

Is Romania's NRRP too good to believe?

A NUTS 2 Perspective

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Abstract. This paper uses a multiregional input output (MRIO) model to estimate the impact of the Romanian Recovery and Resilience Facility Plan (NRRP), as it was designed, on the Romanian economy. We develop an MRIO for the Romania's eight NUTS 2 regions, for 60 industries, using publicly available data and best-practice techniques. We construct the distribution of the impact across Romania's NUTS 2 regions and study the underpinning interregional effects. We estimate the employment effect by occupation and assess the extent to which NRRP could change the occupational distribution of Romanian labor. We find that if all the funds were absorbed as scheduled that the NRRP would have a strong effect on Romania's economy, growth of about 10%. All its NUTS 2 regions would benefit but not only would its more developed regions better retain the impacts of the funds originally allocated to them, but they would also absorb greater shares of the impact generated by funds allocated to the other regions. Roughly a quarter of the new jobs from the NRRP should be generated in high-skill occupations. This would amount to a rather radical occupational shift for the nation. The large, estimated impact of the program and its concentration in just few sectors and occupations suggests a strong likelihood that implementation of the NRRP will face absorptive capacity constraints.

1. Introduction and Background

The European Union's Recovery and Resilience Facility has two basic goals: (1) to mitigate the impact of the coronavirus pandemic and (2) to support reforms and investments aimed at making the economies of the EU member states more sustainable, resilient, and better prepared to undertake the green and digital transitions. To support these goals EU made available €723.8 billion in loans and grants over the six years through 2027.³ Member states

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³ European Commission. (2021). *Recovery and Resilience Facility Regulation*. Brussels: European Commission. European Union Recovery and Resilience Facility | EUR-Lex

prepared reform and public investment plans that addressed broad European and country-specific challenges in four areas: environmental sustainability, productivity, fairness, and macroeconomic stability.

The structure of the National Recovery and Resilience Plan (NRRP) submitted by Romania⁴ suggests three priorities: (1) green transition, the primary destination for 41% of the funds; (2) digital transformation, the primary destination for 20% of the funds; and (3) social and territorial cohesion, the primary destination for 6% of the funds and the secondary destination for 40% of the funds. In all three areas Romania's performance has been poor by the EU standards. The intended transition is proceeding at a glacial pace, Romania ranking 25th in the EU with respect to the Eco-Innovation Index.⁵ Despite a growing information and communication technology sector, the country ranks last in the EU by the Digital Economy and Society Index (DESI)⁶. Meanwhile the nation's interregional economic disparities are among the largest in the EU. Seven of the country's eight NUTS 2 regions have per-capita income between 34% and 57% of the EU average, while the capital Bucharest has a per-capita income of 136% of the EU average.

The Romanian NRRP stood out in several respects. First, the amount requested was large in absolute terms (€29 billion, 6th highest), relative to GDP (12.5%, second highest), and relative to the amount of EU funds Romania absorbed during the six years ending in 2022, the amount was roughly 30% higher. Second, the loans share of the total funds requested was very high, 51.2%. Only 7 of the 27 member states requested loans and among them only Italy requested NRRP funds with a higher share in a form of loans than did Romania, 64%. Finally, Romania's plan was highly complex. It consisted of 507 milestones and targets, a close second to Italy's 520, and yet 2.5 times the median of all EU member states. Of Romania's 507 milestones and targets, 215 were reforms, the highest number among all member states, roughly three times the median number of reform measures across the EU.

From the start, the combined magnitude and complexity of the plan made it doubtful that Romania's economy could absorb the funds, given the six-year horizon of the program. Receiving the funds was conditioned by a deep, multi-dimensional reform of the nation's public administration. The reforms were arguably necessary but lacked broad political support. Multiple intervening reshufflings of the ruling coalition further eroded the little

⁴ European Commission. (2021). *Romania's Recovery and Resilience Plan*. Brussels: European Commission. [Romania's recovery and resilience plan - Reforms and Investments](#)

⁵ European Commission. (2021). *Eco-Innovation Index 2021*. Brussels: European Commission. [RTD - EU Eco-Innovation Index 2021](#)

⁶ European Commission. (2021). *Digital Economy and Society Index (DESI) 2021: Romania*. Brussels: European Commission. [Digital Economy and Society Index \(DESI\) 2021 | Shaping Europe's digital future](#)

support that originally existed. Given the program's relatively short time horizon and its performance-based structure founded on the fulfillment of pre-agreed targets and milestones suggests that a large share of Romania's NRRP request for funds will be ineligible for invoicing.

The reform commitments and the difficulty of implementing them notwithstanding, the Romanian NRRP is a major public investment relative to the nation's annual GDP. The concentration of the investment into several key sectors—construction, professional services, information and communications—further suggests that the capacity of the nation's labor force is likely a prime constraint on country's ability to absorb the funds. This dampens prospects of the fulfilment of the NRRP's national economic potential. Previous literature (e.g., Presbitero, 2016, Gurara et al., 2020) shows that ramping up public investment too much and too fast can lead to inefficient outcomes because the recipient country might lack capacity (in terms of skills, institutions, and management) to execute otherwise well-intentioned plans. The literature further suggests that coordination of many projects requires a set of technical and managerial resources that are difficult to expand in the short run. In the absence of such resources, costs of inputs are often unnecessarily inflated and both a local shortage of needed skills and deficiencies in the country's institutional framework raise the marginal cost of investment governance. Investment booms are particularly precarious in this regard.

Further complicating the analysis, the loan/grant ratio varies substantially across the components of the NRRP budget. With Romania facing the looming possibility of losing some these funds, it would be good to establish a hierarchy of priorities across components of the NRPP so the that those funds that are spent can best benefit the nation's economy.

The broad goal of this paper is to provide an assessment of the impact of the NRRP plan on the Romanian economy. To this end, we develop a 60-industry multiregional input-output (MRIO) model for Romania's eight NUTS 2 regions. Using it, we study the interregional effects of the potential economic impacts of the requested NRRP funds within the nation. This approach enables us to estimate the demand that the NRRP will place on jobs by occupation and, hence, to assess the extent to which the NRRP is likely to change the occupational composition of Romania's labor market. We then suggest how Romania might streamline the NRRP program and design future similar programs that better absorb public investment funds and more effectively contribute to territorial cohesion.

2. A NUTS 2 MRIO Model for Romania

A main assessment is an MRIO model of Romania's economy comprised of eight NUTS 2 regions each with 60 industries. We use publicly available data from TEMPO, the Romanian Institute of Statistics on-line database. We extracted information not only on national input-

output (IO) tables but also on industrywise NUTS 2 regional data on gross domestic product, employment, wages and household expenditure. We proxy intra- and inter-regional transportation costs using travel times within and between regions. We apply techniques detailed by Boero, Edwards & Rivera (2017) to jointly estimate regional IO tables and interregional trade flows within an integrated framework. Both structures are further constrained by applying the data above on each region's industry value added and household consumption, the best practice as identified by de la Torre Cuevas et al. (2026). Appendix A details our approach to building this MRIO.

The Romanian NUTS 2 regions are North-West, Center, North-East, South-East, South-Muntenia, Bucharest-Ilfov, South-West Oltenia, and West. Considerable regional heterogeneity characterizes the Romanian economy. Bucharest-Ilfov is the dominant economic center: it has the highest employment-to-population ratio (86.3 percent) and the highest average wage (135.2 percent of the national average), and it accounts for disproportionately large shares of national output, value added, and labor income (26.8-29.9 percent). At the other end of the spectrum, the North-East, South-East, South-Muntenia, and South-West regions have employment-to-population ratios between 50 and 60 percent, average wages of 85-88 percent of the national average; their shares of output, value added and earnings range between 6.8-7.8% for South-West and 9.9-12.5% for South-Muntenia. Summary regional statistics are reported in Table MRIO 1. Figure MRIO 1 shows the regional structure of Romania, the NUTS 2 regions, the counties (NUTS3 regions), the capital of each county and the main centers of each NUTS 2 region

3. Allocating the NRRP

Our objective is to estimate the impact of the Romanian NRRP, as initially designed, on output, value added, employment, earnings, and occupational structure, and to examine the regional distribution of these effects across Romania's NUTS 2 regions. As a first step of the analysis, we develop a means of allocating NRRP funds across sectors and regions.

Romania's National Recovery and Resilience Plan has 15 components (C1–C15), grouped into six pillars: green transition; digital transformation; smart, sustainable, and inclusive growth; social and territorial cohesion; health, economic, social, and institutional resilience; and policies for the next generation. The plan is rather complex, supporting an extensive reform agenda. It contained 507 milestones and targets, second only to Italy's 520 and approximately 2.5 times the median across EU member states. Of these, 215 are reforms, the highest number among all member states and roughly three times the EU median.

The Romanian NRRP budget has 152 line items: 127 are investments and 25 are reforms. Items are financed either through grants or loans. The total requested amount, €29

billion, is the sixth largest among EU member states. Relative to Romania's 2022 GDP, the scale of the plan was exceptionally large, amounting to 12.5% of GDP – the second-highest ratio in the EU. The requested amount was also approximately 30% larger than the total EU funds absorbed by Romania during the previous 6 years period, 2017-2022. The share of loans in total financing was similarly high, at 51.2%. Only seven member states requested loans under the facility, and only Italy recorded a higher loan share (64%).

Table 4 presents the structure of the NRRP budget by component. For each component (C1–C15), the table reports the number of measures, total allocated funds, the component's share in the total budget, and the share financed through grants. The table also distinguishes between investment and reform measures by reporting, separately for each category, the number of items, allocated funds, and grant shares.

Overall, about half of the NRRP budget is financed through grants, although the grant share varies substantially across components. The number of reform measures and the share of resources allocated to them also differ considerably, reflecting variation in implementation complexity across components.

