax utilisation, while considering public visibility and political incentives in shaping fiscal decisions.

The third research question examines how Bulgarian municipalities and Croatian cities utilise statutory tax rate ceilings, providing a rough indicator of fiscal capacity and potential underutilisation. We recognise that statutory maximum rates offer a narrow measure of fiscal space, as actual municipal fiscal capacity also depends on the tax base, property valuation method, exemptions, collection efficiency, enforcement, and political feasibility (Bahl & Linn, 1992). Nevertheless, comparing actual rates to statutory ceilings allows us to quantify remaining fiscal space and highlight potential underutilisation, while linking fiscal outcomes to political and institutional factors identified in the first two research questions. For example, municipalities and cities with active council debate may apply rates closer to the maximum, whereas mayor-dominated councils may under- or fully utilise rates depending on local incentives and conditions. We present this approach explicitly as an analysis of statutory rate discretion, rather than a comprehensive measure of overall fiscal capacity.

This study is intended primarily as a political-economy explanation of why local tax potential is often underutilised, rather than simply a descriptive mapping exercise. It examines how local political visibility, institutional dynamics, and decision-making processes shape tax policy outcomes. Specifically, the paper shows that institutional arrangements – such as the balance of power between mayors and councils and legal discretion – affect the debate and visibility of tax proposals, influencing municipal decisions on tax rates and fiscal capacity. Focusing on Bulgarian municipalities and Croatian cities, the study investigates how agenda prominence, mayor-council influence, and statutory tax ceilings contribute to the underutilisation of property taxation and limited local revenue generation.

The analysis focuses on the 24 largest municipalities in Bulgaria and 24 "large cities" in Croatia (i.e., cities with more than 30,000 inhabitants or county seats). The selection of this number of study sites was intended to cover the county-seat cities and the largest urban centres with a broader scope of local public affairs in Croatia, where more significant political debate has been identified, and the largest municipalities in Bulgaria, which correspond in population to the Croatian

cities studied, thereby forming a group of comparable size. The study examines the most fiscally significant municipal and city taxes in each country: in Bulgaria, the property tax and the real estate transfer tax; in Croatia, the tax on holiday homes, the newly introduced real estate tax, the surtax on personal income tax, and the personal income tax (PIT).

The study evaluates local tax policy decision-making in selected municipalities and cities. These policies play a critical role in municipal autonomy, fiscal governance, and accountability. Understanding how municipal/city councils, citizens, and media influence these policies helps identify strengths and weaknesses in transparency, public participation, and political dynamics. A structured evaluation framework – the matrix – was developed to systematically assess decision-making processes and translate qualitative observations into quantitative scores. This approach enables comparison across municipalities and cities, highlighting areas for improvement in both participatory and legislative processes.

Understanding and analysing the most fiscally significant municipal and city taxes is essential for assessing the financial autonomy and fiscal capacity of local governments. These taxes typically account for the core of municipal and city revenue, and their performance directly affects local authorities' ability to deliver public services, invest in infrastructure, and fulfil their administrative responsibilities. By focusing on the most important revenue-generating taxes, researchers and policymakers can identify potential fiscal space, assess the efficiency and equity of local tax systems, and evaluate the sustainability of municipal finances. This is particularly relevant in the context of fiscal decentralisation, where a well-functioning system of local taxation underpins effective governance and accountability at the subnational level. Moreover, in the case of Bulgaria and Croatia – both recent entrants to the Eurozone – there is an added importance in ensuring that local public finance systems align with broader EU fiscal stability and convergence criteria. Both countries are in the process of OECD accession, and the efficiency of local self-government is evaluated within the broader public governance framework. Studying these taxes also enables cross-country comparisons, helps identify best practices, and informs evidence-based reforms to improve revenue mobilisation, tax compliance, and economic resilience at the municipal/city level.

In response to changing economic conditions, local authorities are increasingly required to adapt their fiscal frameworks. This necessitates legislative adjustments and a critical reassessment of the role of local taxes as a primary, sustainable source of municipal and city revenue. In Croatia, changes have already been observed concerning real estate tax and the broader regulatory framework governing local taxes and fees. As Bulgaria also prepares municipalities and local authorities for the implications of Eurozone membership and the growing need for additional local revenue, the Croatian experience provides valuable insights and practical lessons.

Based on our critical assessment of the local tax policy practices in the selected Bulgarian municipalities and Croatian large cities, our study presents empirical findings, comparative analysis, and practical solutions for various models of local tax policy decision-making in the two countries. In addition, our research will present both the positive and negative aspects of local tax policy decision-making practices, as well as policy implications for decision-makers at the municipal and large-city levels in the two SEE countries.

To achieve the set objectives, an analysis was conducted on the fiscal significance of local property taxes in both countries, with a focus on real estate tax levels. By examining the current tax rates in the 24 largest Bulgarian municipalities and the 24 large Croatian cities, the study assesses whether there is fiscal space to increase tax revenues through higher rates or whether other measures should be explored. Secondly, the local tax policy in municipalities/cities is evaluated, including identifying the key decision-maker in setting final tax rates – whether the municipal head/mayor, municipal/city councillors, or representatives of the local tax administration. An index was constructed to determine tax policy, incorporating pre-defined components.

The analysis relies on secondary data from official documents, websites, social media, press, and municipal council minutes.

The remainder of the paper is divided into three sections. The main characteristics of local revenues in Bulgarian municipal and Croatian city budgets, with a focus on property tax revenues, are presented in the next section. In the third section, an evaluation of local tax policy is conducted based on evidence from the selected

municipalities and cities. The final section presents the main conclusion of this study and offers suggestions for future research directions.

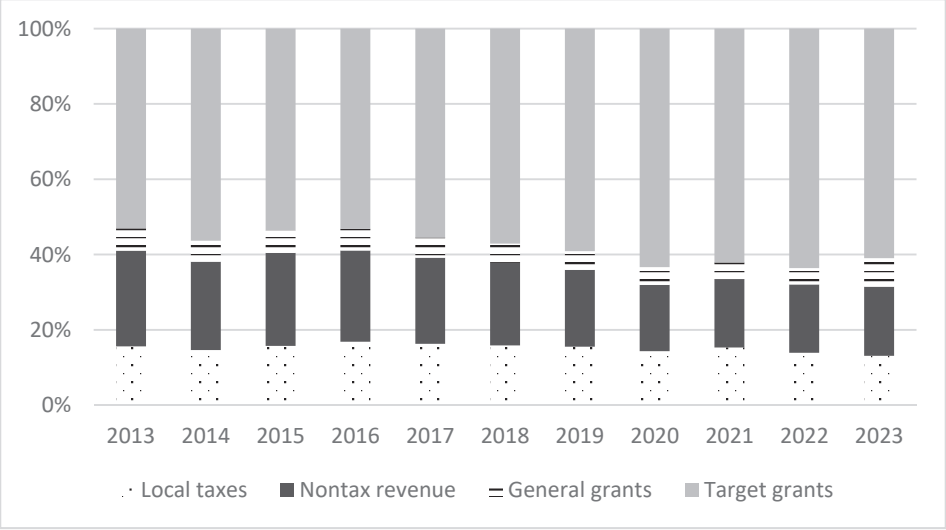
2. CHARACTERISTICS OF LOCAL REVENUES IN BULGARIA AND CROATIA: THE SIGNIFICANCE OF PROPERTY TAXES

2.1. Bulgaria

Bulgarian municipalities acquired real taxation powers in 2008 because of a reform aimed at fiscal decentralisation. Currently, municipal budgets include revenues from local taxes, such as property tax, tax on the acquisition of property for consideration, vehicle tax, gift tax, taxi transport tax, patent tax, and tourist tax, as well as non-tax revenues – revenues from municipal fees, revenues from the sale of property, and others (rents, fines, penalties, etc.). In addition to revenues from these sources, municipalities also receive grants of two types: general and targeted. Figure 1 presents the structure of municipal revenues in Bulgaria for the period 2013–2023.

As shown in Figure 1, state transfers increased in the years following the COVID-19 pandemic. The observed trend toward centralisation raises certain concerns. To achieve the objectives set out in the fiscal decentralisation strategy and in line with the European Charter of Local Self-Government, municipalities in Bulgaria should enjoy a degree of fiscal autonomy, including the capacity to implement independent fiscal policies.

Figure 1: Municipal revenues for the period 2013–2023, in %

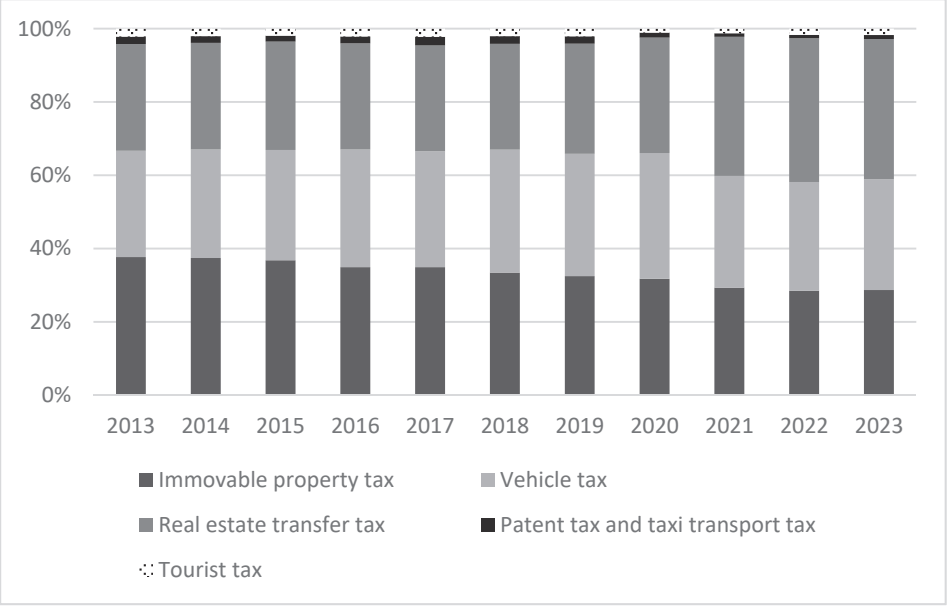


Source: Ministry of Finance of the Republic of Bulgaria; authors' calculations.

The share of tax revenues in total budgetary receipts during the study period ranged from 16% to 13%, with 2023 recording the lowest values. This highlights the significance of local tax revenues, their growth potential, and the relevance and purpose of local tax policy. Data for 2023 indicates that, on average, property tax revenues account for approximately 40% of municipal own-source revenues, while tax revenues constitute around 10% of total budgetary receipts. The share of own-source revenues in total municipal budgetary revenues is roughly 27%. Figure 2 presents the structure of local tax revenues for the period 2013–2023.

Although there are seven municipal taxes in Bulgaria, only three have significant fiscal relevance. These are the property tax, the property transfer tax (i.e., the tax on the acquisition of property for consideration), and the motor vehicle tax. In 2023, revenues from these three taxes accounted for over 95% of all tax receipts in municipal budgets. In this context, setting their rates and conducting a tax policy are critical for the formation of local government own-source revenues.

Figure 2: Structure of local tax revenues in 2013–2023, in %



Note: Inheritance tax is not shown in the chart because it accounted for less than 0.03% of total municipal tax revenue.
Source: Ministry of Finance of the Republic of Bulgaria; authors' calculations.

2.2. Croatia

Croatian cities are financed by local tax revenues (city taxes, real estate transfer tax), shared tax revenues such as PIT, shared revenues from concessions (shared among municipalities, cities, and the central government), non-tax revenues (fees and charges, fines and donations, etc.), grant revenues (equalisation grants for decentralised functions, fiscal equalisation grants), revenues from financial and non-financial assets, and receipts from borrowing.

In this study, the emphasis is on local tax revenues cities collect through the following city taxes: the holiday home tax, which was replaced by the real estate tax in 2025, and the surtax on PIT, which was abolished in 2024. Cities could previously impose the tax on holiday homes at a rate set by the central government. For the real estate tax, the central government sets the limits on tax rates. City councils determine the real estate tax rate applicable in the city. The central government has determined that if a city council has not adopted a

decision on the local real estate tax rate to be applied to the city, the minimum statutory rate will apply. Cities share the collected real estate tax revenue with counties, with counties receiving 20%.

Until its abolition in 2024, to reduce the tax burden in cities, city councils could decide whether to introduce the surtax on PIT and, if so, set its rate within statutory limits. Following the reform, city councils were granted the authority to set new PIT rates directly within centrally prescribed ranges to offset the revenue losses resulting from the abolition of the surtax. The new lower PIT rates range from 15% to 23.6%, and the new higher rates range from 25% to 35.4%. The lower rate applies to an annual tax base of up to EUR 50,400, while the higher rate applies to amounts exceeding that threshold.

The shared tax revenue from PIT is a second group of revenue sources in city budgets. This revenue is shared among cities and municipalities (local self-government) and counties (regional self-government), while a portion is allocated to the financing of decentralised functions, covering material and maintenance costs to ensure the provision of services in primary and secondary education, primary health care, social welfare, and public firefighting. The share of PIT revenue allocated to cities and municipalities is 74%, while counties receive 20%, and the remaining 6% is earmarked for the financing of decentralised functions. PIT revenues are the most important source of revenue in city budgets (55.3% of total revenues in 2024).