The NRRP monies concentrate on fixing historically underperforming areas of Romania's economy. Together, four underperforming areas account for 56% of NRRP funds: sustainable transportation (C4, 26.1%), education (C15, 12.4%), support for private-sector R&D and competitiveness (C9, 8.8%), and health (C12, 8.4%).

To allocate the 152 NRRP measures across sectors and NUTS 2 regions, we employ a two-step procedure. First, we distribute funds across the 60 section- and division-level sectors in the MRIO framework. Second, we distribute these sector-specific allocations across the eight NUTS 2 regions.

3.1. Sectoral Allocation

In this stage, we apply BenDor et al.'s (2015) sectoral shares for items included in component C2 (Forests and Biodiversity) related to ecological restoration. For remaining items, we identify up to five relevant sectors for each item and distribute funds across them proportionally to sectoral value-added shares. As an illustration, consider the two items with the largest budget allocations – both under component C4 (Sustainable Transportation): (i) *Modernization and renewal of railway infrastructure* (€3,480 million, 11.9% of the total budget, fully grant-financed) and (ii) *Development of sustainable highway/road infrastructure* (€3,095 million, 10.6% of the total budget, fully loan-financed). For both items, the relevant sectors are construction, professional services, and manufacturing. Based on sectoral value-added shares, the resulting allocation is 61.5% to construction, 30.4% to professional services, and 8.1% to manufacturing.

3.2. Regional Allocation

In this second stage, we distribute sectoral allocations derived above across the eight NUTS 2 regions using each region's share in sectoral value added. Table 5 reports the results by sector and region. Although the underlying allocation is performed at the item and 60-sector level, the table presents a more-aggregated rendition. Note that sectoral allocations vary substantially across components. Overall, approximately 90% of total funds are concentrated in four sectors: construction (43.3%), professional services (31.4%), manufacturing (8.2%), and information and communications (7.8%).

At the regional level, Bucharest–Ilfov receives the largest share of allocations (38.7%), while the remaining regions receive shares ranging from 10.9% in the North-West region to 6.0% in the South-West region. The regional distribution also differs substantially across sectors. Bucharest–Ilfov receives particularly large shares of allocations directed toward finance and insurance (62.4%), professional, scientific, and technical services (58.8%), administrative and support services (51.9%), and information and communications. Funds allocated to construction, manufacturing, or agriculture are more evenly distributed across regions.

4. Results

Using the MRIO model we estimate the impact of the NRRP across four standard indicators: output, value added, earnings, and jobs. We now analyze how the NRRP's net effects are distributed across sectors and NUTS 2 regions of Romania. We also quantify the magnitude of interregional spillovers. In addition, by mapping sector- and region-level employment changes to occupations, we assess the extent to which the NRRP could drive an occupational transition in Romania's labor markets.

Our baseline estimates are constructed as disaggregated as possible (15 plan components, 60 sectors, 8 regions, and 95 occupations). Full results are reported in Appendix Tables B1-B5. For ease of exposition, the discussion below focuses on aggregated results (19 sectors and 22 occupations). Impacts are reported in absolute terms, as well as relative to 2022 (the base year) and relative to total investment.

The analysis relies on three key assumptions: (1) full absorption of funds within the program period; (2) efficient regional allocation of funds based on regions' shares of sector-specific value added; and (3) perfectly elastic factor supply, implying that investments can be absorbed without changes in factor prices.

4.1. Aggregate

Under the above assumptions, the NRRP would have a strong effect on the Romanian economy. As shown in Table 6, total investments of €29.2 billion are estimated to generate

€69.2 billion in output (10.2% of 2022 output), €25.7 billion in value added (10% of 2022 GDP), and €9.8 billion in earnings (9.8% of 2022 earnings). The employment effect amounts to approximately 635,000 person-years (full-time equivalent jobs), corresponding to 9.4% of 2022 employment.

These effects are large relative to Romania's historical growth performance. Between 2013 and 2019, average annual GDP growth was 4.6%, the second highest growth rate after the country's accession to the EU. Since the COVID-19 pandemic, GDP growth slowed considerably, 2.7% in 2023, 1.8% in 2024. The NRRP's cumulative impact of 10% over six years corresponds to an average annual growth rate of about 0.7%. This represents 14.5% of average GDP growth (2013–2019) and 25%-39% of GDP growth during the post-pandemic slowdown. Moreover, averaging over the full program period undoubtedly understates its peak effects, i.e., such programs are inevitably implemented unevenly over time.

4.2. By Plan Component

Table 7 presents impacts by plan component. For each component, we report absolute effects, shares of total impact, and impact relative to investment.

Components' shares of total impact broadly mirror their shares of total funding. However, impact relative to investment varies with both sectoral and regional allocation.⁷ Components allocating larger shares to construction, manufacturing, and agriculture – such as Forests and Biodiversity (C2), Renovation Wave (C5), Local Development Fund (C10), Water Management (C1), and Sustainable Transportation (C4) – exhibit higher output/investment, employment/investment, and value-added/investment ratios, but lower earnings/investment ratios.

Conversely, components focused on professional services – such as Governance (C14), Fiscal and Social Security Reform (C8), Digital Transformation (C7), and R&D Support (C9) – show higher earnings/investment ratios and lower output-/investment, value added/investment, and jobs/investment ratios. Additionally, components allocating larger shares of funding to Bucharest-Ilfov tend to generate higher earnings impacts but lower output and employment effects. Controlling for the sectoral distribution of funds, components that allocate greater shares of funds to Bucharest-Ilfov have relatively higher

⁷ NOTE: We conduct principal component analysis (PCA) of the four measures of impact-to-investment across plan components. The first component explains 54% of the variation across plan components and gives higher values to components that have relatively higher output/investment, employment/investment, and value added/investment ratios and lower earnings to investment ratios. We also conduct separate PCAs for the components' distribution of funds across sectors and across regions. We estimated a linear regression model of the first component from the analysis of impact relative to investment on the first component of the PCA of fund allocation. The sectoral and regional distribution capture 85% of the variation in impact relative to funds across plan components, indicating that allocation patterns are prime drivers of impact differences.

earnings/investment ratios and relatively lower output/investment, value added/investment, and jobs/investment ratios.

4.3. By Sector

Table 8 reports sectoral impacts in absolute terms, as shares of total impact, and relative to 2022 sectoral values. The largest effects occur in sectors receiving the most funding – Construction, Professional Services, Manufacturing, and Information and Communications. Relative to the 2022 levels of the relevant measures, impacts amount to 23% for Construction, 40% for Professional Services, 8% for Manufacturing, and 12% for Information and Communications.

These magnitudes are comparable to historical growth rates during peak periods. For example, Professional Services grew at an average annual rate of 8.3% between 2013 and 2019; the 40% cumulative increase over six years generated by NRRP implies an annual growth rate of 2.6% (31% of historical growth for Professional Services). For Construction, the historical growth rate was 2%, compared to an estimated annual NRRP impact of 1.5% (38% of historical growth)

4.4. By Romanian Region

Table 9 presents impacts by NUTS 2 region. All regions benefit, and the distribution of impacts broadly follows the allocation of funds. Because funds are allocated based on regional shares of sectoral value added, the distribution of value added and earnings closely mirrors funding patterns. Output and employment effects are more evenly distributed, with Bucharest-Ilfov capturing relatively smaller shares in these dimensions.

Relative to 2022 levels, impacts are substantial across all regions. In Bucharest-Ilfov, the richest region, impacts are 13.3% for output, 12.9% for value added, 12.7% for earnings, and 12.2% for employment. In other regions, impacts range between 8% and 9.5% for the 2022 levels. This suggests that the NRRP is likely to widen existing regional disparities.

The ratio of impacts relative to funds received varies significantly. Bucharest-Ilfov and the North-East show the lowest returns, while the West, Center, and South-Muntenia show the highest. These differences reflect, in part, the sectoral allocation of funds across regions. Bucharest-Ilfov receives a greater share of the funds allocated to Professional Services, a sector with higher wages, this naturally reduces its employment impact potential for a fixed funding amount. West, Center, and South-Muntenia receive relatively larger shares of the funds allocated to Manufacturing, a sector that yields greater output and employment impacts.

4.5. Interregional Spillovers

A second determinant is each region's ability to retain the effects of the own funds and capture the effects of funds allocated to other regions. While the regional distribution of impacts generally follows the distribution of funds, we find substantial interregional spillovers of net impacts. Table 10 shows the share of impacts by economic measure generated by funds originally allocated to a region that is captured by that region as well as the shares of its impacts transmitted to other regions via intra-national supply chains.

Bucharest-Ilfov captures the highest shares of the impact of own funds (52.76% of output, 55.9% of value added, 56.96% of earnings, and 44.75% of employment). This region also captures large shares of the effects of investments made in the other regions. Spillover patterns vary by impact measure and geographic proximity.

The degree to which regions transfer impact to Bucharest Ilfov depends on the impact measure as well as on the regions' geographic proximities to Bucharest. All regions tend to retain relatively larger shares of the employment and output impacts and transfer to Bucharest-Ilfov relatively larger shares the value added and earnings impacts. This suggests that higher-paying jobs and recipients of property-type income (e.g., profits) tend to locate in Bucharest-Ilfov.

More remote regions (North-West, North-East, West) retain greater shares of the impact of their own funds, while regions surrounding Bucharest-Ilfov (South-Muntenia, South-East) have greater rates of transfer to and from Bucharest-Ilfov. For example, for North West, the share of the impact induced by the funds allocated to the region generated in the region is 24.87% for output, 24.10% for value added, 25.79% for earnings, and 26.19% for employment; the shares of impact generated in Bucharest-Ilfov are 24.27% for output, 27.16% for value added, 27.37% for earnings, 19.69% for employment. For South-Muntenia, the region surrounding Bucharest-Ilfov, the share of the impact induced by the funds allocated to the region generated in the region is 14.12% for output, 14.47% for value added, 12.71% for earnings, and 14.13% for employment; the shares of impact generated in Bucharest-Ilfov are 28.62% for output, 30.98% for value added, 31.82% for earnings, 23.93% for employment.

Table 11 shows the net interregional spillovers in absolute terms. The values in the table indicate the difference between the effect induced by investment allocated to the row region produced in the column region and the effect induced by funds allocated in the column region produced in the row region. A positive value indicates that the column region is the net beneficiary of the bilateral interregional spillovers generated by the plan. The total net transfers are shown both in absolute terms and as a percentage of the total effect generated in the column region.

These net transfers are determined, on the one hand, by each region's capacity to absorb a large share of the impact generated by the funds and, on the other hand, by the share of funds received. Bucharest-Ilfov receives a large share of the funds (38.7%). Even though it retains a large share of the impact and absorbs relatively large shares of the impact generated by funds allocated to the other regions, in terms of net transfers, Bucharest-Ilfov is a net contributor with respect to output and employment and net beneficiary, albeit marginal, with respect to value added and earnings. The regions that benefit the most from the interregional spillovers are West, Center, North-West, and South-Muntenia. At the other end of the spectrum, North-East, the most remote region of the country, has negative net transfers with all the other regions for all dimensions of impact, with one exception, a positive transfer of impact with respect to employment from Bucharest-Ilfov.

4.6. Employment by Occupation

We map the sector-specific employment impact of NRRP into occupations. Table 12 shows the employment impact by occupation. We show the number of person-year, full-time jobs at the average sector- and region-specific wage generated by the NRRP, the occupations' shares and the impact relative to the equivalent measure of employment for 2022.

Approximately 60% of NRPP-generated jobs in low-skilled occupations: construction/extraction (14.9%), office and administrative support (13%), production (9.6%), sales (8.6%), transportation and material moving (8.6%), and installation, maintenance and repair (5.6%). High-skill professional services occupations account for roughly 26% of the new jobs: business and financial operations (8.3%), management (7.4%), computer and mathematical (4.3%), architecture and engineering (3.3%), legal (1.4%), science (1.2%).

The impact relative to the equivalent measure of employment for 2022 is very high in the high-skill, professional services occupations: 25.1% for legal services, 15.8% for architecture and engineering 14.1% for science, 13.3% for business and financial operations, 12.5% for computer and mathematical, 9.7 for management. Among the low skill occupations, the largest relative gains occur in construction and extraction 21.9%, office and administrative support 10.2%, installation, maintenance and repair 10.1%.

The more detailed results for 95 occupations (Appendix Tables 4 and 5) reveal particularly strong effects in forestry-related occupations (25.5% increase) and in specific technical roles such as architects and surveyors (27.6%), reflecting the large shares of funds allocated to forestry and logging through the C2 component of NRRP, Forests and biodiversity, and to construction (43% of all NRRP the funds).

4.7. Occupation by Region

Table 13 and Figure 3 show the regional distribution of the employment impact by occupation. Bucharest-Ilfov receives 38.7% of the funds and accounts for 28.6% of all new jobs generated by NRRP.

The degree to which job creation is concentrated in Bucharest-Ilfov varies greatly across occupations. For many of the high-skill professional services occupations, the employment impact is disproportionately concentrated in Bucharest-Ilfov. The share of new jobs generated in Bucharest-Ilfov is 47.7% for legal occupations, 43.1% for computer and mathematical, 39.2% for business and financial operations, 37.6% for science, 32.5 for architecture and engineering, 32.4% for management. For the low-skill occupations, the employment impact is more uniformly distributed across occupations. The share of new jobs generated in Bucharest-Ilfov is 24.6% for construction & extraction jobs, 23.6% for installation, maintenance and repair, 21.2% for transportation and material moving, 14.5% for production, and 8.4% for farming, fishing and forestry.

Our results suggest that NRRP is likely to reshape the occupational structure of the Romanian economy in two ways. First, NRRP is likely to shift the occupational composition of jobs substantially nationwide. This is because high-skill occupations comprise a large share of the overall employment impact of the NRRP, and the impact relative to the base employment in 2022 is quite high in these occupations. Second, NRRP will enhance the pre-existing concentration of the high-skill occupations in Bucharest-Ilfov. While job impacts relative to the base year are greater in these occupations for all regions, the effect is nearly twice as strong in Bucharest-Ilfov.

5. Conclusions

This paper uses an MRIO model to estimate the impact of the Romanian Recovery and Resilience Facility Plan (NRRP), as it was designed, on the Romanian economy. Our prime aim is to estimate the employment effect by occupation so we can assess the extent to which the NRRP might change the occupational composition of Romania's labor market.

We find that if all the funds were absorbed during the program's relatively short window of time, the Romanian NRRP would have a strong effect on the Romanian economy. The impact is especially large in several key sectors: professional services, construction, administrative and support services, mining and extractive industries, water and waste management, utilities, finance and insurance, information and communication. All regions benefit. Indeed, for all regions the impact is large relative to the relevant measures of economic activity. There are intense interregional transfers, and more developed regions have a higher ability to retain the impact of the funds originally allocated to them and absorb

the impact generated by funds allocated to the other regions. This suggests that any NRRP intentions to enable interregional economic convergence are likely to be thwarted.

Roughly a quarter of the new jobs will be generated in high-skill occupations – business and financial operations, management, computer and mathematical, architecture and engineering, legal, science. This suggests that the plan could generate substantial occupational shifts.

The relative size of the impacts compared to the size of the regional economies indicate that these occupations would have to expand at previously unattained rates; indeed, the nation's absorptive capacity of NRRP funds is very likely to disable successful implementation of the plan in its entirety. Recent developments in the execution of the plan confirm our concerns. Romania just renegotiated its NRRP. The revisions reduce the fund total by 27% from €29.18 billion to €21.41 billion; perhaps wisely, they preserve access to all full non-refundable grants and reduce the loan component. Still, with a year left in the plan, roughly only 40% of even this reduced set of funds has been absorbed.

The detailed analysis of the Romanian NRRP, of which this study is only a first step, offers valuable guidelines for the optimal design of any future, comparatively large public investment plans for the nation. First, such programs should be designed such that the fund total and the pace of spending them should be within the limits of the nation's absorptive capacity, perhaps measured by the country's previous experience with EU funds absorption. Second, when preparing the plans we suggest that a detailed multiregional analysis should be performed to help anticipate occupational effects in each Romanian labor market. Such an analysis could help policymakers finetune how funds are distributed across sectors and regions so funds can enable Romania to attain desired program outcomes. That is, the analysis could help policymakers by pointing out unrealistic assumptions, particularly about the rate at which necessary resources could expand.

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APPENDIX A: A NUTS 2 MRIO FOR ROMANIA

A1. National IO Accounts

Romania's national accounts are constructed using two data sources: the national input-output table (NIOT)⁸ and the resources-uses balance table.⁹ The NIOT is a symmetric commodity-by-industry matrix. Data on transactions are in current producers' prices for 88 sectors, the division level as defined in the NACE Rev. 2 classification system (European standard classification of productive economic activities). Commodities are classified using the CPA system (European Classification of Products by Activity), which organizes products according to industrial origin. Value-added contains compensation of employees, taxes on production, subsidies, gross operating surplus, and mixed income. We use data for 2022, the most recent year available as we undertook this research.

Romania's resources-uses balance table provides information by commodity for the same 88 sectors. The resources section reports output, taxes on products, trade and transportation margins, subsidies, imports, and redistribution of market output of institutional sectors with non-market output. The uses section reports intermediate demand, final consumption expenditure, gross fixed capital formation, change in inventories, net acquisitions of valuables, and exports.

To reconcile the data in the NIOT with final demand components, we incorporate the redistribution and trade and transportation margin columns into the corresponding rows of the input-output matrix, and we add the transposed taxes and subsidies columns to the corresponding rows in the value-added block. Following these adjustments, total output, imports, exports, and final demand are fully consistent across the two data sources.

A2. Estimating Regional IO Accounts

To regionalize the national accounts, we use both survey and nonsurvey data. Data on regional employment and wages are obtained from the Annual Labor Cost Survey (ALCS)¹⁰. We use data for 2022 on the average number of employees¹¹ and average monthly nominal

⁸ Table CON111D - Input-Output table, production account and generation of income account by industries - uses by products and by activities of the national economy - current prices - ESA 2010 - NACE Rev.2 INNSE [TEMPO Online](#)

⁹ Table CON111A - Input-Output table, balance resources-uses by products - current prices - ESA 2010 - NACE Rev.2 INNSE [TEMPO Online](#)

¹⁰ ALCS uses a sample of about 28000 establishments of all sizes from both public and private, civilian sector. Establishments with 50 or more employees are exhaustively surveyed. Public sector entities are exhaustively surveyed. Data on local public administration units are collected separately using a sample representative at county level.

¹¹ Table FOM104F - Average number of employees by economic activities at level of CANE Rev.2 (section and division), sex, macroregions, development regions and counties, INNSE [TEMPO Online](#)

gross earnings¹² to construct regional payroll by sector. Data on employment and wages are available for 59 sectors at both the section level (12 sectors) and division-level (47 sectors). Table A1 shows, by section, the level of aggregation at which wage and employment data are available.

The procedure detailed below yields an initial unbalanced regional transactions matrix. It contains, for each commodity and region, total supply (regional output plus imports) and total demand (intermediate demand, final demand, and exports).

A2.1 Output

We estimate regional industry output using sector-specific regional shares of national labor income, an approach proposed by Lahr (2001). Regional labor income is constructed from ALCS employment and wage data for the 60 industries included in the model.