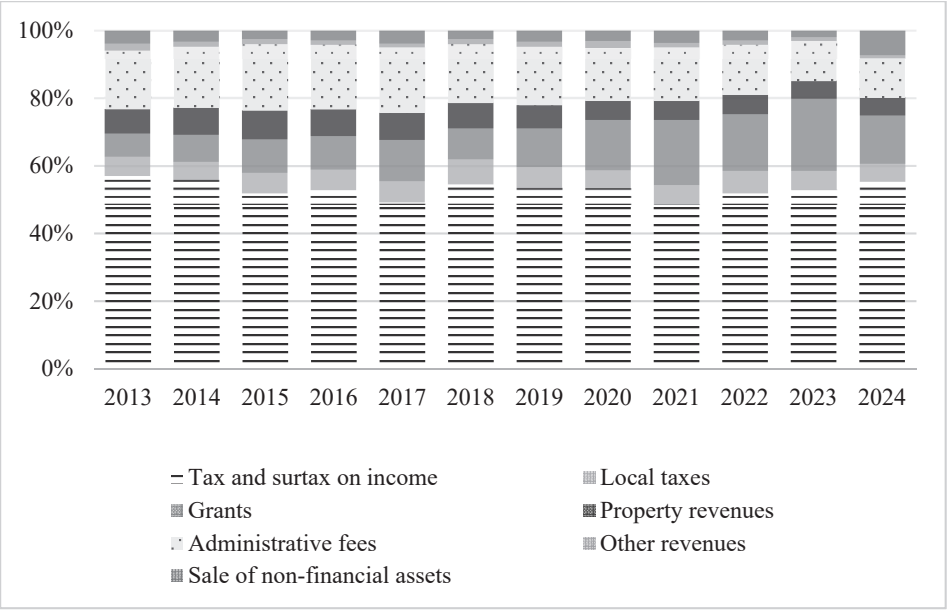
The 2024 change in PIT rates was intended to allow municipalities and cities to offset revenue losses resulting from the abolition of the local income surtax by introducing higher PIT rates. Alternatively, municipalities and cities could reduce PIT rates if alternative revenue sources (such as EU funds or non-tax revenues) were expected to be sufficient to compensate for lost revenue, or if they could otherwise maintain current revenue levels. Most cities and municipalities – 469 out of 556 – kept the 20% and 30% tax rates unchanged.

The 2025 change aimed to reduce the income tax burden while introducing a higher local real estate tax (replacing the tax on holiday homes). Nineteen cities and municipalities reduced PIT rates, while 62 increased them.

Figure 3 shows the structure of revenues in city budgets in the period 2013–2024. During the twelve-year period, PIT revenue accounted for an average of 53.1% of total city budget revenues, with a minimum of 48.7% (2021) and a maximum of 57.0% (2013). Administrative fees constituted the second largest source of revenues. During the period analysed, the share of grants steadily increased. Their average annual share of total revenues in city budgets was 12.7%, with a low of 6.7% in 2013 and a high of 21.1% in 2023.

The structure of local tax revenues in city budgets from 2013 to 2024 is shown in Figure 4. The data presented indicate that the most significant source of local tax revenue is the real estate transfer tax. During the analysed twelve-year period, its share of local tax revenue averaged 68.9% annually, with the lowest share recorded at 54.4% (2014) and the highest at 78.7% (2022).

Figure 3: Revenues in cities' budgets in the period 2013–2024, in %



Source: Ministry of Finance of the Republic of Croatia; authors' calculations.

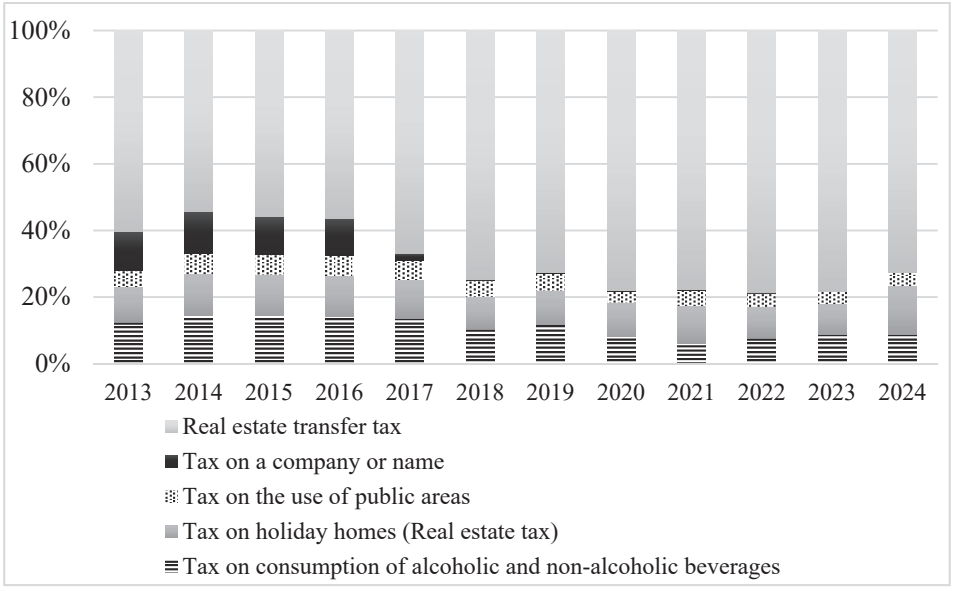
The tax on the consumption of alcoholic and non-alcoholic beverages and the tax on holiday homes accounted for similar average annual shares in revenues from local taxes (11.0% and 11.1%, respectively). However, in 2024, the tax on holiday

homes recorded the highest individual annual share, reaching 14.5% of local tax revenues. The significant increase in revenue from the tax on holiday homes indicates that cities raised the applicable tax rate – up to EUR 5/m² per year – following amendments to the Law on Local Taxes.

Revenue from PIT and the surtax on PIT accounted for 55.3% of city revenues in 2024 and had the greatest fiscal importance in city budgets. As noted earlier, the legal changes in 2024 enabled large city councils to set PIT rates within legal limits. Large cities took advantage of this increased fiscal autonomy by adopting different PIT rates (Jurlina Alibegović et al., 2018). Prior to its abolition, some large cities had also exercised fiscal autonomy by adjusting the surtax rate on PIT within the legally prescribed limits.

Following the replacement of the tax on holiday homes with the newly introduced real estate tax, several large cities took advantage of the opportunity and adopted tax rates that differed from those previously applied to holiday homes, within the statutory limits. In 2024, revenues from the tax on holiday homes accounted for 14.5% of total local tax revenues.

Figure 4: Local tax revenues in cities' budgets in the period 2013–2024, in %



Source: Ministry of Finance of the Republic of Croatia; authors' calculations.

Consequently, setting surtax, PIT, and real estate tax rates, as well as implementing tax policy, are key to generating large cities' revenues.

3. ANALYSIS OF KEY MUNICIPAL TAXES AND EVALUATION OF LOCAL TAX POLICY: EVIDENCE FROM THE 24 LARGEST MUNICIPALITIES IN BULGARIA AND 24 LARGE CITIES IN CROATIA

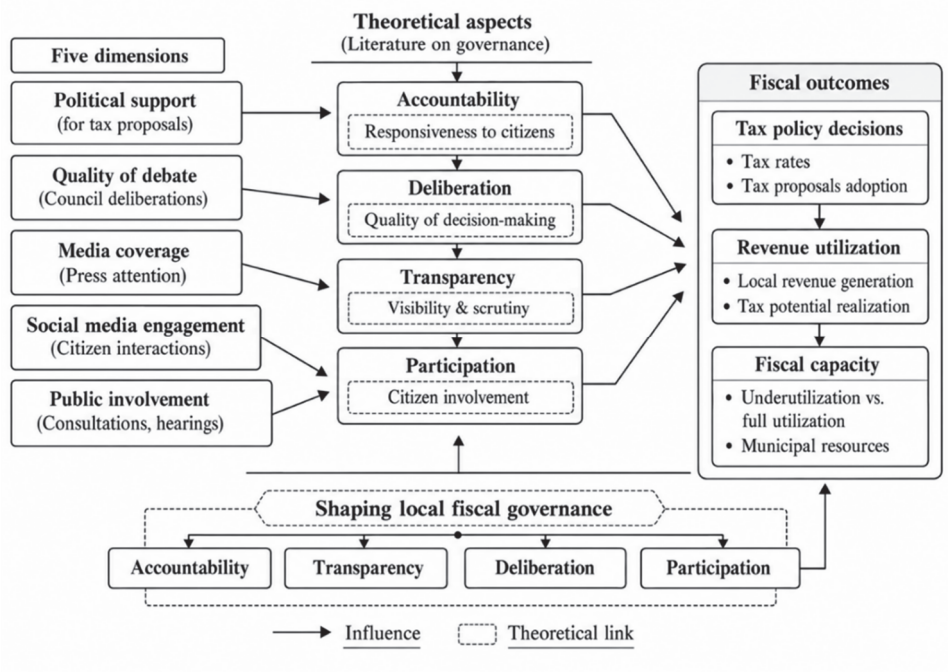
3.1. Methodology

For the purposes of the study, the levels of key municipal taxes in the 24 largest municipalities in Bulgaria and the 24 large cities in Croatia were examined. The study assessed local tax policy as implemented by local authorities when adjusting tax rates. Minutes from municipal and city council meetings in both countries were reviewed and evaluated, along with information published in local and national media, including websites, social media platforms, and print publications. In both countries, debates on changes to local taxes typically take place in November–December of the previous year, or immediately before the announcement of statutory changes that increase the fiscal autonomy of local governments. The data were collected from November 2024 to March 2025.

To assess local accountability in the context of municipal/city tax policy, we conceptualise a multidimensional decision-making matrix grounded in established governance and accountability theory (Figure 5). The matrix captures accountability through five complementary dimensions. Political support captures the degree to which the municipal/city council endorses the policy, reflecting principal-agent dynamics and the influence of political incentives on policy implementation (Przeworski et al., 2012). Quality of debate measures the transparency and depth of council discussions, operationalising deliberative democracy and procedural accountability by ensuring decisions are reasoned, justified, and publicly scrutinised (Dryzek, 2000; Habermas, 1996; Roberts, 2006). Social media engagement evaluates online citizen interactions, reflecting the digital public sphere's role in enabling real-time monitoring, feedback, and civic influence (Boulianne, 2015; Shirky, 2008). Media coverage encompasses both traditional and online reporting, capturing the watchdog function of the press in shaping public attention, enhancing transparency, and creating reputational pressure on policymakers (Besley & Prat, 2006; McCombs & Shaw, 1972). Finally, public involvement includes offline citizen participation such as consultations, petitions, and protests, anchoring the matrix in participatory governance theory

by highlighting the procedural and substantive impact of direct citizen engagement (Fung, 2006; Mansbridge, 2009; Putnam, 1994). Together, these five dimensions provide a theoretically grounded framework linking measurable behaviours and interactions to the broader principles of accountability, transparency, and civic participation (see Table 1).

Figure 5: Five dimensions of the scoring matrix



Source: Authors' systematisation.

Table 1: Five dimensions of local accountability – theoretical foundations, operationalisation, and mechanisms of influence

Dimension	Operationalisation	Theoretical basis	Key references	Mechanism for accountability
Political support	Degree of support from the municipal/city council for the tax policy based on discussions during municipal/city meetings	Principal-agent theory; local governance & political accountability – political alignment and incentives shape policy adoption and oversight	Przeworski et al. (1999)	Signals whether policymakers are responsive to political pressures, affecting implementation and policy adherence
Quality of debate	Transparency and depth of council discussions	Deliberative democracy; procedural accountability – reasoned, transparent debate enhances legitimacy and informed decision-making	Habermas (1996) Dryzek (2000) Roberts (2006)	Ensures decisions are publicly scrutinised, rationally justified, and traceable
Social media engagement	Online public discussion and citizen interaction	Digital public sphere; e-governance – social media facilitates civic participation, monitoring, and signalling	Boulianne (2015); Shirky (2008)	Provides real-time feedback, mobilises public attention, and allows citizens to monitor and influence policy
Media coverage	Scope and depth of coverage in media and social networks, including posts on Facebook, local press, regional/national reports	Media as watchdog; agenda-setting – media exposure increases public scrutiny and accountability pressure	Besley & Prat (2006); McCombs & Shaw (1972)	Increases transparency by informing the public and creating reputational pressure on decision-makers
Public involvement	Offline citizen participation, such as consultations, petitions, or protests	Participatory governance; social capital – direct engagement strengthens legitimacy and enables collective oversight	Fung (2006); Mansbridge (2009); Putnam (1993)	Strengthens procedural and substantive accountability by directly incorporating citizen input into decision-making

Source: Authors' systematisation.

To support this assessment, a scoring matrix was developed to systematically evaluate local tax policy processes in the selected municipalities and cities. Each municipality and city was scored across five dimensions. The matrix translates qualitative observations into numeric indices, using the following criteria:

1. Political support – measures the extent of backing from municipal/city councils:
   - 3 → almost complete or a full majority without significant opposition
   - 2 → strong majority, with a few dissenting or abstaining votes
   - 1 → divided voting, without dominant support
2. Quality of debate – evaluates the thoroughness and transparency of council discussions:
   - 3 → detailed motives, comprehensive arguments, transparent presentation of information
   - 2 → constructive and reasoned debate, but with fewer details or unaccepted alternatives
   - 1 → moderately detailed, with gaps or a more political than technical focus
3. Social media engagement – assesses public discussion and interaction online:
   - 4 → extensive engagement across social media platforms
   - 3 → active discussion, sharing, and citizen comments
   - 2 → limited or mixed online participation
   - 1 → minimal or almost no online presence
4. Media coverage – evaluates the scope and depth of reporting in traditional media:
   - 3 → broad national and regional coverage with analyses and commentary
   - 2 → active regional coverage and partial national coverage
   - 1 → mainly local media, predominantly informational
5. Public involvement – measures offline citizen participation:
   - 4 → active citizen participation (protests, petitions, public consultations)
   - 3 → moderate involvement, visible discussion
   - 2 → limited participation
   - 1 → passive, no significant actions

Each municipality and city was scored from 1 to 3 or 1 to 4 on each dimension, depending on the criterion, with higher scores indicating stronger performance.