A2.2 Value added

Regional value added is estimated using regional gross domestic product (RGDP) data combined with regional payroll information. RGDP is available at the 10-category, high-aggregation level. The 10-category RGDP data group the 20 NACE sections as follows:

- (1) Agriculture, forestry, and fishing (section A)
- (2) Mining and quarrying; manufacturing; electricity, gas, steam, and air conditioning production and supply; water supply; sewerage, waste management, and decontamination activities (sections B, C, D, E)
- (3) Construction (section F)
- (4) Wholesale and retail; repair of motor vehicles and motorcycles; transport and storage; hotels and restaurants (sections G, H, I)
- (5) Information and communication (section J)
- (6) Financial intermediation and insurance (section K)
- (7) Real estate activities (section L)
- (8) Professional scientific and technical activities; activities of administrative services and of support services (sections M, N)
- (9) Public administration and defense; social insurance of public sector; education; health and social assistance (sections O, P, Q)
- (10) Shows, culture and recreation activities; repair of household goods and other services (sections R, S)

¹² Table FOM107E - Average monthly nominal gross earnings by economic activities at level of CANE Rev.2 (section and division), sex, macroregions, development regions and counties, INNSE [TEMPO Online](#)

As per Lahr (2001), within each aggregate category, we use sectoral shares of the more aggregated sector's regional payroll to allocate value added across the corresponding industries of the region.

A2.3 Final demand components

A2.3.1 Household consumption expenditures

We obtained regional household expenditures data from the Household Budget Survey (HBS), which reports average monthly household expenditure by NUTS 2 region across thirteen categories of goods and services¹³: (1) Food and non-alcoholic beverages; (2) Alcoholic beverages and tobacco; (3) Clothing and footwear; (4) Home furniture, appliances, maintenance; (5) Housing and utilities; (6) Transportation; (7) Hotels and restaurants; (8) Communications; (9) Education; (10) Health; (11) Financial & Insurance; (12) Recreation and Culture; (13) Other goods and services. Household expenditure includes both monetary expenditure and the imputed value of consumption from own production.

To each of the 88 commodities in the national accounts we assign one of the categories available in the HBS. Regional average household expenditure for that category, weighted by the population size, is then used to regionalize household consumption by commodity.

A2.3.2 Capital formation, inventories, exports, and imports

Informed by de la Torre Cuevas et al. (2026), we regionalize gross fixed capital formation and changes in inventories using regional shares of sectoral value added. Exports are allocated across regions according to sector-specific regional output shares.

Regional imports are estimated using each region's share of total demand, defined as the sum of intermediate and final demand. The derivation of regional intermediate demand is described below.

A2.4 Regional demand

Assuming identical production technologies across regions, we estimate regional demands by applying columnwise national technical coefficients to our industry estimates of regional output and then summing across intermediate and final demand components.

¹³ Table BUF108J - HBS Monthly averages of total expenditure per household by expenditure categories and main social categories by macroregions and development regions, INNSE [TEMPO Online](#)

A3. Estimating Interregional Trade

We estimate interregional trade flows using a stochastic gravity-type allocation procedure, as per Boero, Edwards & Rivera (2017). in which trade probabilities depend on transportation costs. As is standard in the literature (see, e.g., Yotov, 2022; Lahr, 2026), we proxy transportation costs by travel time (in minutes). We assume that trade costs increase with distance and that the probability of trade between two regions declines accordingly.

We use travel times both between principal urban centers of the eight NUTS 2 regions and within each region between the regional center and the county capitals. For each region, the ratio of average intra-regional travel time to bilateral interregional travel time is computed and normalized such that trade probabilities sum to one:

$$t_{ij} = \frac{d_{ii}/d_{ij}}{\sum_{j=1}^R d_{ii}/d_{ij}}$$

where d_{ii} denotes average intra-regional travel time and d_{ij} denotes travel time between regions i and j . The resulting normalized ratios are interpreted as bilateral trade probabilities.

Tables A2 and AA3 show the travel-time matrix, the associated trade probabilities. Figure A1 shows the relationship between bilateral trade probabilities and transportation costs.

The allocation procedure is performed iteratively by commodity. At each iteration, regions simultaneously allocate demand orders and supply offers across trading partners according to the estimated trade probabilities. Let D_{ij} denote the quantity demanded by region i from region j , and S_{ji} the quantity supplied by region j to region i . Matched flows are determined as:

$$M_{ij} = \min (D_{ij}, S_{ji})$$

Matched quantities are subtracted from residual regional supply and demand, and the allocation process is repeated iteratively until all commodity flows are exhausted. The resulting matrix provides a complete allocation of interregional trade flows consistent with regional supply and demand constraints.

Table 1. Region Characteristics in 2022

	North- West	Center	North- East	South- East	South- Muntenia	Bucharest- Ilfov	South- West	West
Output	12.7%	12.8%	9.1%	9.5%	12.5%	26.8%	6.8%	9.7%
Value added	12.1%	10.8%	10.1%	9.7%	11.5%	29.1%	7.8%	8.8%
Earnings	13.1%	11.6%	10.1%	9.1%	9.9%	29.9%	6.8%	9.5%
Employment*	13.9%	12.6%	11.4%	10.8%	11.3%	22.1%	7.9%	10.0%
Regional/National Average								
Monthly Wage	94.6%	92.0%	88.1%	84.1%	87.9%	135.2%	85.5%	95.7%
Working-Age Population**	13.2%	11.6%	16.6%	12.0%	14.4%	14.1%	9.5%	8.7%
Employment/Population***	68.9%	71.5%	50.1%	59.8%	56.5%	86.3%	59.3%	73.8%

*The average number of employees comprises the persons employed under a labour contract/agreement on a definite or indefinite duration

**Working age population able to work and active persons under and over working age

***The civil employed population includes all the persons who work for an income, employed, self-employed, unpaid family workers

Table 2. Travel times within and between regions (minutes)

	North- West	Center	North- East	South- East	South- Muntenia	Bucharest- Ilfov	South- West	West
North- West	139	245	393	498	342	362	366	219
Center		121	295	277	111	164	254	299
North- East			108	379	314	353	465	557
South- East				159	177	140	284	552
South- Muntenia					113	64	216	396
Bucharest-Ilfov						30	196	416
South- West							97	280
West								96

Table 3. The probabilities with which regions will trade with each other

	North- West	Center	North- East	South- East	South- Muntenia	Bucharest- Ilfov	South- West	West
North- West	0.250	0.142	0.088	0.070	0.101	0.096	0.095	0.158
Center	0.098	0.198	0.081	0.087	0.216	0.146	0.094	0.080
North- East	0.092	0.122	0.333	0.095	0.115	0.102	0.077	0.065
South- East	0.061	0.110	0.081	0.193	0.173	0.219	0.108	0.055
South- Muntenia	0.056	0.172	0.061	0.108	0.169	0.298	0.088	0.048
Bucharest-Ilfov	0.037	0.081	0.038	0.095	0.208	0.443	0.068	0.032
South- West	0.076	0.110	0.060	0.098	0.129	0.142	0.287	0.099
West	0.150	0.110	0.059	0.060	0.083	0.079	0.117	0.342

Table 4. Structure of the PNRR budget

COMPONENT		TOTAL				INVESTMENT			REFORM		
		Items	Funds	% of total	% grants	Items	Funds	% grants	Items	Funds	% grants
Green transition		46	15,314.01	52.5%	33.6%	40	15,280.4	33.6%	6	33.7	32.7%
C1	Water management	8	1,462.00	5.0%	0.0%	7	1,459.5	0.0%	1	2.5	0.0%
C2	Forests and biodiversity	10	1,173.00	4.0%	66.6%	9	1,172.0	66.6%	1	1.0	100.0%
C3	Waste management	7	1,239.01	4.2%	0.0%	7	1,239.0	0.0%	0	0.0	-
C4	Sustainable transportation	6	7,620.00	26.1%	51.3%	4	7,591.0	51.3%	2	29.0	34.5%
C5	Renovation wave	9	2,200.00	7.5%	0.0%	8	2,199.9	0.0%	1	0.2	0.0%
C6	Energy	6	1,620.00	5.6%	28.4%	5	1,619.0	28.4%	1	1.0	0.0%
Digital transformation		20	1,884.95	6.5%	96.9%	19	1,873.1	96.9%	1	11.9	100.0%
C7	Digital transformation	20	1,884.95	6.5%	96.9%	19	1,873.1	96.9%	1	11.9	100.0%
Smart, sust., inclusive growth		28	3,015.56	10.3%	15.2%	25	3,007.9	15.1%	3	7.6	52.4%
C8	Fiscal and social security reform	11	456.93	1.6%	100.0%	10	452.9	100.0%	1	4.0	100.0%
C9	Support for private sector R&D	17	2,558.63	8.8%	0.0%	15	2,555.0	0.0%	2	3.6	0.0%
Social and territorial cohesion		16	2,549.01	8.7%	47.1%	14	2,538.0	47.3%	2	11.0	0.0%
C10	Local development fund	7	2,100.00	7.2%	57.1%	7	2,100.0	57.1%	0	0.0	-
C11	Tourism and Culture	9	449.01	1.5%	0.0%	7	438.0	0.0%	2	11.0	0.0%
Health, econ, soc & inst resilience		24	2,812.35	9.6%	96.8%	11	2,563.1	96.6%	13	249.3	99.4%
C12	Health	5	2,450.01	8.4%	100.0%	2	2,269.5	100.0%	3	180.5	100.0%
C13	Social reform	8	196.74	0.7%	54.7%	4	192.5	54.5%	4	4.2	64.7%
C14	Governance	11	165.60	0.6%	100.0%	5	101.1	100.0%	6	64.5	100.0%
Policies for next generation		18	3,605.97	12.4%	80.0%	18	3,606.0	80.0%	0	0.0	-
C15	Education	18	3,605.97	12.4%	80.0%	18	3,606.0	80.0%	0	0.0	-
TOTAL		152	29,181.85		48.8%	127	28,868.4	48.4%	25	313.4	87.6%

Table 5. Distribution of the PNRR Budget across NUTS 2 Regions, by Sector

Sector		TOTAL	Sector %	North-		North-		South-	South-	Bucharest-	South-	
				West	Center	East	East	Muntenia	Ilfov	West	West	West
AGRICULTURE	A	809.63	2.8%	14.6%	17.3%	23.1%	5.6%	13.1%	1.6%	14.4%	10.4%	
MANUFACTURING	C	2389.26	8.2%	9.9%	19.3%	5.4%	11.7%	17.3%	15.7%	6.3%	14.3%	
UTILITIES	D	184.07	0.6%	6.6%	7.5%	6.5%	17.2%	9.1%	29.0%	19.9%	4.3%	
WATER/WASTE MGT	E	150.45	0.5%	8.9%	8.0%	9.5%	17.8%	15.0%	23.4%	10.4%	7.0%	
CONSTRUCTION	F	12630.83	43.3%	12.1%	10.2%	12.0%	11.6%	11.0%	28.7%	7.9%	6.5%	
TRANSPORTATION	H	19.90	0.1%	15.8%	14.1%	8.5%	8.8%	13.4%	21.5%	6.3%	11.6%	
INFORM&COMMUNIC	J	2278.13	7.8%	17.2%	6.8%	8.8%	1.7%	1.2%	51.9%	1.7%	10.7%	
FINANCIAL&INSURANCE	K	499.96	1.7%	12.4%	4.6%	4.3%	4.0%	4.9%	62.4%	3.3%	4.1%	
REAL ESTATE	L	58.05	0.2%	12.9%	13.0%	14.3%	9.7%	13.2%	21.8%	6.3%	8.8%	
PROF&SCI&TECH	M	9162.53	31.4%	7.4%	6.7%	5.3%	5.7%	6.7%	58.8%	3.4%	6.0%	
ADMI&SUPPORT	N	211.20	0.7%	9.1%	8.6%	6.8%	6.9%	7.9%	49.8%	4.6%	6.3%	
PUB ADMINISTRATION	O	202.16	0.7%	9.6%	9.8%	11.4%	10.1%	11.0%	32.3%	8.6%	7.3%	
EDUCATION	P	409.55	1.4%	14.6%	12.5%	16.3%	10.7%	11.5%	16.5%	8.7%	9.1%	
HEALTH	Q	109.74	0.4%	12.8%	12.2%	13.9%	10.1%	10.0%	22.1%	9.2%	9.7%	
ARTS&ENTERTAINMENT	R	66.38	0.2%	11.0%	11.6%	8.8%	8.9%	7.9%	37.9%	6.0%	8.0%	
TOTAL		29181.85		10.9%	9.7%	9.3%	8.7%	9.3%	38.7%	6.0%	7.4%	

Table 6. Aggregate Economic Impact of PNRR

	Value	% of 2022 value	rltv. to invest.
PNRR (mil. €)	29,181.9		
Output (mil. €)	69,156.8	10.2%	2.37
Value added (mil. €)	25,745.8	10.0%	0.88
Earnings (mil. €)	9,865.5	9.8%	0.34
Employment (person - year FT jobs)	634,823	9.4%	21.75

Table 7. Aggregate Economic Impact of NRRP by component

COMPONENT		PNRR Funds		Output			Value added			Earnings			Employment		
		mil. €	% of total	mil. €	% of total	rltv. to invest.	mil. €	% of total	rltv. to invest.	mil. €	% of total	rltv. to invest.	person - year FT	% of total	rltv. to invest.
Green transition		15,314.0	52.5%	38,177.0	55.2%	2.49	13,710.5	53.3%	0.90	4,990.4	50.6%	0.33	346,886	54.6%	22.65
C1	Water management	1,462.0	5.0%	3,525.7	5.1%	2.41	1,383.8	5.4%	0.95	507.2	5.1%	0.35	35,716.9	5.6%	24.43
C2	Forests and biodiversity	1,173.0	4.0%	2,698.3	3.9%	2.30	1,390.5	5.4%	1.19	393.7	4.0%	0.34	27,557	4.3%	23.49
C3	Waste management	1,239.0	4.2%	3,089.2	4.5%	2.49	1,075.3	4.2%	0.87	402.6	4.1%	0.32	27,805.2	4.4%	22.44
C4	Sustainable transportation	7,620.0	26.1%	19,172.1	27.7%	2.52	6,646.5	25.8%	0.87	2,499.6	25.3%	0.33	171,005	26.9%	22.44
C5	Renovation wave	2,200.0	7.5%	5,787.8	8.4%	2.63	1,914.1	7.4%	0.87	690.3	7.0%	0.31	51,910.5	8.2%	23.60
C6	Energy	1,620.0	5.6%	3,903.8	5.6%	2.41	1,300.3	5.1%	0.80	497.0	5.0%	0.31	32,891	5.2%	20.30
Digital transformation		1,885.0	6.5%	3,751.0	5.4%	1.99	1,636.4	6.4%	0.87	704.3	7.1%	0.37	33,144	5.2%	17.58
C7	Digital transformation	1,885.0	6.5%	3,751.0	5.4%	1.99	1,636.4	6.4%	0.87	704.3	7.1%	0.37	33,144	5.2%	17.58
Smart, sust., inclusive growth		3,015.6	10.3%	5,871.9	8.5%	1.95	2,569.9	10.0%	0.85	1,038.6	10.5%	0.34	53,019	8.4%	17.58
C8	Fiscal and social security reform	456.9	1.6%	865.1	1.3%	1.89	384.0	1.5%	0.84	184.6	1.9%	0.40	8,711	1.4%	19.06
C9	Support for private sector R&D	2,558.6	8.8%	5,006.9	7.2%	1.96	2,186.0	8.5%	0.85	854.0	8.7%	0.33	44,308.3	7.0%	17.32
Social and territorial cohesion		2,549.0	8.7%	6,696.1	9.7%	2.63	2,264.1	8.8%	0.89	850.7	8.6%	0.33	57,735	9.1%	22.65
C10	Local development fund	2,100.0	7.2%	5,680.6	8.2%	2.71	1,880.9	7.3%	0.90	708.2	7.2%	0.34	48,354	7.6%	23.03
C11	Tourism and Culture	449.0	1.5%	1,015.5	1.5%	2.26	383.2	1.5%	0.85	142.6	1.4%	0.32	9,381.2	1.5%	20.89
Health, econ, soc & inst resilience		2,812.4	9.6%	6,837.8	9.9%	2.43	2,387.8	9.3%	0.85	948.6	9.6%	0.34	63,388	10.0%	22.54
C12	Health	2,450.0	8.4%	6,063.0	8.8%	2.47	2,099.4	8.2%	0.86	809.4	8.2%	0.33	55,180	8.7%	22.52
C13	Social reform	196.7	0.7%	480.0	0.7%	2.44	165.5	0.6%	0.84	63.4	0.6%	0.32	4,372	0.7%	22.22
C14	Governance	165.6	0.6%	294.9	0.4%	1.78	122.9	0.5%	0.74	75.8	0.8%	0.46	3,837	0.6%	23.17
Policies for next generation		3,606.0	12.4%	7,823.0	11.3%	2.17	3,177.2	12.3%	0.88	1,332.8	13.5%	0.37	80,651	12.7%	22.37
C15	Education	3,606.0	12.4%	7,823.0	11.3%	2.17	3,177.2	12.3%	0.88	1,332.8	13.5%	0.37	80,651	12.7%	22.37
TOTAL		29,181.9	100.0%	69,156.8		2.37	25,745.8		0.88	9,865.5		0.34	634,823		21.75

Table 8. Aggregate Economic Impact of PNRR by sector

Sector	PNRR		Output			Value added			Earnings			Employment		
	mil. €	% of total	mil. €	% of total	% of 2022 value	mil. €	% of total	% of 2022 value	mil. €	% of total	% of 2022 value	person - year FT	% of total	% of 2022 value
AGRICULTURE	809.6	(2.8%)	1,480.3	(2.1%)	(4.7%)	945.8	(3.7%)	(8.8%)	194.5	(2.0%)	(10.0%)	14,263	(2.2%)	(8.8%)
MINING/EXTRACTIVE	-	-	2,047.7	(3.0%)	(16.8%)	443.8	(1.7%)	(13.3%)	131.0	(1.3%)	(14.3%)	6,550	(1.0%)	(15.1%)
MANUFACTURING	2,389.3	(8.2%)	17,074.1	(24.7%)	(7.5%)	4,016.5	(15.6%)	(8.7%)	1,460.6	(14.8%)	(8.3%)	100,522	(15.8%)	(7.5%)
UTILITIES	184.1	(0.6%)	3,160.9	(4.6%)	(12.1%)	525.4	(2.0%)	(12.2%)	185.2	(1.9%)	(12.1%)	7,636	(1.2%)	(12.0%)
WATER/WASTE MGT	150.4	(0.5%)	757.4	(1.1%)	(12.2%)	474.5	(1.8%)	(11.0%)	138.0	(1.4%)	(10.9%)	11,597	(1.8%)	(11.3%)
CONSTRUCTION	12,630.8	(43.3%)	14,041.3	(20.3%)	(22.9%)	4,389.4	(17.0%)	(22.9%)	1,610.1	(16.3%)	(22.9%)	141,433	(22.3%)	(22.9%)
TRADE	-	-	5,415.3	(7.8%)	(7.2%)	2,847.8	(11.1%)	(7.2%)	1,071.8	(10.9%)	(7.2%)	82,468	(13.0%)	(7.2%)
TRANSPORTATION	19.9	(0.1%)	2,492.6	(3.6%)	(5.5%)	820.3	(3.2%)	(6.0%)	356.0	(3.6%)	(5.6%)	25,805	(4.1%)	(5.5%)
ACCOMM&FOOD	-	-	118.6	(0.2%)	(1.1%)	62.3	(0.2%)	(1.1%)	17.9	(0.2%)	(1.1%)	2,021	(0.3%)	(1.1%)
INFORM&COMMUNIC	2,278.1	(7.8%)	4,040.1	(5.8%)	(11.8%)	2,447.8	(9.5%)	(12.6%)	1,090.1	(11.0%)	(12.8%)	33,773	(5.3%)	(12.0%)
FINANCIAL&INSURANCE	500.0	(1.7%)	1,360.9	(2.0%)	(12.0%)	1,049.2	(4.1%)	(12.8%)	299.9	(3.0%)	(13.0%)	11,168	(1.8%)	(12.4%)
REAL ESTATE	58.1	(0.20%)	694.0	(1.0%)	(2.6%)	533.0	(2.1%)	(2.5%)	18.0	(0.2%)	(2.6%)	1,610	(0.3%)	(2.6%)
PROF&SCI&TECH	9,162.5	(31.4%)	12,702.8	(18.4%)	(40.6%)	4,224.8	(16.4%)	(39.1%)	1,854.5	(18.8%)	(39.3%)	97,083	(15.3%)	(38.3%)
ADMI&SUPPORT	211.2	(0.7%)	1,818.3	(2.6%)	(13.8%)	1,512.7	(5.9%)	(13.8%)	542.0	(5.5%)	(13.8%)	45,359	(7.1%)	(13.5%)
PUB ADMINISTRATION	202.2	(0.7%)	423.7	(0.6%)	(2.4%)	225.7	(0.9%)	(2.5%)	226.6	(2.3%)	(2.4%)	9,937	(1.6%)	(2.4%)
EDUCATION	409.6	(1.4%)	737.9	(1.1%)	(7.1%)	758.1	(2.9%)	(7.1%)	415.6	(4.2%)	(7.1%)	26,468	(4.2%)	(7.1%)
HEALTH	109.7	(0.4%)	437.9	(0.6%)	(2.0%)	281.7	(1.1%)	(2.0%)	182.5	(1.9%)	(2.0%)	10,640	(1.7%)	(1.9%)
ARTS&ENTERTAINMENT	66.4	(0.2%)	177.1	(0.3%)	(2.5%)	120.0	(0.5%)	(2.5%)	29.9	(0.3%)	(2.5%)	2,269	(0.4%)	(2.5%)
OTHER SERVICE ACTIVITIES	-	-	175.9	(0.3%)	(2.7%)	67.1	(0.3%)	(2.6%)	41.1	(0.4%)	(2.7%)	4,221	(0.7%)	(2.6%)
TOTAL	29,181.8		69,156.8		(10.2%)	25,745.8		(10.0%)	9,865.5		(9.8%)	634,823		(9.4%)