Scores were based on documented council proceedings, media monitoring, and evidence of social and public engagement.

The main sources used for coding:

- Minutes of municipal and city council meetings – provided insights into the quality of the debate and the statements made by the ruling party and the opposition in the local council, as well as the political support received for the proposed texts.
- Social media – municipalities' and cities' Twitter and Facebook accounts were analysed to capture citizen engagement and the positions expressed in comments on posts related to changes in municipal and city tax rates.
- Media – national and regional media were analysed and publications in those outlets tracked with a focus on municipal and city council decisions.
- Information on protests and reactions against tax increases – gathered from social and traditional media for each municipality to capture the local populations' reaction and opposition to the proposed changes.

Information was available for all municipalities and cities; therefore, coding was performed based on the collected data. A lower rating indicates, for example, a lack of debate and only symbolic media coverage.

A mixed scoring system is used to reflect variation across the five dimensions. Political support, quality of debate, and media coverage are measured on a three-point scale, as three categories are sufficient to distinguish between low, medium, and high levels. Social media engagement and public involvement, however, are assessed on a four-point scale in order to capture an additional level of exceptionally strong participation. This enabled ordinary active engagement to be distinguished from unusually intense civic mobilisation.

This mixed-method approach, combining qualitative observation with quantitative scoring, enables:

- comparison between municipalities and cities;
- identification of patterns in political support, debate quality, media attention, and public engagement;

- analysis of the interaction between executive proposals, council approval, and citizen involvement; and
- calculation of an evaluation index reflecting the overall quality and effectiveness of local tax policy processes, in the context of transparent and participatory processes in tax policymaking.

For the purposes of the study, the levels of key local taxes in the 24 largest municipalities in Bulgaria and the 24 large cities in Croatia were examined. An assessment of the local tax policy implemented by local authorities when adjusting tax rates is provided. To support this assessment, a matrix was developed, serving as the basis for calculating an evaluation index.

The matrix is interpreted not only as a descriptive but also as an analytical tool, allowing procedural indicators to be compared with specific fiscal outcomes, such as changes in tax rates, proximity to statutory ceilings, and the overall direction of local tax policy. This relationship is formulated cautiously, without a strong causal claim, given the limited number of cases and the predominantly qualitative comparative design of the study. In this sense, the matrix's contribution lies primarily in enabling a clearer comparison of the political and institutional conditions under which the municipalities and cities exercise their tax discretion.

3.2. Bulgaria

Three taxes are of fiscal significance for municipal budgets in Bulgaria: property tax, property transfer tax, and motor vehicle tax. Due to the more complex determination of the motor vehicle tax, its dynamics will not be analysed. Likewise, the remaining local taxes will not be considered in this part of the study due to their low fiscal significance.

Given that 2019 was an election year and municipalities did not increase taxes, gradual changes in the main taxes and fees began in 2020. In the following years, processes of gradual increases in local tax rates were observed.

In 2023, seven municipalities applied the legally established maximum property tax rate of 4.5‰, one municipality applied a rate of 4.4‰, and six municipalities applied a rate of 4‰. A total of 17 municipalities applied a property tax rate above

3.5‰, representing 6.5% of all municipalities. The largest share of municipalities, approximately 68%, applied property tax rates between 1‰ and 2.4‰.

In 2024, property tax rates gradually increased. The share of municipalities applying a tax rate above 3.5‰ increased by 1 percentage point, reaching 7.5% of all municipalities (a total of 20 municipalities). The share of municipalities applying tax rates in the range of 2–2.44‰ was approximately 31%, while the share of local authorities applying tax rates in the range of 1–1.98‰ was 30%.

Following the 2023 local elections, increases in the property transfer tax in municipalities were observed. The number of municipalities applying the maximum tax rate increased by 14, while the number applying a tax rate in the range of 2.6–2.9% increased by 1. In contrast, the number of municipalities applying a tax rate in the range of 2–2.5% decreased by 15. By 2024, nearly half of the municipalities in the country applied the maximum allowable tax rate (Kalcheva, 2025).

According to an analysis by the National Association of Municipalities in the Republic of Bulgaria (NAMRB, 2025), 2025 saw a significant increase in local taxes and fees compared to the previous two years. Of the 242 municipalities participating in the NAMRB survey in 2025, 65 increased property tax rates and 64 increased property transfer tax rates (both gift- and purchase-based). The average property tax rate in 2025 was 2.3‰, while municipal councils have the authority to set rates between 0.1‰ and 4.5‰. Of the municipalities analysed, 136 set rates above the average (compared with 93 in 2024), 70 applied rates at or near the average (91 in 2024), and 36 applied the minimum rate (45 in 2024).

The average property transfer tax rate in 2025 was 1.55%, with municipal councils authorised to set rates between 0.1% and 3%. The number of municipalities setting rates above the average was 238 (89% of all municipalities), compared with 221 (83%) in 2024.

This data indicates that, in 2025, municipalities actively updated local tax rates, aiming to improve their financial sustainability through more adequate and efficient tax policy.

Table 2 presents the property tax and property transfer tax rates set by municipal councils in 2024 and 2025.

Before proceeding with the analysis, it is essential to note that, according to the Local Taxes and Fees Act and the Local Self-Government and Local Administration Act, municipal councils establish local tax and fee rates through ordinances within the limits specified by law. Proposals for tax rates are prepared by the municipal administration and submitted to the municipal council by the mayor of the respective municipality.

In 2024, the average property tax rate for the analysed municipalities was 1.99‰, compared with the national average of 2.28‰. The average rate for the property transfer tax on purchase-based acquisitions for the analysed municipalities was 2.78%, compared with a national average of 2.69%. The results suggest greater potential to increase property tax revenues through higher rates. This is further confirmed by the changes in 2025, when twelve municipalities included in the analysis raised their local tax rates.

Regarding the 2025 tax changes, an analysis was conducted of the tax policies of municipalities that implemented adjustments. This analysis aimed to examine the extent to which municipal councillors influence the proposed tax changes submitted by the mayor. The underlying hypothesis is that, although the municipal council is the body legally responsible for setting local tax rates, the mayor's proposals are generally adopted without significant modification.

Subsequently, the local-level tax policy was evaluated by constructing an index that allows assessment of the municipalities that implemented tax changes in 2025. Of the 24 largest municipalities in Bulgaria, 12 proposed changes to tax rates. The other municipalities did not raise the issue of changing local taxes.

Table 2: Local tax rates in force in 2024 and 2025 in the 24 largest municipalities in Bulgaria – property tax and property transfer tax

Municipality	Population	Property tax rate (‰) 2024	Property tax rate (‰) 2025	Property transfer tax rate (%) 2024	Property transfer tax rate (%) 2025
		Statutory maximum rates 4.5‰	Statutory maximum rates 4.5‰	Statutory maximum rates 3%	Statutory maximum rates 3%
Petrich	46,343	1.8	2	2.2	2.5
Kustendil	46,856	2.5	2,9	2.5	2.9
Targovishte	47,823	1.65	2.5	3	3
Gabrovo	49,472	2.3	2.3	2.5	2.5
Asenovgrad	56,859	1.3	1.3	2.5	2.5
Vratsa	59,130	1.5	1.5	2.5	2.5
Yambol	59,364	1.98	2.5	3	3
Kazanlak	63,529	1.5	2.5	2	3
Kardzhali	65,935	1.2	2	2.8	3
Blagoevgrad	69,265	2.5	2.4	3	2.9
Dobrich	69,434	1.3	2.5	3	2.6
Veliko Tarnovo	77,049	2.5	2.5	3	3
Shumen	77,390	2	2	2.6	2.6
Haskovo	78,812	2	2.5	2.6	3
Pernik	81,170	2.5	2.5	3	3
Pazardzhik	88,700	1.45	1.45	3	3
Pleven	109,080	2.9	2.9	2.85	2.85
Sliven	110,470	2.7	2.7	3	3
Ruse	137,159	3	3	2.7	3
Stara Zagora	142,296	1.7	2.2	3	3
Burgas	195,719	1.75	2.2	3	3
Varna	327,424	2	2	3	3
Plovdiv	329,489	1.8	1.8	3	3
Stolichna	1,295,931	1.875	1.875	3	3
Group average		1.99	2.19	2.78	2.87
National average		2.28	2.3	2.69	1.55

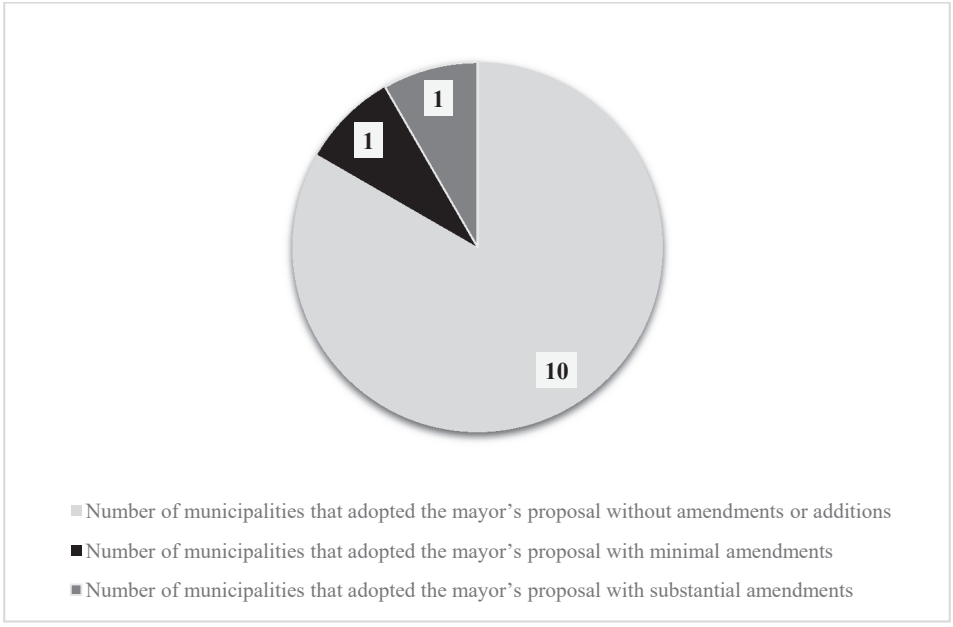
Source: Based on municipal ordinances on the determination of local tax rates across the 24 municipalities.

Figure 6 shows the share of local authorities that approved of the proposed changes from the municipal council, with and without additional modifications.

The proposal to amend local taxes is carefully prepared by the director of the municipal finance department, the deputy mayor responsible for finance, and the mayor of the respective municipality. In smaller municipalities, participation is typically limited to tax experts and the mayor, depending on the municipality's administrative structure.

Although municipal councillors legally hold the leading role in determining local tax rates, the observed practice shows that changes to the proposals resulting from council debates occurred in only two municipalities.

Figure 6: Decisions adopted by municipal councils to increase local taxes, with and without amendments to the mayor's proposal



Source: Minutes of municipal council meetings.

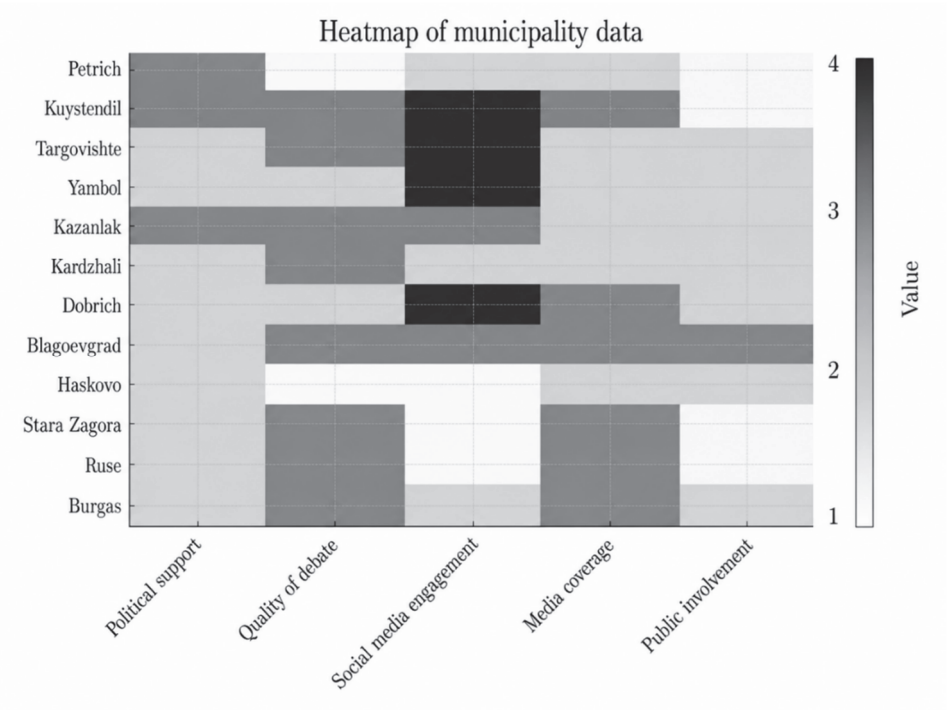
The configuration of horizontal power relations at the local level in Bulgaria most accurately fits the strong-mayor model (Heinelt et al., 2018). The institutional weight of the directly elected mayor is primarily consolidated through a stable

majority in the municipal council that supports his or her governance initiatives and policy proposals. Acting as the chief executive of the local administration, the mayor is responsible for personnel management and the overall governance of human resources (Kalcheva & Ushatova, 2022).

Within the scope of the competences vested in the office, he or she exercises the authority to appoint deputy mayors and the municipal secretary and submits the draft municipal budget for council deliberation. The position of the mayor is further reinforced through an extended set of prerogatives enshrined in various national legislative acts (Stefanova, 2018, pp. 94–96).

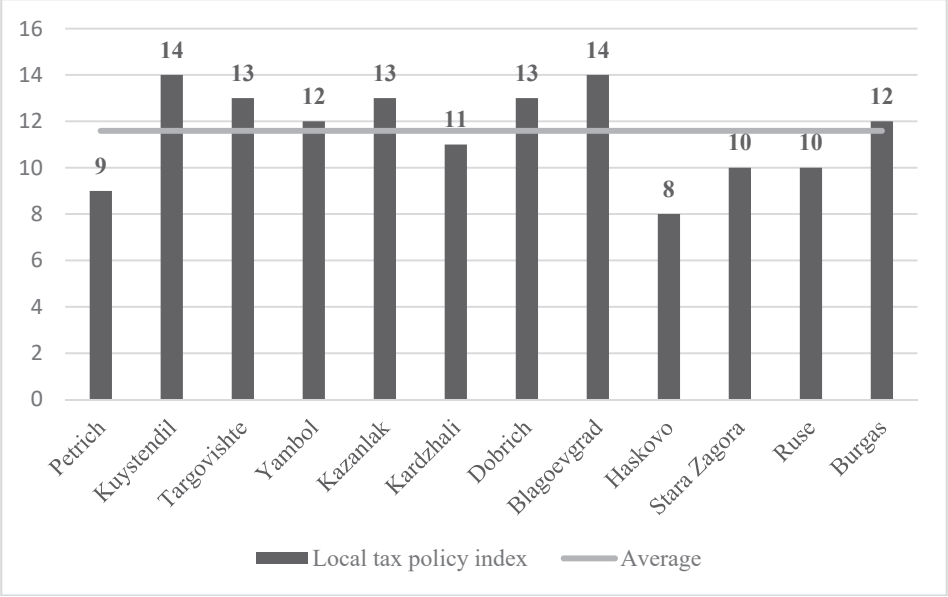
Figures 7 and 8 graphically present the results of evaluating the tax policy implemented in municipalities that increased local taxes in 2025.

Figure 7: Components heatmap



Source: Minutes of municipal council meetings; Regional news.

Figure 8: Index chart – local tax policy assessment



Source: Minutes of municipal council meetings; Regional news.

The average index value is around 12 points, indicating that most municipalities have a moderately strong tax policy – well-founded and supported, but often with gaps in public engagement or debate. Only a few municipalities stand out as leaders (over 14 points), while others lag with indices around 11–12 points.

Municipalities with the highest results:

- Kyustendil (14 pts) – high scores across all indicators, particularly political support and social visibility. This exemplifies a "strong local policy" model, combining institutional stability with active public discussion.
- Blagoevgrad (14 pts) – exceptionally high-quality debate and broad media coverage. The drawback is weaker social engagement.
- Targovishte, Kazanlak, and Dobrich (13 pts) – stable across almost all components, though not as high as Kyustendil.

Municipalities with near-average scores (second level):

- Yambol (12 pts), Burgas (12 pts) Kardzhali (11 pts) – solid results, but no powerful features. Social and media coverage varies, and the quality of debate is moderate.
- These municipalities have a balanced, but unremarkable, policy.

Municipalities with the lowest scores according to the matrix and index:

- Stara Zagora (10 pts), Ruse (10 pts), Petrich (9 pts), Haskovo (8 pts) – despite political support, weaknesses are evident: social visibility is almost absent, and in some cases, the debate is superficial or confrontational.
- These results indicate a formal but unconvincing tax policy that fails to mobilise public support or interest.

Key insights from the heatmap:

- Social visibility is the weakest component – many municipalities received zero or low scores. This suggests that citizens and online communities rarely participate in the tax policy debate.
- Media coverage is a strong point – most municipalities have active coverage, including at the national level.
- Political support is stable – most municipalities receive 2–3 points, showing that decisions are easily approved at the institutional level.
- Quality of debate varies – some municipalities have well-argued and thorough discussions (Blagoevgrad, Kyustendil), while others (Petrich, Haskovo) have limited or more confrontational debates.

In conclusion, Kyustendil and Blagoevgrad are excellent examples of municipalities with transparent and participatory tax policy processes. Haskovo, Stara Zagora, and Ruse show weaknesses, mainly in social legitimacy. Most municipalities fall within the average range, meaning that the institutional system functions, but broad public engagement remains insufficient.

3.3. Croatia

Croatia's accession to the Eurozone in January 2023 necessitated adjustments in fiscal and tax policies, including at the local level. The primary objective of these reforms was to ensure the stability of municipal revenues, facilitate integration

into the European financial system, and stimulate economic activity through a practical tax framework. Amendments to the Law on Local Taxes have been in force since 2024, abolishing the surtax on PIT and the tax on holiday homes and introducing a real estate tax.

3.3.1 Real Estate Tax

The amendments to the Law on Local Taxes did not introduce a new, comprehensive tax on all types of real estate to replace the existing forms of real estate taxation. Instead, the tax on holiday homes was replaced by a real estate tax. Taxpayers who own property that is not permanently occupied are required to pay a higher amount of real estate tax than they previously paid under the tax on holiday homes. The tax does not apply to permanently inhabited real estate or property rented for long-term use (at least 10 months a year), but does apply to property rented for short-term use. One objective of this tax reform and the introduction of a new tax is to address housing-market pressures and create preconditions for affordable housing.

In 2025, Croatia introduced a series of changes to its real estate tax system, granting local authorities significant flexibility in setting rates within a legal framework designed to promote transparency and fairness. Cities can set real estate tax rates ranging from EUR 0.60/m² to EUR 8.00/m², depending on the type and location of the real estate. Lower rates generally apply to holiday homes and properties not used for permanent residential purposes located within lower-income cities. Conversely, higher rates are levied on holiday homes in tourist areas, as well as on properties in central and tourist areas that are not used for permanent residence.

3.3.2 Criteria for setting real estate tax

Real estate tax is paid based on the following criteria:

- Purpose and use of the property – tax applies to properties that are not used for permanent residence or long-term rental.
- Property location – the tax amount may depend on the municipality, street, settlement, or zone (e.g., tourist or central areas).
- Property characteristics – factors such as the age of the property, amenities, and other features affecting its value may influence the tax amount.

- Condition and usability of the property – properties unsuitable for residential use or unusable due to extraordinary circumstances may be exempt from taxation.
- Ownership and social status – certain categories of owners (e.g., socially vulnerable persons or local government units) may qualify for tax exemption.
- Special property purpose – public-use properties, institutional accommodation facilities, and certain business properties intended for sale may be exempt under prescribed conditions.

3.3.3 Procedure for determining the real estate tax rate

The process begins with the city finance department preparing a proposal in collaboration with the mayor and, frequently, the deputy mayor. The proposal is then discussed in public sessions that involve civil organisations, business representatives, and the academic and research communities. The city council formally adopts the tax rate through a local ordinance. Mayoral proposals are usually approved with minimal modifications, particularly in larger cities.

3.3.4 Connection to fiscal policy and the euro

Flexibility in setting tax rates allows local authorities to optimise revenues while promoting socially desirable uses of property. Following the adoption of the euro, these reforms are crucial for stabilising cities' budgets and integrating Croatia into the European financial system. Improved real estate tax policies are also expected to enhance the management of real estate resources, contributing to the economic sustainability of cities.

3.3.5 Analysis of key city taxes and tax policy in the 24 large cities

Local taxes account for approximately 6% of total city budget revenues on average. The local taxes that are fiscally significant for city budgets in Croatia are the following: the tax on holiday homes, which was replaced by the real estate tax; the surtax on PIT; and PIT. Real estate transfer tax generates significant revenue for city budgets; however, we do not examine it in this study because its rate is set by law, and city councils do not have the fiscal authority to change it.

Therefore, we analyse changes in tax rates of the most important taxes in the budgets of large cities in Croatia. These include: (i) the change in the surtax rate,

before the surtax was abolished in 2024; (ii) the change in the lower PIT rate; (iii) the change in the higher PIT rate, which we treat

as a local tax because city councils have the legal authority to set PIT rates within the limits specified in the PIT law; and (iv) the change in the real estate tax rate, which replaced the tax on holiday homes (we treat the two taxes as a single category).

Local elections were held in 2013, 2017, 2021, and 2025. During these electoral cycles, several significant changes to tax laws occurred. One of the main changes relates to the surtax on PIT. Four cities reduced the surtax rate after the 2019 local elections, while two cities abolished the surtax altogether.

Other important changes included frequent adjustments to PIT rates, the primary source of revenue for city budgets. In 2024, the range of lower PIT rates for cities was 15% to 22.4%, and the higher rate ranged from 25% to 33.6%, instead of the previously specified 20% and 30% for the lower and higher PIT rates, respectively. In 2025, PIT rates for cities changed again, with the law setting lower rates between 15% and 21% and higher rates between 25% and 31%.

Prior to the 2024 reform, all large cities applied the previously established PIT rates of 20% and 30%, regardless of whether they had previously generated PIT revenue through a surtax (abolished in 2024) or had never introduced one. Following changes to the law and the introduction of greater flexibility in setting lower and higher PIT rates in 2024, two cities lowered their lower PIT rates, eight cities introduced higher ones, and 14 cities maintained their previous tax rates. A further change in tax rates occurred in 2025, when one city introduced an even lower tax rate than those adopted in 2024 for the lower PIT rate. At the same time, five cities introduced lower tax rates, while 18 maintained the same rates as the previous year. Higher PIT rates in 2024 display the same pattern as the lower rate in 2024: two cities reduced their higher PIT rates, eight cities increased theirs, and 14 cities maintained the same higher PIT rate as previously in force. In 2025, however, eight cities further reduced their higher PIT rates, and 16 cities maintained their 2024 rates.

The tax on holiday homes is the second-most-important local tax. In 2024, the last year this tax was in force, it was introduced by 16 large cities. The tax rates varied,

with only five large cities applying the maximum rate of EUR 5/m². In 2024, the average tax on holiday homes in large cities was EUR 1.79/m². The city of Kaštela applied the lowest tax rate for holiday homes at EUR 0.60/m², followed by Vukovar at EUR 0.66/m².

Following the replacement of the tax on holiday homes with a new real estate tax, 12 cities applied a higher tax rate under the new system than that previously applied to holiday homes. Of those 12 cities, eight had not previously imposed a tax on holiday homes. City councils were required to introduce a minimum level of real estate tax in accordance with legal provisions, despite mayors and city councillors strongly opposing it.

The tax rates for all three taxes in cities are determined by the city council, based on the mayor's proposal. These results indicate that cities cannot independently shape local fiscal policy; instead, their autonomy is limited by national laws that regulate the types of local taxes, tax bases, tax rate limits, exemptions, and payment deadlines. Additionally, national law prescribes which local taxes cities must impose and which they may introduce voluntarily.

This study aims to investigate the extent to which city councillors influence the mayor's proposed local tax policies. The basic hypothesis is that, although the city council is legally the body that makes decisions on local fiscal policy, including setting local tax rates, the mayor’s proposals are generally approved with only minor modifications. Subsequently, city tax policy was evaluated using an index designed to assess individual large cities that implemented tax changes in 2024 and 2025.