Table 9. Aggregate Economic Impact of NRRP by region

Sector	North- West	Center	North- East	South- East	South- Muntenia	Bucharest- Ilfov	South- West	West	TOTAL
PNRR (mil. €)	3,170.6	2,827.2	2,705.6	2,532.7	2,725.4	11,293.4	1,761.9	2,165.1	29,181.9
(% of total)	(10.9%)	(9.7%)	(9.3%)	(8.7%)	(9.3%)	(38.7%)	(6.0%)	(7.4%)	
Output (mil. €)	7,932.2	8,023.7	5,524.8	6,007.3	7,306.5	24,160.2	4,316.7	5,885.4	69,156.8
(% of total)	(11.5%)	(11.6%)	(8.0%)	(8.7%)	(10.6%)	(34.9%)	(6.2%)	(8.5%)	
(% of 2022 Value)	(9.2%)	(9.2%)	(8.9%)	(9.4%)	(8.6%)	(13.3%)	(9.4%)	(8.9%)	(10.2%)
Output/Investment	2.50	2.84	2.04	2.37	2.68	2.14	2.45	2.72	2.37
Value added (mil. €)	2,775.2	2,432.4	2,192.9	2,280.5	2,662.0	9,710.5	1,780.4	1,912.0	25,745.8
(% of total)	(10.8%)	(9.4%)	(8.5%)	(8.9%)	(10.3%)	(37.7%)	(6.9%)	(7.4%)	
(% of 2022 Value)	(8.9%)	(8.7%)	(8.4%)	(9.1%)	(8.9%)	(12.9%)	(8.8%)	(8.4%)	(10.0%)
Value Added/Investment	0.88	0.86	0.81	0.90	0.98	0.86	1.01	0.88	0.88
Earnings (mil. €)	1,143.1	1,006.9	804.9	814.8	892.2	3,821.1	560.2	822.3	9,865.5
(% of total)	(11.6%)	(10.2%)	(8.2%)	(8.3%)	(9.0%)	(38.7%)	(5.7%)	(8.3%)	
(% of 2022 Value)	(8.7%)	(8.7%)	(7.9%)	(8.9%)	(8.9%)	(12.7%)	(8.2%)	(8.6%)	(9.8%)
Earnings/Investment	0.36	0.36	0.30	0.32	0.33	0.34	0.32	0.38	0.34
Employment*	78,571	74,715	62,148	65,298	68,642	181,398	46,578	57,475	634,823
(% of total)	(12.4%)	(11.8%)	(9.8%)	(10.3%)	(10.8%)	(28.6%)	(7.3%)	(9.1%)	
(% of 2022 Value)	(8.4%)	(8.8%)	(8.1%)	(8.9%)	(9.0%)	(12.2%)	(8.7%)	(8.6%)	(9.4%)
Empl./Investment	24.78	26.43	22.97	25.78	25.19	16.06	26.44	26.55	21.75

Note: *Jobs measure person-years of full-time employment at the average region and industry wage

Table 10. Regional linkages.

The regional distribution of impact by the region in which the NRRP funds were allocated

A. Output (mil. €)

Region of Investment	NRRP Funds	Regional Distribution of Impact								
		Output Total	North-West	Center	North-East	South-East	South-Muntenia	Bucharest-Ilfov	South-West	West
North-West	3,170.6	7540.3	24.87%	11.21%	8.01%	6.94%	7.91%	24.27%	5.43%	11.37%
Center	2,827.2	7018.6	12.08%	18.62%	7.91%	8.37%	12.94%	24.24%	6.55%	9.31%
North-East	2,705.6	6535.7	12.96%	11.53%	22.82%	8.51%	8.83%	22.46%	5.51%	7.38%
South-East	2,532.7	6287.5	10.07%	11.52%	8.36%	16.38%	11.28%	28.72%	6.68%	6.98%
South-Muntenia	2,725.4	6848.8	9.38%	16.25%	6.93%	9.69%	14.12%	28.62%	7.22%	7.79%
Bucharest-Ilfov	11,293.4	25302.2	7.15%	8.41%	4.87%	7.41%	10.25%	52.76%	4.39%	4.78%
South-West	1,761.9	4374.9	10.71%	12.89%	7.08%	9.69%	11.88%	21.55%	15.83%	10.37%
West	2,165.1	5248.8	15.44%	11.22%	6.35%	6.65%	8.31%	21.02%	7.06%	23.94%

B. Value Added (mil. €)

Region of Investment	NRRP Funds	Regional Distribution of Impact								
		Value Added Total	North-West	Center	North-East	South-East	South-Muntenia	Bucharest-Ilfov	South-West	West
North-West	3,170.6	2795.9	24.10%	9.38%	8.57%	6.91%	7.71%	27.16%	6.01%	10.16%
Center	2,827.2	2554.2	11.54%	15.43%	8.76%	8.51%	13.20%	26.89%	7.43%	8.24%
North-East	2,705.6	2465.8	11.99%	9.55%	24.70%	8.44%	8.54%	24.10%	6.15%	6.55%
South-East	2,532.7	2313.0	9.02%	9.31%	8.48%	18.43%	11.16%	30.15%	7.39%	6.06%
South-Muntenia	2,725.4	2466.5	8.70%	13.50%	7.45%	9.95%	14.47%	30.98%	8.23%	6.73%
Bucharest-Ilfov	11,293.4	9617.3	6.68%	6.63%	5.04%	7.28%	9.67%	55.90%	4.66%	4.15%
South-West	1,761.9	1624.8	9.80%	10.61%	7.53%	9.79%	12.01%	23.19%	18.20%	8.85%
West	2,165.1	1908.5	15.01%	9.56%	7.02%	6.84%	8.33%	23.89%	8.04%	21.32%

Table 10. Regional linkages (Continued)

The regional distribution of impact by the region in which the NRRP funds were allocated

C. Earnings (mil. €)

Region of Investment	NRRP Funds	Regional Distribution of Impact								
		Earnings Total	North-West	Center	North-East	South-East	South-Muntenia	Bucharest-Ilfov	South-West	West
North-West	3,170.6	1087.3	25.79%	9.88%	8.03%	6.30%	6.50%	27.37%	4.81%	11.32%
Center	2,827.2	966.3	12.35%	16.76%	8.27%	8.04%	11.63%	27.64%	6.08%	9.22%
North-East	2,705.6	920.0	12.98%	10.31%	23.82%	8.02%	7.43%	25.04%	5.00%	7.39%
South-East	2,532.7	861.5	9.84%	10.34%	8.38%	17.36%	9.95%	31.02%	6.23%	6.87%
South-Muntenia	2,725.4	917.9	9.39%	14.98%	7.16%	9.52%	12.71%	31.82%	6.83%	7.58%
Bucharest-Ilfov	11,293.4	3766.2	7.17%	7.18%	4.98%	6.76%	8.58%	56.95%	3.87%	4.51%
South-West	1,761.9	593.8	10.72%	11.85%	7.29%	9.47%	10.60%	24.17%	15.59%	10.31%
West	2,165.1	752.5	15.84%	10.02%	6.61%	6.24%	6.97%	23.71%	6.44%	24.18%