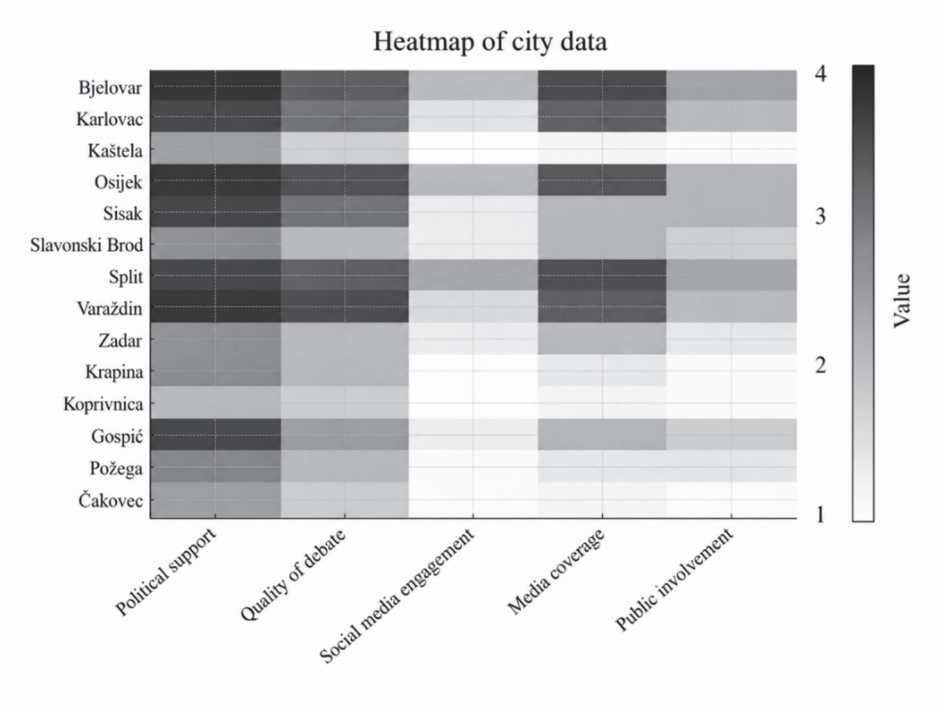
Table 3: Rates in the 24 large cities in Croatia in the analysed period – tax on holiday homes, real estate tax, surtax on PIT, and PIT

	Tax on holiday homes, EUR/m2, 2024	Real estate tax, EUR/m2, 2025	Surtax rate on PIT, %, 2019	Surtax rate on PIT, %, 2023	Lower PIT rate, %, 2024	Lower PIT rate, %, 2025	Higher PIT rate, %, 2024	Higher PIT rate, %, 2025
Bjelovar	0.00	3.00 – 6.00	6	0	18	18	28	25
Dubrovnik	5.00	0.60 – 5.00	10	10	20	20	30	30
Karlovac	2.00	2.00	12	9	20	19	33	29
Kaštela	0.60	2.00	12	12	20	20	30	30
Osijek	0.00	0.60	13	13	20	20	30	30
Pula	5.00	5.00	12	12	21	21	31	31
Rijeka	5.00	5.00	15	13	22.4	22	33.6	32
Samobor	1.33	1.33	0	0	18	18	27	27
Šibenik	5.00	5.00	10	10	20	20	30	30
Sisak	2.00	2.00 – 3.00	10	10	23	21.6	34	31.6
Slavonski Brod	1.33	2.00	6	6	20	20	30	30
Split	1.99	1.99	15	15	21.5	21.5	32.25	32
Varaždin	0.00	0.60	10	7.50	22	21	33	32
Velika Gorica	0.80	0.80	12	12	20	20	30	30
Zadar	0.00	0.60	12	12	20	20	30	30
Zagreb	5.00	5.00	18	18	23.6	23	35.4	33
Krapina	0.00	0.60	0	0	20	20	30	30
Koprivnica	0.00	0.60	0	0	20	20	30	30
Gospić	1.33	3.00	10	10	22.4	22	33.6	32
Virovitica	2.00	2.00	10	10	20	20	30	30
Požega	0.00	0.60	10	7	20	20	30	30
Vukovar	0.66	0.66	0	0	20	20	30	30
Pazin	4.00	4.00	9	9	22	22	30	30
Čakovec	0.00	0.60	10	0	20	20	30	30

Source: Ministry of Finance of the Republic of Croatia.

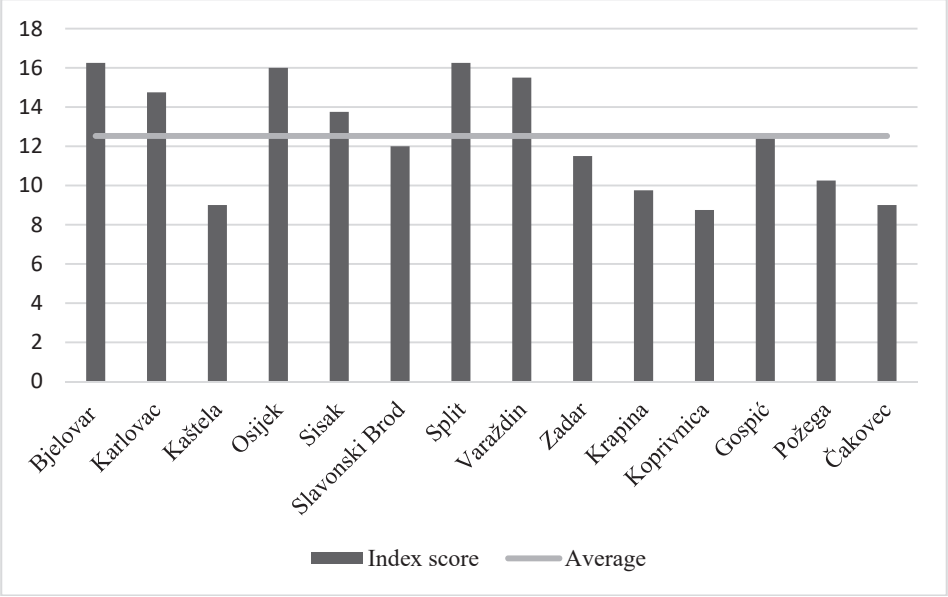
Figures 9 and 10 present the evaluation of local tax policy in the 14 of the 24 large cities that implemented an active tax policy in 2025. The analysis focuses on cities that decided to introduce higher real estate tax rates following the replacement of the tax on holiday homes, as well as on cities in which PIT surtax rates changed after the 2021 local elections and where lower and higher PIT rates were subsequently modified following the legal reforms of 2024 and 2025. The figures evaluate local tax decision-making processes in relation to these reforms. The remaining cities did not raise the issue of changing local taxes and maintained their existing tax rates.

Figure 9: Components heatmap



Source: Authors' processing based on Web search.

Figure 10: Index chart - local tax policy assessment



Source: Authors' processing based on Web search.

In the absence of information for a given component of the index, a value of 0 was assigned in the calculations. Nevertheless, the overall index scores for several large Croatian cities are almost identical to those of the Bulgarian municipalities. Additionally, the debates on the various tax types were evaluated separately, whereas the overall index was calculated using the average values derived from the individual discussions.

The index average is approximately 12.5 points, indicating that half of the cities have a moderate tax policy, often accompanied by strong political support.

The cities with the highest results are Split and Bjelovar (16.25 points), characterised by a high level of political support, quantity of debate, and media coverage. Although Split achieved the highest overall score, with strong visibility in the decision-making process – driven by high ratings in debate quality, media coverage, and political support – this did not affect fiscal outcomes. The city council made no decisions to change tax rates, and the higher income tax rate in 2025 was reduced to the legally mandated limit. In contrast, in Bjelovar, which

achieved the same overall score, high ratings in debate quality, media coverage, and political support resulted in concrete fiscal actions. These included the legally mandated introduction of a real estate tax, differentiation of tax rates across city areas, and the early abolition of the income tax surtax. While the higher income tax rate was reduced, the lower rate remained unchanged.

The city with the highest average score across the evaluated criteria is Gospić (12.5 points). This may reflect the importance of both political support and the quality of debate on local tax policy in this city council. Strong political support, reinforced during city council discussions on reducing both lower- and higher-income tax rates, combined with legal amendments that allowed the mayor to propose and the council to adopt changes, led to a reduction in income tax rates.

The city with the lowest scores, according to the matrix and the index, is Koprivnica (8.75 points). The reason for this result is the lack of publicly published information on the adoption and amendment of important local tax provisions, their tax rates, and the organisation of public hearings. The only information identified through website searches relates to the adoption of the new local real estate tax.

In most large Croatian cities, the decision-making process – assessed by quality of debate, citizen engagement, media coverage, political support, and social media interaction – did not result in changes to tax policy, such as adjustments to tax rates, statutory limits, or tax revenues. Changes were observed in only a few cities. In Karlovac and Varaždin, income tax rates and local surtaxes were reduced, driven by strong political support and transparent, comprehensive council debates, with extensive media coverage. In Čakovec, tax policy outcomes were similarly shaped by political support and high-quality debate, resulting in the introduction of a statutory minimum real estate tax, the abolition of the local income surtax, and the maintenance of minimum income tax rates.

Key insights from the heat map:

- Social visibility is the weakest component – many cities received zero or low scores due to the lack of publicly published information on the adoption and amendment of important local tax provisions and their tax rates. This suggests

that citizens and online communities rarely participate in the tax policy debate.
- Media coverage is a relatively strong point – many cities have active reporting on local taxation.
- Political support is stable – this is the most important element of the evaluation of local tax policy in large cities and indicates that decisions are institutionally approved.
- Quality of debate – this is ranked second among the criteria by which cities are evaluated in terms of conducting local tax policy. It varies across large cities, suggesting that citizen and other social group participation is strong in some cities, but absent in others, where there is no debate over changes in local taxes.
- Public involvement is not sufficiently represented in large cities when decisions are made about local taxes.

4. CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH

Our analysis of local tax decision-making in Bulgarian municipalities and Croatian cities confirms the dominance of mayors in line with patterns observed in other SEE countries, such as Poland and Hungary (Rajca, 2021). While municipal councils formally approve tax policies, mayors largely initiate and shape decisions, with councillors making only limited amendments. This refines existing understandings of strong-mayor systems by showing how executive dominance interacts with statutory tax ceilings and local fiscal discretion.

Fiscal space varies across tax types. In Bulgaria, the property acquisition tax is applied near the statutory maximums, leaving little room for revenue increases, while real estate taxes offer municipalities the potential to raise funds through updated bases. In Croatia, statutory maximums are rarely reached for key local taxes, including the newly introduced real estate tax, while PIT rates remain at or below legal limits. An important point to note is that local authorities in both Bulgaria and Croatia have authority only to set tax rates. They cannot independently determine or adjust the size of the tax base, valuation methods, or exemptions. In this context, we examined fiscal space from the perspective of the opportunities provided by law to increase tax revenues by raising tax rates or tax amounts. All other decisions related to changes in municipal tax revenues fall under the jurisdiction of the central government.

These findings extend prior work on municipal fiscal capacity (Bahl & Linn, 1992) by demonstrating that discretion varies by tax type and is influenced by political and institutional factors. It should be emphasised that the term fiscal space is used in our article not in the broad sense of overall fiscal capacity, but in a more limited sense as the scope for action within the limits of legally permissible rates.

The similarities identified across Bulgaria and Croatia suggest that local tax decisions in both countries are shaped by a shared tension between formal council authority, executive leadership, and the political sensitivity of tax increases. At the same time, the differences observed in quality of debate, public visibility, and the role of the mayor appear to reflect broader institutional and political conditions. The findings point to an important nuance: even under similar decision-making conditions, different fiscal outcomes may emerge. For example, in Croatia, the cities of Split and Bjelovar achieved high scores on the index but report different fiscal outcomes. In Bulgaria, Kyustendil and Blagoevgrad combined relatively high process scores with higher tax rates, while Haskovo, despite its lower score, also applied relatively high rates. These cases suggest that process quality and fiscal outcomes do not necessarily move in tandem. Accordingly, they are best treated as analytically distinct outcomes rather than assumed to be mechanically linked. Variation across cases may be shaped by a range of institutional and political conditions, including the degree of local fiscal discretion, the balance between mayoral influence and council dynamics, the level of administrative capacity, and the extent to which tax issues become politically salient in the local public sphere.

As a result of the study, we arrive at the following answers to the questions posed in the introduction:

(i) Local tax policy is an important element of the political agenda of local authorities in Bulgaria and Croatia, but the intensity of political discussions varies across cities.
(ii) The mayor dominates decision-making on local tax policy, with only a few cases identified where the mayor's initial proposal on tax rates has been amended.
(iii) In Bulgaria, the amount of tax on the acquisition of property by way of compensation is close to the maximum permitted by law, and there is no significant fiscal space for increasing revenue from this tax. In contrast, it is

still possible to increase real estate tax rates. Moreover, updating the real estate tax base in Bulgaria could increase revenue from the main local taxes. In Croatia, the maximum statutory rates of key local taxes are currently applied only in a few large cities. This applies to the newly introduced real estate tax. At the same time, surtax rates on PIT were reduced or abolished even before their formal legal abolition. In most cities, PIT rates have either remained unchanged or been set below the statutory maximum. The evaluation indicates that there is fiscal space to increase real estate rates, thereby increasing city tax revenues. However, since the national objective is to reduce the tax burden on labour, there is little scope to increase PIT tax rates.

More broadly, the findings should be interpreted within the wider institutional context of fiscal decentralisation in South-East Europe, where local governments often operate under constrained fiscal autonomy, frequent legislative changes, uneven administrative capacity, and coordination challenges between central and local institutions. Although structural issues such as fragmented systems, outdated fiscal registers, weak system connectivity, and enforcement gaps fall beyond the direct empirical scope of the present study, they remain important contextual factors for understanding the limits and possibilities of local fiscal governance. Against this background, the concentration of decision-making authority at the municipal level underscores the need for balanced governance mechanisms that combine effective leadership with accountability, transparency, public engagement, and equitable service provision. By linking strong-mayor governance with fiscal space and local tax outcomes in the context of tax rate determination, this study contributes to debates on executive authority, fiscal effort, and the capacity of municipalities and cities in South-East Europe to strengthen own-source revenues while preserving broader policy objectives.

Future research could expand the analysis by comparing the effects of the strong-mayor model across different European institutional contexts and by examining the political, legal, and administrative factors that reinforce the mayor's dominant role. Further attention should also be paid to the relationship between concentrated executive power, financial performance, efficiency, transparency, and civic participation. The next phase of the study could supplement the analysis of secondary data with interviews with local authorities and community

representatives, thereby providing a deeper understanding of the practical dynamics of local fiscal governance.

Overall, understanding the dynamics of local tax decision-making, the concentration of executive power, and the interaction with legislative bodies is crucial for designing policies that strengthen municipal autonomy, improve fiscal governance, and enhance accountability. Strengthening institutional checks, fostering council participation, and promoting citizen engagement are key strategies to ensure that local tax policies serve the public interest and support sustainable local development.

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LEARNING IN THE WORKING FROM HOME TRANSITION: A MULTILEVEL ANALYSIS OF INDIVIDUAL, TEAM, AND ORGANISATIONAL ADAPTATION

ABSTRACT: *The rapid expansion of work-from-home (WFH) arrangements raises an important question: how does organisational learning travel across individual, team, and organisational levels when work becomes spatially distributed? Drawing on organisational learning and human resource management (HRM) theory, this study examines how individual learning (IL) translates into collective outcomes under WFH conditions. Using survey data from 2,171 employees in Serbia, we analyse the interplay of learning across individual, team, and organisational levels during an abrupt shift to remote work. The findings indicate that learning operates as a multilevel process in which team dynamics act as a critical bridge between individual initiative and organisational adaptation. Individual self-regulation contributes to broader learning only when supported by collaborative teams and enabling organisational structures. Leadership and psychological safety facilitate this cross-level learning, while rigid structures and limited formal systems constrain team and organisational learning. The study contributes empirical insight into multilevel learning during large-scale disruption and highlights the conditions under which individual learning generates collective benefits, particularly in a non-Western, post-socialist context. The findings offer practical implications for designing organisational strategies that support learning in remote and hybrid work environments.*

KEY WORDS: *team learning; psychological safety; working from home; organisational learning; learning across levels; team learning dynamics, leadership and learning support.*

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1. INTRODUCTION

The widespread shift to work-from-home (WFH) arrangements has profoundly reshaped how work is organised, coordinated, and experienced within contemporary organisations. While remote work broadly refers to work performed outside traditional office settings, WFH specifically denotes arrangements in which employees perform their work primarily from their homes using digital communication technologies. In this study, we focus on WFH as the most common form of remote work during the pandemic period. As employees increasingly collaborate through digital technologies rather than physical proximity, the traditional mechanisms through which knowledge is shared, interpreted, and embedded in organisational routines become less stable. These changes raise an important question: how does organisational learning unfold when individuals, teams, and organisations must adapt simultaneously under conditions of spatially distributed work?

Organisational learning (OL) is widely recognised as a multilevel process involving interactions between individual, team, and organisational levels (Argote & Miron-Spektor, 2011; Crossan et al., 1999). While individuals acquire and interpret knowledge, teams integrate insights through collaboration and shared reflection, and organisations institutionalise learning through structures, routines, and leadership practices. The relationships between these levels are dynamic and recursive: individual learning can initiate change, while organisational systems shape the conditions under which individual and team learning (TL) occur. Understanding how learning travels across these levels is therefore central to explaining how organisations adapt to changing environments.

Despite this theoretical recognition of OL as a multilevel phenomenon, empirical research rarely examines how learning processes unfold simultaneously across levels, particularly under conditions of distributed work. Existing studies tend to focus on a single level of analysis – such as individual motivation, team collaboration, or organisational adaptation – without systematically exploring the interactions between them. This limitation becomes particularly salient in remote and hybrid work environments, where the spatial separation of employees may disrupt traditional mechanisms of coordination, feedback, and shared interpretation.

Prior research highlights both the benefits and the challenges associated with WFH arrangements. On the one hand, WFH has been associated with increased flexibility, autonomy, job satisfaction, and productivity (Delanoeije & Verbruggen, 2020; Nakrošienė et al., 2019), higher employee engagement (Grant et al., 2013;), reduced stress and improved well-being (Prasad et al., 2020), and improved work–life balance (Grant et al., 2013; Prasad et al., 2020). On the other hand, remote work may generate significant challenges, including social isolation, longer working hours, blurred work–life boundaries, and increased technostress (Barber & Santuzzi, 2015; Charalampous et al., 2019; Galanti et al., 2021; Molino et al., 2020), which may ultimately undermine job performance and productivity (Grant et al., 2019). The effectiveness of WFH arrangements therefore depends strongly on contextual conditions such as job characteristics, organisational culture, leadership practices, and employees' home environments (Allen et al., 2021; Song & Gao, 2020).

The rapid and widespread transition to WFH during the global health crisis in 2020 represented one of the most significant disruptions to organisational routines in recent history (Černe & Lamovšek, 2025). This sudden shift fundamentally reshaped how employees work, collaborate, and learn, requiring individuals, teams, and organisations to adjust their learning behaviours, coordination practices, and supporting infrastructures.

This study addresses this gap by examining how learning unfolds across individual, team, and organisational levels during the transition to WFH. Drawing on OL and HRM theory, we analyse survey data from 2,171 employees in Serbia to investigate the interplay between individual learning capacities, team collaboration, and organisational support structures. In doing so, the study provides empirical insight into the mechanisms that enable – or constrain – the translation of individual learning into collective organisational outcomes in distributed work environments.

The remainder of the paper is structured as follows. The next section reviews the relevant literature and develops the theoretical framework, followed by the methodology, empirical findings and implications of the results for OL and remote work research. The final section summarises the conclusions.

2. LITERATURE REVIEW

OL research has long emphasised the multilevel nature of learning processes, highlighting how knowledge emerges through interactions between individuals, teams, and organisational systems (Argote & Miron-Spektor, 2011; Crossan et al., 1999). In distributed work environments, however, these interactions may be reconfigured as communication becomes mediated by digital technologies and informal learning opportunities decline. Understanding how learning unfolds across levels in such contexts therefore requires integrating insights from organisational learning, team learning, and remote work research. Recent research on learning in remote and digitally mediated work environments highlights several mechanisms that shape how knowledge is created and shared across organisational levels. One stream of studies focuses on the socio-technical conditions for individual learning. For example, Keppler and Leonardi (2023) introduce the concept of *relational confidence*, demonstrating how enterprise social media platforms reduce relational risk and encourage knowledge-seeking behaviour by increasing psychological safety. Other studies emphasise the importance of informal and socially embedded learning processes, which remain central even in virtual environments where spontaneous interactions are less frequent (Zajac et al., 2022).

A second stream of research focuses on team-level adaptation, highlighting how distributed teams develop new coordination and collaboration practices in response to remote work arrangements (Peprah, 2023). At the same time, several studies point to organisational and affective constraints on learning in remote contexts, including social isolation, increased workload, and reduced opportunities for informal exchange (Mosquera et al., 2022).

To complement these conceptual insights, we conducted a bibliometric analysis of publications between 2015 and 2025 using VOSviewer and Bibliometrix. The resulting citation network reveals several clusters reflecting the growing scholarly interest in learning under conditions of organisational disruption and distributed work. The first cluster centres on the psychosocial and emotional dimensions of remote work, including psychological safety, employee well-being, and HRM adaptation (Reese, 2020; Sidani & Reese, 2018; Tortorella et al., 2020). A second cluster highlights the role of digital transformation and innovation in shaping OL, particularly through leadership and strategic renewal (Islam, 2019). A third

cluster examines the social infrastructure of distributed teams, focusing on knowledge sharing and mutual support in virtual collaboration settings (Boccia & Cseh, 2021; Mak & Hong, 2020; Mosquera et al., 2022). Additional clusters address critical and epistemological perspectives on OL (Tsang, 2017), the influence of leadership and organisational climate (Aboramadan et al., 2022; Bhaskar & Mishra, 2017; Ellinger & Ellinger, 2021), and the integrative concept of the *learning organisation* (Örtenblad, 2004).

Taken together, these streams of research underscore the importance of examining learning as a multilevel process shaped simultaneously by individual capabilities, team dynamics, and organisational conditions, particularly in remote work contexts.

2.1 Multilevel nature of organisational learning

OL is widely acknowledged as a multilevel phenomenon involving individuals, teams, and the organisation as a whole (Argote & Miron-Spektor, 2011; Crossan et al.,1999). The 4I framework (Crossan et al., 1999) outlines how learning emerges through four interconnected processes – intuiting, interpreting, integrating, and institutionalising – spanning the three levels. While intuiting and interpreting typically begin at the individual level, integration and institutionalisation occur at team and organisational levels, facilitating the retention and diffusion of knowledge. Crucially, learning is not a linear process that moves upward from individuals to the organisation, but a recursive interaction in which organisational structures, culture, and routines also influence lower levels of learning. In this study, the 4I framework serves as an analytical lens for examining how learning processes unfold across levels under WFH conditions, with particular attention to the mechanisms that enable – or constrain – the translation of individual insights into collective OL.

Recent studies further illustrate the multilevel nature of OL. For example, Salles et al. (2025), drawing on the 4I framework, identify several learning types that emerge iteratively across organisational levels. However, their work pays limited attention to psychological factors (e.g., individual motivation, psychological safety, and leadership) and demographic or organisational characteristics that may influence how learning spreads across levels. Other research emphasises the

role of organisational cultures that support reflection, dialogue, and continuous learning in new work arrangements (Palenque & de Armas, 2023).

Despite these insights, empirical studies often remain focused on a single level of analysis. In remote work contexts, this leaves an important question unresolved: how do individual, team, and organisational learning interact under conditions of physical distance and reduced informal exchange? Addressing this question is essential for understanding adaptive capacity in distributed work environments. Accordingly, we propose the following hypothesis:

H1: Individual learning, team learning, and organisational learning are positively associated, reflecting the multilevel nature of learning during WFH.

2.2 Individual learning in remote work contexts

Remote work reshapes the conditions under which individual learning (IL) occurs by reducing direct supervision and informal interaction. In dispersed work settings, employees rely more heavily on self-regulation, intrinsic motivation, and proactive help-seeking to sustain learning (Goller & Paloniemi, 2017).

The rapid shift to WFH during the COVID-19 pandemic further amplified the role of individual capabilities such as self-discipline, metacognitive skills, and the ability to use digital tools for professional and personal development (Wang et al., 2021). At the same time, remote work alters the informal learning ecology: spontaneous interactions and observational learning decline, placing greater emphasis on intentional and reflective learning practices (Zajac et al., 2022).

Emerging research also suggests that WFH may reshape learning beyond the workplace. For example, Ando and Shirahada (2024) show that remote work can trigger broader reflexive learning processes, including changes in family roles and everyday practices. Despite these insights, empirical research remains limited in explaining how IL capacities vary across employees and contexts during WFH. Building on this literature, we examine the prevalence of self-directed learning behaviours in remote work settings and propose the following hypothesis:

H2: Higher levels of individual motivation, self-discipline, and self-regulation are associated with stronger IL while WFH.

2.3 Team learning and collaboration in remote settings

Team learning (TL) depends on members' ability to share knowledge, coordinate efforts, and engage in collective reflection. In co-located teams, these processes often emerge through informal interactions, real-time problem-solving, and spontaneous feedback.

In remote work environments, however, such interactions become less frequent, increasing the importance of deliberate communication practices and supportive team climates.

A key condition for TL is psychological safety, defined as a shared belief that interpersonal risk-taking is acceptable within a team (Edmondson, 1999). When team members feel safe to express uncertainties, ask questions, and share ideas, collaborative learning becomes more likely. Prior research shows that psychological safety remains critical in distributed teams, where the absence of physical proximity may weaken informal feedback and trust-building processes (Newman et al., 2017; Zajac et al., 2022). In such environments, intentional practices become critical.

Trust and inclusiveness in globally dispersed teams must often be actively cultivated through structured interactions and explicit norms, rather than emerging spontaneously (Gibson & Gibbs, 2006). Leadership behaviours such as active listening and inclusive dialogue further support TL in technology-mediated environments (Lee & Edmondson, 2019), while digital collaboration tools can enable collective cognition when accompanied by norms of transparency and shared responsibility (Kirkman et al., 2002).

Recent work also conceptualises TL as a dynamic process unfolding over time. Edmondson and Harvey (2025) suggest that exploratory, exploitative, and reflective learning behaviours may produce different outcomes depending on their sequencing and contextual conditions. However, empirical evidence on whether TL can be sustained under conditions of physical distance remains limited. Existing studies often rely on conceptual or qualitative insights, leaving

open the question of whether psychological safety continues to support TL in distributed work settings.

To address this gap, we propose the following:

H3: In WFH settings, higher levels of psychological safety within teams are positively associated with TL.

2.4 Leadership and organisational learning

Leadership plays a pivotal role in shaping OL processes, particularly under conditions of uncertainty and change. Leaders influence not only strategic direction, but also the culture, routines, and relational dynamics that determine how knowledge is created, shared, and institutionalised. In the context of remote work, where informal learning channels are disrupted and coordination becomes more complex, the leader's role as facilitator and enabler of learning becomes especially salient.

Strategic leadership affects OL by creating the conditions for dialogue, feedback and experimentation, thereby shaping how new knowledge is interpreted and integrated into practice (Vera & Crossan, 2004). Transformational leadership further promotes collective learning by fostering vision clarity, individualised consideration, and intellectual stimulation – factors that sustain collective learning even in digitally mediated workspaces (Berson et al., 2015).

In virtual work settings, leaders also play a critical role in maintaining trust, ensuring information flows, and encouraging knowledge sharing across distributed teams (Collings et al., 2021). While leadership is frequently cited as a driver of OL, few empirical studies have examined which specific leader behaviours foster learning in remote and hybrid contexts. As OL during remote work is not a spontaneous outcome of adaptation, but a strategically enabled process shaped by leadership behaviour and communication practices, we propose the following:

H4: Leadership behaviours that support communication, trust, and shared reflection are positively associated with OL in WFH contexts.