D. Employment (person-years of full-time employment at the average region and industry wage)

Region of Investment	NRRP Funds	Regional Distribution of Impact								
		Empl. Total	North-West	Center	North-East	South-East	South-Muntenia	Bucharest-Ilfov	South-West	West
North-West	3,170.6	70,894	26.19%	11.24%	9.48%	7.84%	7.63%	19.69%	6.04%	11.89%
Center	2,827.2	65,699	12.69%	18.03%	9.40%	9.63%	13.20%	19.89%	7.46%	9.70%
North-East	2,705.6	63,248	13.38%	11.23%	26.31%	9.50%	8.32%	17.72%	5.97%	7.58%
South-East	2,532.7	59,444	10.50%	11.35%	9.81%	18.98%	11.18%	23.31%	7.55%	7.32%
South-Muntenia	2,725.4	63,450	9.80%	16.30%	8.26%	11.28%	14.13%	23.93%	8.34%	7.97%
Bucharest-Ilfov	11,293.4	219,910	8.28%	9.02%	6.53%	9.38%	11.26%	44.75%	5.40%	5.38%
South-West	1,761.9	42,520	10.84%	12.52%	8.05%	10.73%	11.48%	17.08%	18.63%	10.67%
West	2,165.1	49,659	15.98%	11.17%	7.57%	7.60%	8.13%	17.02%	8.14%	24.39%

Table 11. Regional linkages. Net interregional spillovers in absolute terms

A. Output (mil. €)

Region of Investment	Producer Region							
	North-West	Center	North-East	South-East	South-Muntenia	Bucharest-Ilfov	South-West	West
North-West		-2.29	-243.15	-110.38	-46.13	22.14	-59.14	47.11
Center	2.29		-198.58	-136.67	-205.29	-426.62	-104.46	64.30
North-East	243.15	198.58		30.54	102.52	236.80	50.29	149.06
South-East	110.38	136.67	-30.54		45.59	-68.14	-3.67	89.89
South-Munte	46.13	205.29	-102.52	-45.59		-633.21	-25.16	97.30
Bucharest-Ilf	-22.14	426.62	-236.80	68.14	633.21		166.90	106.07
South-West	59.14	104.46	-50.29	3.67	25.16	-166.90		82.91
West	-47.11	-64.30	-149.06	-89.89	-97.30	-106.07	-82.91	
Net Transfer	391.84	1005.02	-1010.93	-280.18	457.77	-1141.99	-58.16	636.63
% of Total	4.94%	12.53%	-18.30%	-4.66%	6.27%	-4.73%	-1.35%	10.82%

B. Value Added (mil. €)

Region of Investment	Producer Region							
	North-West	Center	North-East	South-East	South-Muntenia	Bucharest-Ilfov	South-West	West
North-West		-32.41	-56.11	-15.32	0.96	117.27	8.71	-2.40
Center	32.41		-11.62	1.92	4.06	49.61	17.41	27.99
North-East	56.11	11.62		11.90	26.80	109.85	29.12	27.50
South-East	15.32	-1.92	-11.90		12.79	-3.16	11.75	9.63
South-Munte	-0.96	-4.06	-26.80	-12.79		-165.60	7.70	7.02
Bucharest-Ilf	-117.27	-49.61	-109.85	3.16	165.60		71.36	-56.62
South-West	-8.71	-17.41	-29.12	-11.75	-7.70	-71.36		-9.61
West	2.40	-27.99	-27.50	-9.63	-7.02	56.62	9.61	
Net Transfer	-20.69	-121.79	-272.90	-32.49	195.49	93.23	155.65	3.52
% of Total	-0.75%	-5.01%	-12.44%	-1.42%	7.34%	0.96%	8.74%	0.18%

Table 11. Regional linkages. (Continued) Net interregional spillovers in absolute terms

C. Earnings (mil. €)

Region of Investment	Producer Region							
	North-West	Center	North-East	South-East	Muntenia	Bucharest-Ilfov	South-West	West
North-West		-11.92	-32.14	-16.32	-15.59	27.61	-11.38	3.94
Center	11.92		-14.98	-11.42	-25.10	-3.16	-11.61	13.73
North-East	32.14	14.98		1.61	2.58	42.75	2.68	18.30
South-East	16.32	11.42	-1.61		-1.66	12.49	-2.56	12.27
South-Munte	15.59	25.10	-2.58	1.66		-31.05	-0.19	17.17
Bucharest-Ilf	-27.61	3.16	-42.75	-12.49	31.05		2.09	-8.37
South-West	11.38	11.61	-2.68	2.56	0.19	-2.09		12.70
West	-3.94	-13.73	-18.30	-12.27	-17.17	8.37	-12.70	
Net Transfer	55.80	40.63	-115.05	-46.67	-25.72	54.92	-33.67	69.74
% of Total	4.88%	4.04%	-14.29%	-5.73%	-2.88%	1.44%	-6.01%	8.48%

D. Employment (person-years of full-time employment at the average region and industry wage)

Region of Investment	Producer Region							
	North-West	Center	North-East	South-East	Muntenia	Bucharest-Ilfov	South-West	West
North-West		-369	-1742	-683	-810	-4243	-322	492
Center	369		-930	-417	-1669	-6775	-422	828
North-East	1742	930		179	21	-3158	350	1038
South-East	683	417	-179		-510	-6767	-72	573
South-Munte	810	1669	-21	510		-9590	410	1020
Bucharest-Ilf	4243	6775	3158	6767	9590		4607	3373
South-West	322	422	-350	72	-410	-4607		492
West	-492	-828	-1038	-573	-1020	-3373	-492	
Net Transfer	7677	9017	-1100	5854	5192	-38512	4058	7815
% of Total	9.77%	12.07%	-1.77%	8.97%	7.56%	-21.23%	8.71%	13.60%

Table 12. NRRP Impact. Employment by occupation

Occupation	BY OCCUPATION		
	person - year FT	% of total	% of 2022 value
Total	634823	100.0%	9.4%
Management	46704	7.4%	9.8%
Business and financial ops	52508	8.3%	13.3%
Computer&mathematical	27263	4.3%	12.5%
Architecture&engineering	20683	3.3%	15.8%
Science	7552	1.2%	14.1%
Community&social services	4471	0.7%	7.4%
Legal	9024	1.4%	25.1%
Educational instruction&library	7510	1.2%	2.9%
Arts&design&entertainment&sports&media	8545	1.3%	6.2%
Healthcare practitioners&technical	16174	2.5%	8.3%
Healthcare support	9639	1.5%	7.8%
Protective service	10426	1.6%	9.7%
Food preparation&serving related	7793	1.2%	4.7%
Building and grounds	5816	0.9%	5.2%
Personal care&service	6381	1.0%	3.0%
Sales	54678	8.6%	7.8%
Office&administrative support	82354	13.0%	10.2%
Farming&fishin&forestry	11743	1.8%	6.1%
Construction&extraction	94399	14.9%	20.9%
Installation maintenance repair	35715	5.6%	10.1%
Production	60910	9.6%	7.7%
Transportation&material moving	54535	8.6%	7.3%

Table 13. NRRP Impact: Changes in Employment by Occupation, Regional Shares

Occupation	PNRR IMPACT: REGIONAL SHARES OF CHANGES IN EMPLOYMENT BY OCCUPATION								
	person - year FT	North- West	North- Center	North- East	South- East	South- Muntenia	Bucharest- Ilfov	South- West	West
Management	46,704	11.9%	11.1%	9.3%	9.5%	10.3%	32.4%	6.7%	8.7%
Business and financial ops	52,508	11.5%	9.9%	8.4%	8.1%	9.0%	39.2%	5.7%	8.2%
Computer&mathematical	27,263	9.8%	9.6%	7.1%	7.7%	9.2%	43.1%	5.3%	8.1%
Architecture&engineering	20,683	10.6%	12.1%	7.4%	9.6%	11.4%	32.5%	6.6%	9.7%
Science	7,552	9.6%	10.8%	8.1%	8.7%	10.6%	37.6%	6.9%	7.6%
Community&social servi	4,471	10.2%	10.4%	9.6%	9.5%	11.5%	33.5%	7.6%	7.6%
Legal	9,024	8.4%	8.8%	6.5%	7.5%	9.3%	47.7%	5.2%	6.6%
Educational instruction&library	7,510	9.1%	10.4%	9.6%	10.9%	14.6%	29.1%	8.8%	7.5%
Arts&design&entertainment&sports&mec	8,545	10.8%	10.1%	7.9%	8.3%	9.7%	39.6%	5.8%	7.8%
Healthcare practitioners&technical	16,174	12.1%	11.6%	12.1%	10.0%	11.4%	25.4%	8.4%	8.9%
Healthcare support	9,639	13.0%	12.3%	13.8%	10.3%	11.9%	20.0%	9.3%	9.5%
Protective service	10,426	8.7%	9.3%	6.9%	9.0%	10.8%	42.3%	6.3%	6.7%
Food preparation&serving related	7,793	11.8%	11.3%	10.9%	10.7%	11.6%	27.0%	8.1%	8.7%
Building and grounds	5,816	10.9%	10.5%	9.7%	9.8%	11.3%	32.3%	7.4%	8.1%
Personal care&service	6,381	11.5%	11.1%	10.5%	10.4%	11.6%	28.3%	8.0%	8.7%
Sales	54,678	12.8%	11.2%	10.4%	10.2%	9.9%	29.1%	6.9%	9.4%
Office&administrative supp	82,354	12.2%	10.7%	9.3%	9.2%	9.7%	33.8%	6.5%	8.6%
Farming&fishin&forestry	11,743	14.7%	17.8%	15.2%	9.1%	9.8%	8.4%	11.5%	13.5%
Construction&extraction	94,399	13.4%	11.6%	12.0%	11.5%	10.4%	24.6%	8.2%	8.3%
Installation maintenance repair	35,715	12.5%	12.1%	10.4%	12.4%	11.4%	23.6%	8.6%	9.0%
Production	60,910	14.2%	16.2%	8.6%	12.0%	14.5%	14.5%	8.4%	11.5%
Transportation&material moving	54,535	13.7%	13.0%	9.9%	12.4%	11.8%	21.2%	7.7%	10.2%

Table R9. PNRR Impact. Employment by occupation, relative to 2022 employment levels