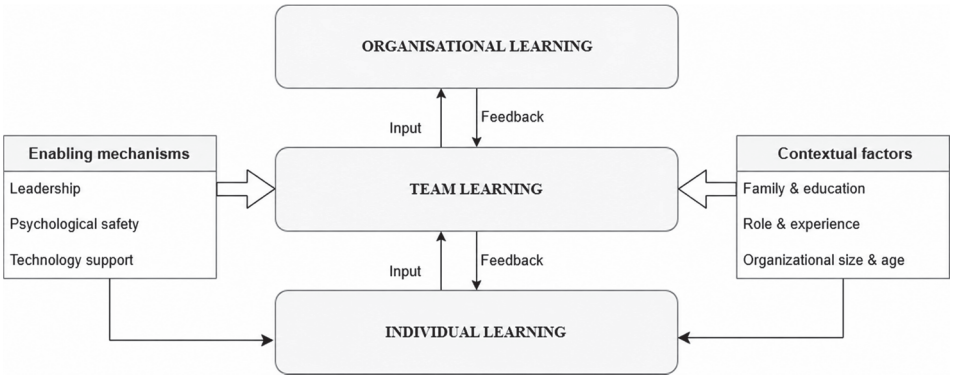
Building on the theoretical foundations discussed above, and in order to investigate whether and how contextual factors, such as demographic and organisational characteristics, influence IL, TL, and OL in organisations during transition to WFH, we propose two additional hypotheses:

H5: Demographic factors such as education, gender, and household composition (e.g., presence of children) significantly influence the intensity of IL, TL, and OL.

H6: Organisational characteristics such as company size, age, and maturity significantly influence the levels of learning across individual, team, and organisational domains.

Figure 1 summarises the conceptual framework guiding our analysis of learning across individual, team, and organisational levels in WFH settings.

Figure 1: Learning across levels in work-from-home environments



3. METHODOLOGY

In order to test the hypotheses, we conducted a quantitative study using a structured, self-administered questionnaire.

3.1 Research design and data collection

The survey was administered between late March and early May 2021 during a period when many organisations in Serbia had institutionalised WFH in response to the pandemic. The questionnaire was distributed online using Google Forms.

We collected a total of 2,171 valid responses. Participants were recruited using a convenience sampling approach, facilitated through university students enrolled in a research methodology course. Each student was instructed to randomly select at least five individuals from their personal social networks who had been working remotely since the onset of the pandemic-related shift. While the selection was randomised within each student's network, the broader sample reflects a non-probabilistic design, and caution should be applied when generalising findings beyond the study sample.

The inclusion criterion was that all respondents had already worked remotely for a time during the pandemic. The duration of WFH experience varied: 30% had been working remotely for more than one year, 23% between 6 and 12 months, 17% between 3 and 6 months, 21% for about 3 months, and 8% had just started WFH at the time of data collection.

The sample is diverse in terms of gender, age, education, occupation, and organisational context, allowing for a robust multilevel analysis of learning processes.

3.1.1 Gender and age

The sample comprises 60.1% women and 39.9% men. The age distribution is concentrated in the 25–34 age group (38.6%), followed by 45–54 (21.0%), 35–44 (19.6%), and 18–24 (13.4%). Participants over 55 years of age represent less than 8% of the sample.

3.1.2 Education and work experience

Over half the participants (50.3%) hold a bachelor's degree, while 23.3% have a master's degree and 2.9% hold a PhD. By comparison, 17.1% report high school as their highest educational attainment. In terms of professional experience, 20.5% of respondents report 10–20 years of experience, and 18.0% report 5–10 years. The distribution suggests a moderately experienced workforce.

3.1.3 Organisational characteristics

In terms of firm size, the largest segment of respondents works in medium-sized firms (44.0%), followed by small (30.1%) and large organisations (25.9%). A significant portion of the sample is employed by organisations that are more than

30 years old, particularly those established 30–50 years ago (36.5%). The largest group of respondents (44.2%) have been with their current organisation for fewer than 10 years.

3.1.4 Occupational roles and sectors

Experts (41.3%) and managers (34.0%) together make up the majority of respondents, followed by administrative staff (18.3%) and manual workers (6.4%). The private sector is the largest represented (48.6%), followed by public (27.2%) and multinational companies (21.3%). Only 2.9% are employed in joint ventures (JVs) or similar hybrid forms.

3.1.5 Household context

Nearly half the respondents (49.0%) report having no children, while 25.0% have two children and 21.1% have one child. Respondents are predominantly single (47.6%) or married (46.2%), with a small proportion divorced or widowed.

3.2 Measurement instruments

To assess learning at the team and organisational levels, we used the Learning Organisation Questionnaire developed by Marsick and Watkins (2003). This validated instrument captures employees' perceptions of how their organisation supports learning through systems, structures, and leadership practices. To measure IL, we employed the instrument designed by Fisher et al., (2001), which evaluates self-directedness, autonomy, and motivation for learning. This tool is well-suited for identifying readiness to learn in professional settings and has demonstrated good psychometric properties in prior research. All items were adapted for the WFH context and pilot-tested for clarity and internal consistency.

3.3 Data analysis

We applied both descriptive and inferential statistical techniques. Analyses included descriptive statistics for central tendencies and distributions, non-parametric methods, including the independent-samples Kruskal–Wallis test, to account for skewed distributions and ordinal-level data. All statistical tests were conducted at the 0.05 significance level unless otherwise noted. In this study, the term multilevel is employed in a conceptual rather than a statistical sense. It denotes the theoretical differentiation of learning processes across individual, team, and organisational levels, consistent with established frameworks in OL

research. The empirical analyses do not rely on hierarchical or multilevel modelling techniques, but instead examine patterns and differences across these conceptually defined levels using descriptive statistics, group comparisons, and nonparametric tests.

4. RESULTS AND DISCUSSION

4.1 Individual learning (IL) in WFH

Participants demonstrated high levels of self-management, intrinsic motivation, and self-regulation, indicating strong capacities for independent learning in WFH environments (see Appendix Tables 1-3). Key behaviours include autonomous planning, reflective learning, and readiness to seek help when facing challenges. These individual capacities, however, contribute to TL and OL only when supported by collaborative practices and organisational mechanisms, highlighting that IL alone is insufficient for cross-level learning.

4.2 Team learning in WFH

Perceptions of team learning were generally low, with limited engagement in collaborative reflection, mutual problem-solving, and team rewards (see Appendix Table 4). Freedom to adjust team goals was particularly constrained. These findings underscore that team dynamics serve as a critical bridge between IL and organisational outcomes. Without effective TL, even highly motivated individuals may not contribute to collective learning.

4.3 Organisational learning in WFH

Formal support for learning at the organisational level was relatively weak. Employees reported limited access to structured knowledge-sharing systems, continuous improvement practices, and rewards for learning (see Appendix Tables 5 and 6). Leadership support for learning was also perceived as relatively limited, although some leadership-related practices received slightly higher ratings than other organisational learning dimensions (see Appendix Table 7). These findings suggest that organisational structures and leadership behaviours may play an important role in enabling individual learning (IL) and team learning (TL) to translate into broader organisational outcomes during work-from-home transitions. High standard deviations indicate substantial variability among respondents, suggesting that experiences of working from home and

organisational adaptation depended on the characteristics of individual teams and organisations.

4.4 Multilevel interplay

Correlation analyses indicate strong interconnections between IL, TL, and OL (see Appendix Table 8). Employees with higher IL were more likely to engage in TL, and high TL corresponded with stronger perceptions of OL. Leadership, systemic support, and psychological safety emerged as key enabling mechanisms, facilitating the transfer of learning across levels. These findings demonstrate that IL, TL, and OL operate as a mutually reinforcing system, consistent with multilevel OL theory (Argote, 2012; Crossan et al., 1999).

4.5 Contextual and demographic influences

The results indicate that both sociodemographic and organisational factors are significantly associated with individual, team, and organisational learning dimensions during the transition to working from home (see Appendix Table 9). In particular, organisational characteristics appear to exert a stronger and more consistent influence on higher-level learning outcomes, highlighting the importance of organisational context in facilitating learning and adaptation in remote work environments.

The results of the Kruskal–Wallis test indicate that both sociodemographic and organisational factors significantly influence learning outcomes during the transition to working from home. Family-related variables, particularly the presence of children in different age groups, were primarily associated with dimensions of individual learning, whereas organisational characteristics, including ownership structure, business activity, organisational age, size, and employees' tenure, showed stronger and more consistent relationships with team and organisational learning dimensions. These findings suggest that while individual learning is shaped by employees' personal and family circumstances, higher-level learning processes depend more heavily on organisational context and structural conditions that support knowledge sharing and adaptation.:

1. Family obligations: The presence of young children negatively affects IL, self-management, and self-control, while employees with older children participate more effectively in TL and OL (see Appendix Table 9).

2. Education and occupational role: Higher education levels and managerial or expert positions correlate with stronger IL, TL, and OL perceptions, whereas administrative and manual roles show lower engagement and access to organisational support (see Appendix Table 10 and Table 11).
3. Work experience and organisational characteristics: Employees with minimal (< 1 year) or extensive (> 30 years) experience show the highest motivation and adaptation, while mid-career employees display slightly lower engagement (see Appendix Table 12). Younger organisations and smaller companies provide stronger support structures, whereas older and larger organisations, as well as public-sector entities, lag behind (see Appendix Table 13, Table 14, and Table 15).

5. IMPLICATIONS OF FINDINGS

Across all levels, leadership and structured organisational support are critical mechanisms that enable IL to generate team and organisational outcomes. Team collaboration mediates the translation of individual capacities into collective adaptation, while formal systems, continuous improvement, and psychological safety provide the infrastructure for sustainable learning. These results emphasise the need for strategically designed remote and hybrid work environments that link individual development with TL and OL goals.

5.1 Learning as a multilevel interdependent process

The results clearly demonstrate that learning in WFH and hybrid contexts operates as a multilevel system, where dynamics at one level influence outcomes at others. Table 8 presents the Pearson correlation coefficients among the study variables. All correlations are positive and statistically significant at the 0.01 level, indicating that higher levels of learning at one level are associated with higher levels of learning at other levels. Individual learning is strongly associated with its underlying dimensions, namely self-management (r = 0.929), wish to learn (r = 0.946), and self-control (r = 0.955), confirming the internal consistency of the construct.

Team learning is moderately to strongly related to organisational learning (r = 0.606), continuous learning (r = 0.478), organisational systems supporting learning (r = 0.540), and leadership support for learning (r = 0.537).

Organisational learning exhibits particularly strong associations with leadership (r = 0.940) and organisational systems supporting learning (r = 0.799), suggesting that organisational learning is closely linked to both leadership practices and organisational infrastructures that facilitate knowledge sharing and learning processes.

The correlations between individual learning and organisational learning (r = 0.261), as well as between individual learning and team learning (r = 0.301), are positive but moderate, indicating that learning at higher organisational levels depends not only on individual learning capabilities but also on collective and organisational mechanisms. Overall, the findings support the view that learning during the transition to working from home is a multilevel phenomenon involving interconnected individual, team, and organisational processes.

5.2 Descriptive findings reinforce this interpretation

Most respondents demonstrated high levels of intrinsic motivation and self-regulation, with particularly strong scores on items related to taking responsibility, personal standards, and confidence in one's abilities. This underscores the role of metacognitive capacity as a critical resource for navigating distributed environments. However, TL appeared more constrained: lower average scores and moderate variability indicated limited opportunities for shared reflection, feedback integration, and coordinated knowledge exchange.

At the organisational level, employees reported low perceived support for learning, especially in terms of formal structures. Informal peer support partially compensated for this gap, but key indicators such as open dialogue about mistakes and shared learning from problems were rated below the scale midpoint, suggesting the absence of a mature learning culture.

5.3 Individual factors that shape learning

Kruskal–Wallis tests revealed statistically significant differences in learning outcomes based on demographic and personal characteristics. Employees with higher education levels and longer tenure reported stronger learning engagement, particularly in self-regulation and motivation. Parents of young children faced greater barriers to IL at home, while those with older children reported higher engagement in TL and OL, suggesting that life circumstances

shape one's ability to participate in distributed learning processes. Employees in manual and operational roles, and those with lower formal education, consistently reported lower scores across key learning dimensions. These findings raise important equity concerns and call for tailored interventions that account for individual differences in capacity, access, and opportunity.

5.4 Organisational structures and contexts

The organisational context played a decisive role in shaping learning outcomes. Smaller organisations (under 50 employees) recorded the highest average values in all three dimensions – OL, systems, and leadership – likely due to more direct communication, interpersonal closeness, and flexible structures. In contrast, large organisations (over 500 employees) reported the lowest values, suggesting structural barriers such as hierarchy, depersonalised leadership, and slower adaptation to change. Medium-sized organisations (251–500 employees) displayed a modest rebound in support structures, perhaps reflecting deliberate efforts to formalise learning processes during organisational scaling.

Organisational age also mattered. Entities older than 50 years reported the weakest results across all learning dimensions, including leadership and continuous improvement, indicating institutional rigidity and resistance to change. By contrast, organisations aged 30–50 years showed stronger self-directed adaptation, even in the absence of formal support. These patterns suggest that both the size and life cycle stage of organisations affect their capacity to adapt and support employee learning during disruptive transitions. Public sector organisations lagged behind private and multinational firms in supporting learning, while employees in hybrid organisational forms (e.g., JVs) reported low motivation and self-management, likely due to ambiguous or poorly defined support structures.

6. CONCLUSION

This study examined how individuals in different organisations in Serbia adapted their learning practices during the abrupt shift to WFH. Anchored in OL and HRM theory, the study explored how learning unfolds across individual, team, and organisational levels under distributed work conditions, and identified cross-

level factors that either enable or constrain learning in such settings. From this cross-level analysis, several definitive conclusions emerge.

In sum, the findings show that individuals brought substantial adaptive capacity into the WFH transition, but that organisations often lacked the systemic infrastructure to support, align, and amplify those capacities. Learning in distributed work settings is not an isolated function of individual effort – it is a socially embedded, structurally conditioned, and leadership-dependent process. To make WFH and hybrid work sustainable, organisations must go beyond digital infrastructure and invest in structured learning environments, inclusive leadership practices, and a culture that frames disruption as an opportunity for collective development. A one-size-fits-all approach is unlikely to succeed. Instead, a differentiated learning strategy – responsive to individual circumstances, organisational maturity, and structural realities – is essential for fostering resilient and adaptive organisations in the post-pandemic world.

Theoretically, the study contributes to multilevel models of OL by providing empirical evidence of how learning propagates across levels in WFH and hybrid contexts. It reinforces the application of frameworks such as the 4I model, highlighting the recursive interactions between individual agency, team processes, and institutional structures. In contrast to Palenque and de Armas's (2023) level-specific approach, our multilevel framework empirically substantiates and expands upon their findings by revealing statistically significant correlations between individual, team, and organisational learning, demonstrating their mutual reinforcement in remote work settings.

In practical terms, the study offers useful guidance and effective strategies for organisations seeking to enhance learning in distributed environments: establishing robust digital collaboration norms; promoting a culture of inclusion and belonging that sustains meaningful remote work (Byrd, 2022); reinforcing trust and autonomy; strengthening leader–member exchange relationships; building more effective organisational systems for knowledge sharing; and designing HRM policies that are adaptive to organisational size, maturity, employee education, work experience, and family circumstances. Tailored support, rather than uniform solutions, appears essential to unlocking learning potential in diverse remote and hybrid settings.

This study makes several contributions to the literature on organisational learning and remote work. First, it provides a rare empirical analysis of learning processes across individual, team, and organisational levels during a period of abrupt transition to WFH, offering evidence of how learning dynamics unfold in practice under constrained conditions. Second, it advances the theoretical understanding of cross-level learning by integrating insights from the 4I model and identifying how factors such as leadership, psychological safety, and work-family conflict influence learning simultaneously across levels. Third, by focusing on the Serbian context – a non-Western, post-socialist environment – the study expands the geographic and institutional diversity of organisational learning research, which remains heavily concentrated in Western, high-resource settings. Finally, the findings offer actionable insights for managers and HR professionals seeking to strengthen learning capabilities in distributed and hybrid work systems, particularly in contexts where institutional support and digital readiness may be limited.

Several limitations to this study should be recognised. First, the study focused on a single national context, which may limit the generalisability of the findings. Second, both the sample size and cross-sectional design preclude causal inference. Additionally, we did not explore whether the identified demographic and organisational variables act as moderators or mediators in cross-level learning. Nor did we investigate how technological, cultural, industrial, or institutional contexts shape the success of learning across levels (Mak & Hong, 2020). Furthermore, learning was assessed using self-reported, perceptual measures, which may be subject to bias. Finally, this study focused only on WFH and not on other types of remote working; consequently, the conclusions and implications are limited to this specific working arrangement.

Future research could adopt longitudinal and multi-country designs, employ mixed methods, and incorporate objective indicators of learning processes to further deepen insights in different types of remote working settings.

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APPENDIX

Table 1. Descriptive statistics for the dimension of IL – self-management

	Plan	Prioritise	Self-disciplined	Time manage-ment	Organised	Management skills	Deadlines	Method	Systematic	Love to plan	Can be trusted to	Love to direct my learning
N	2,143	2,161	2,156	2,162	2,159	2,161	2,164	2,163	2,165	2,158	2,159	2,163
Missing	128	110	115	109	112	110	107	108	106	113	112	108
Mean	3.72	3.60	3.95	3.84	3.97	3.88	3.69	3.75	3.78	3.93	4.07	3.98
Standard deviation	1.22	1.21	1.19	1.22	1.19	1.14	1.18	1.11	1.14	1.18	1.16	1.13

Note: All variables are measured on a scale of 1-5

Table 2. Descriptive statistics for the dimension of IL – wish to learn

	Need to know why	Critical	Learn from my mistakes	Opened	Search for help	Evaluate	Enjoy learning	Have need to learn	Enjoy challenge	Facts	Control
N	2,157	2,157	2,163	2,163	2,163	2,164	2,164	2,163	2,160	2,161	2,166
Missing	114	114	108	108	108	107	107	108	111	110	105
Mean	3.9	3.75	4.06	4.19	4.09	3.71	3.64	3.74	3.81	4.11	3.72
Standard deviation	1.19	1.17	1.16	1.13	1.16	1.21	1.19	1.19	1.18	1.11	1.14

Note: All variables are measured on a scale of 1-5

Table 3. Descriptive statistics for the dimension of IL – self-control

	Focus	Logical	Evaluate	Performance	Responsible	Information	Decision making	Goals	Control	Expectations	Pers stand	Believe	Aware	Responsible
N	2,162	2,163	2,164	2,164	2,163	2,163	2,162	2,167	2,165	2,165	2,160	2,163	2,165	2,162
Missing	109	108	107	107	108	108	109	104	106	106	111	108	106	109
Mean	4.06	4.03	3.9	3.76	4.23	3.92	3.83	3.85	3.92	3.93	3.96	3.93	3.99	4.24
Standard deviation	1.1	1.12	1.15	1.21	1.1	1.15	1,17	1.15	1.17	1.15	1.17	1.15	1.13	1.11

Note: All variables are measured on a scale of 1-5

Table 4. Descriptive statistics for the dimension of TL – team learning

	Freedom to adjust	Team members equal	Focus	Discussion	Team Reward	React
N	2,168	2,160	2,168	2,167	2,163	2,167
Missing	103	111	103	104	108	104
Mean	1.90	2.59	2.30	2.11	2.05	2.07
Standard deviation	1.06	1.74	1.64	1.49	1.35	1.36

Note: All variables are measured on a scale of 1-5

Table 5. Descriptive statistics for the dimension of OL – continuous learning

	Discuss	Skills	Help	Coverage	Chance	Reward 2
N	2,166	2,169	2,161	2,169	2,167	2,167
Missing	105	102	110	102	104	104
Mean	2.28	2.3	2.65	2.08	2.25	2.21
Standard deviation	1.35	1.34	1.61	1.15	1.35	1.24

Note: All variables are measured on a scale of 1-5

Table 6. Descriptive statistics for the dimension of OL – organisational systems that support learning

	Communication	Information	Lessons
N	2,165	2,164	2,165
Missing	106	107	106
Mean	2.62	2.55	2.52
Standard deviation	1.56	1.62	1.54

Note: All variables are measured on a scale of 1-5

Table 7. Descriptive statistics for the dimension of OL – leadership

	Leaders support	Leaders share info	Leaders empower	Leaders are mentors	Leaders search to learn	Leaders respect values
N	2,166	2,166	2,166	2,166	2,166	2,166
Missing	105	105	106	104	104	106
Mean	2.33	2.39	2.47	2.51	2.45	2.52
Standard deviation	1.40	1.49	1.52	1.56	1.47	1.59

Note: All variables are measured on a scale of 1-5

Table 8. Correlation Matrix between learning dimensions

Variable	1	2	3	4	5	6	7	8	9
1. IL	1								
2. TL	.301**	1							
3. OL	.261**	.606**	1						
4. SM	.929**	.213**	.169**	1					
5. WL	.946**	.232**	.188**	.852**	1				
6. SC	.955**	.235**	.185**	.849**	.897**	1			
7. CL	.256**	.478**	.517**	.090**	.111**	.115**	1		
8. OLS	.226**	.540**	.799**	.160**	.152**	.164**	.426**	1	
9. LS	.236**	.537**	.940**	.145**	.176**	.165**	.478**	.546**	1

Note: IL = Individual Learning; TL = Team Learning; OL = Organisational Learning; SM = Self-Management; WL = Wish to Learn; SC = Self-Control; CL = Continuous Learning; OLS = Organisational Systems Supporting Learning; LS = Leadership Support for Learning. ** $p < .01$.

Table 9. Sociodemographic and organisational factors on learning dimensions

	BAB	SK	PSK	SSK	IK	E	O	WE	YO	OWN	BS	OA	OS
Individual learning	0.004	0.043		0.003		0.005	0			0.007			
Self-management	0.002			0.017		0	0	0.048		0.012		0.027	
Wish to learn	0.019			0.005		0	0			0.013			
Self-control	0.026	0.018		0.035		0.023	0			0.011			
Team learning			0.035	0.047				0.013	0.003	0.019	0.004	0.015	
Continuous learning				0.033		0.021		0.008	0.033			0.008	
Organisational systems			0.03								0.001		0.019
Leadership								0.003	0.006	0.046	0.022	0	0.001
Organisational learning			0.024				0.011	0.014	0.004	0.016	0	0.001	0.001

Note: BAB = babies; SK = young children; PSK = primary school children; SSK = secondary school children; IK = independent children; E = education; O = occupation; WE = work experience; YO = years in the organisation; OWN = ownership structure; BS = business activity; OA = organisational age; OS = organisational size. Reported values are asymptotic p-values from the Kruskal–Wallis H test. Differences were considered statistically significant at $p < .05$.

Table 10. The impact of education on the components of IL

Education	Individual Learning	Self-Management	Wish To Learn	Self-Control	Continuous Learning
I level	3.56	3.66	3.75	3.85	2.32
II level	3.67	3.85	3.85	3.95	2.32
III level	3.76	3.94	4.01	4.06	2.25
Total	**3.68**	**3.85**	**3.88**	**3.97**	**2.30**

Note: Education is grouped into three categories: Level I – primary and secondary education, Level II – tertiary education (Bachelor's degree), and Level III – postgraduate education (Master's and PhD degrees).

Table 11. The impact of occupation on the components of IL

Occupation	Individual Learning	Self-Management	Wish To Learn	Self-control	Organisational learning	Organisational Systems	Leader
Administration & Service	3.56	3.74	3.72	3.83	2.38	2.43	2.36
Manual	3.40	3.48	3.55	3.68	2.30	2.36	2.26
Manager	3.77	3.96	3.98	4.06	2.59	2.65	2.56
Expert	3.70	3.86	3.92	4.00	2.47	2.58	2.41
Total	**3.68**	**3.85**	**3.88**	**3.97**	**2.48**	**2.56**	**2.44**

Note: The mean values of the variables are shown

Table 12. The impact of work experience on the components of IL

Work Experience	Team Learning	Organisational learning	Self-Management	Continuous Learning	Leader
Up to 1 year	2.32	2.77	3.81	2.53	2.75
1–2 years	2.18	2.54	3.79	2.33	2.51
3–4 years	2.19	2.48	3.82	2.25	2.42
5–9 years	2.19	2.46	3.85	2.32	2.42
10–19 years	2.04	2.37	3.86	2.20	2.33
20–30 years	2.15	2.44	3.89	2.26	2.40
above 30 years	2.44	2.61	3.93	2.47	2.60
Total	**2.17**	**2.48**	**3.85**	**2.30**	**2.44**

Note: The mean values of the variables are shown

Table 13. The impact of ownership structure on the components of IL

Ownership	Team Learning	Organisational learning	Self-Management	Wish to Learn	Self-Control	Individual Learning	Leader
Public	2.07	2.37	3.80	3.84	3.89	3.62	2.33
JV and similar	2.16	2.57	3.50	3.58	3.58	3.37	2.48
MNC	2.22	2.57	3.96	4.01	4.09	3.78	2.54
Private	2.21	2.51	3.84	3.87	3.98	3.68	2.46
Total	**2.17**	**2.48**	**3.85**	**3.88**	**3.97**	**3.68**	**2.44**

Note: JV = joint venture; MNC = multinational company; The mean values of the variables are shown

Table 14. The impact of organisational age on the components of IL

Organisation Age (years)	Team Learning	Organisational learning	Self-Management	Continuous Learning	Leader
Up to 5	2.46	2.76	3.61	2.54	2.74
6–10	2.14	2.56	3.84	2.29	2.57
11–20	2.14	2.46	3.82	2.29	2.41
21–30	2.19	2.49	3.86	2.27	2.44
31–50	2.14	2.42	3.90	2.28	2.37
More than 50	1.99	2.04	3.80	1.94	2.05
More than 100	2.02	2.41	3.89	2.27	2.27
Total	**2.17**	**2.48**	**3.84**	**2.30**	**2.44**

Note: The mean values of the variables are shown

Table 15. The impact of organisational size on the components of IL

Size (employees)	Organisational learning	Organisational Systems	Leader
Up to 50	2.61	2.67	2.58
51–100	2.45	2.54	2.41
101–250	2.39	2.50	2.33
251–500	2.49	2.65	2.40
More than 500	2.41	2.46	2.39
Total	**2.48**	**2.57**	**2.44**

Note: The mean values of the variables are shown

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