Occupation	PNRR IMPACT: EMPLOYMENT BY OCCUPATION RELATIVE TO 2022 EMPLOYMENT								
	North- West	Center	North- East	South- East	South- Muntenia	Bucharest- Ilfov	South- West	West	TOTAL
Management	8.5%	8.9%	7.9%	8.7%	9.0%	13.6%	8.4%	8.7%	9.8%
Business and financial ops	11.3%	11.4%	10.9%	11.8%	12.5%	17.5%	11.3%	11.2%	13.3%
Computer&mathematical	9.8%	9.8%	9.3%	9.4%	12.0%	18.6%	9.7%	10.0%	12.5%
Architecture&engineering	11.9%	13.1%	14.7%	16.4%	14.3%	25.1%	13.6%	11.5%	15.8%
Science	11.6%	12.7%	10.7%	12.3%	12.6%	19.9%	11.8%	12.2%	14.1%
Community&social services	6.3%	6.9%	5.8%	6.8%	7.4%	9.4%	6.8%	6.8%	7.4%
Legal	20.2%	21.5%	19.9%	22.0%	23.9%	31.1%	20.7%	20.5%	25.1%
Educational instruction&library	2.4%	2.8%	2.1%	2.8%	3.4%	3.5%	2.7%	2.6%	2.9%
Arts&design&entertainment&sports&media	5.0%	5.2%	4.1%	4.9%	5.9%	9.8%	4.7%	5.2%	6.2%
Healthcare practitioners&technical	7.5%	8.0%	6.9%	7.7%	8.2%	10.6%	8.2%	8.3%	8.3%
Healthcare support	7.1%	7.7%	6.7%	7.4%	7.8%	9.2%	8.1%	8.2%	7.8%
Protective service	7.8%	8.5%	6.8%	8.9%	9.6%	12.8%	8.1%	7.8%	9.7%
Food preparation&serving related	4.3%	4.5%	3.8%	4.5%	4.7%	5.8%	4.3%	4.5%	4.7%
Building and grounds	4.5%	4.7%	3.8%	4.8%	5.2%	7.2%	4.5%	4.7%	5.2%
Personal care&service	2.6%	2.8%	2.1%	2.8%	3.1%	4.3%	2.6%	2.7%	3.0%
Sales	7.6%	7.4%	7.0%	7.2%	7.6%	9.0%	7.3%	7.6%	7.8%
Office&administrative support	9.1%	9.2%	8.6%	9.2%	9.6%	13.4%	9.1%	9.2%	10.2%
Farming&fishin&forestry	6.0%	9.0%	6.3%	4.5%	4.4%	3.9%	7.1%	8.4%	6.1%
Construction&extraction	20.6%	20.5%	21.3%	21.3%	20.7%	22.1%	19.7%	19.8%	20.9%
Installation maintenance repair	9.6%	9.8%	9.7%	10.2%	10.0%	11.4%	10.0%	9.3%	10.1%
Production	6.3%	7.5%	6.3%	9.1%	8.3%	9.7%	8.2%	6.9%	7.7%
Transportation&material moving	6.8%	7.3%	7.0%	7.3%	7.3%	7.6%	7.5%	7.1%	7.3%

Figure MRIO 1. Regional Structure of Romania: NUTS 2 Regions

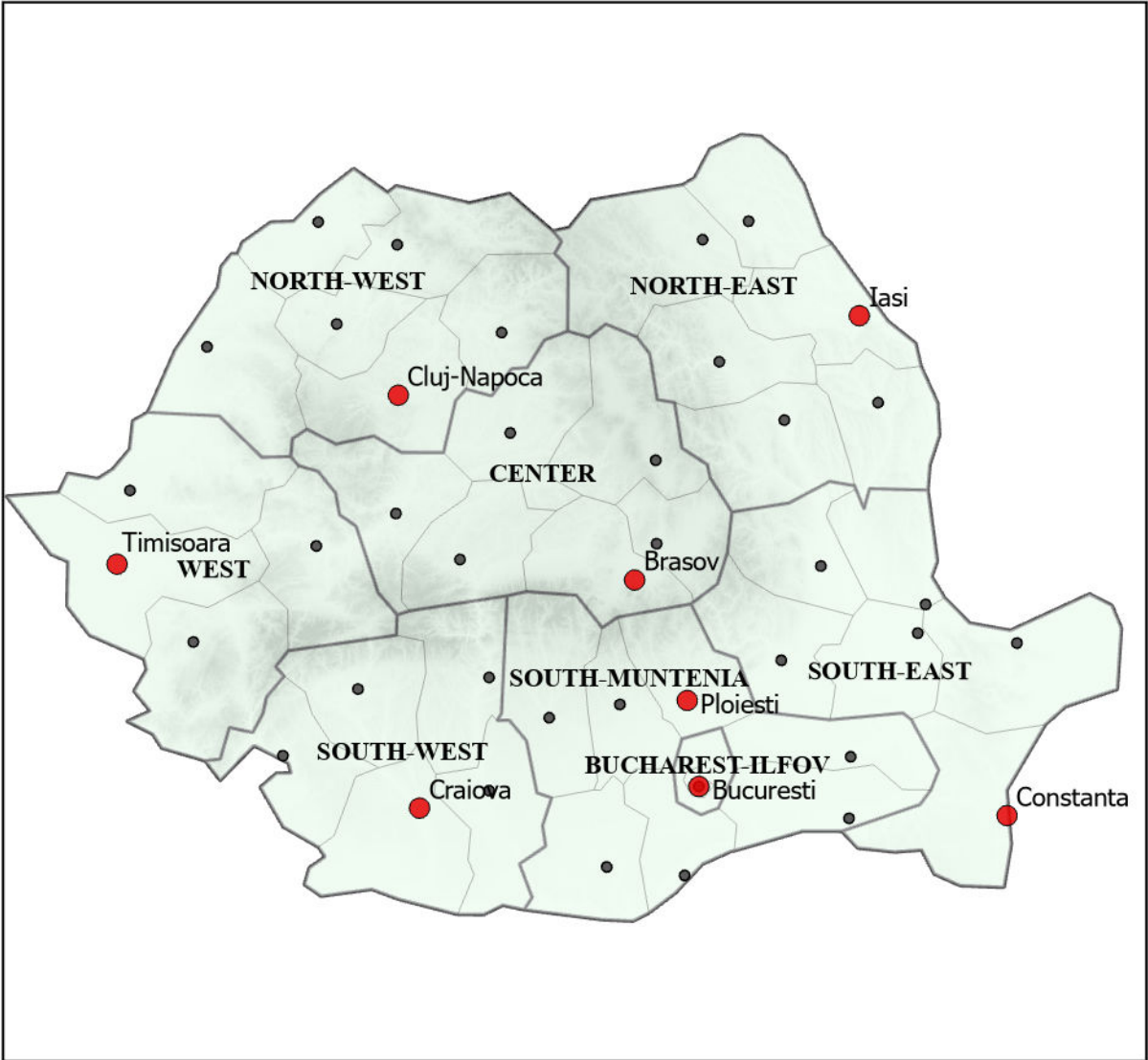


Figure 2. Probability of intra- and inter-regional trade as a function of travel time (minutes)

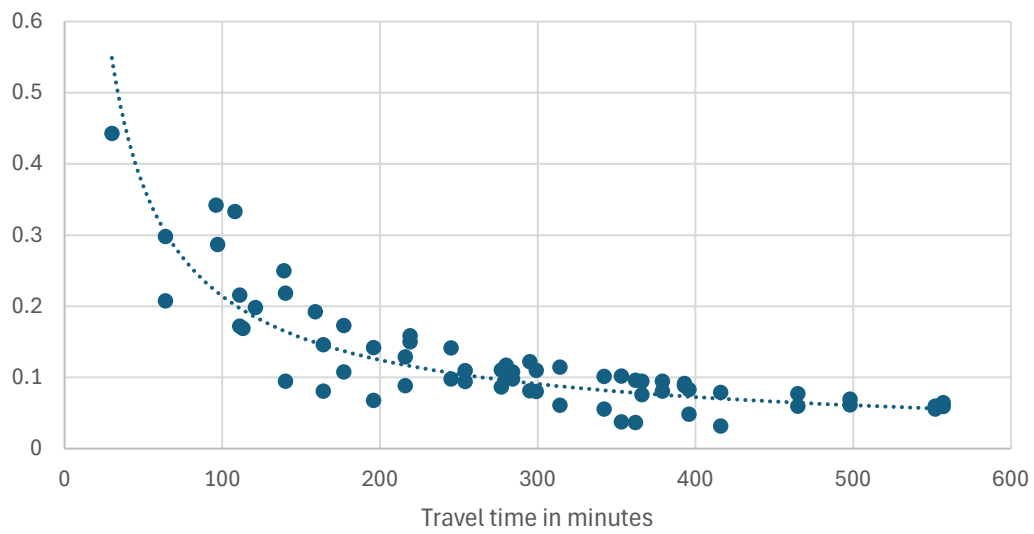


Figure 3. NRRP Impact: Changes in Employment by Occupation, Regional Shares



Appendix Table 1 . The Level of Aggregation of the Data from Annual Labor Cost Survey

Section	Title	Division	Annual Labor Cost Survey Availability	
			Section	Division
A	Agriculture, forestry and fishing *	01 – 03		✓
B	Mining and quarrying	05 – 09		✓
C	Manufacturing	10 – 33		✓
D	Electricity, gas, steam and air conditioning supply	35		✓
E	Water supply; sewerage, waste management and remediation activities	36 – 39		✓
F	Construction	41 – 43	✓	
G	Wholesale and retail trade; repair of motor vehicles and motorcycles	45 – 47	✓	
H	Transportation and storage	49 – 53		✓
I	Accommodation and food service activities	55 – 56	✓	
J	Information and communication	58 – 63		✓
K	Financial and insurance activities	64 – 66		✓
L	Real estate activities	68		✓
M	Professional, scientific and technical activities **	69 – 75	✓	
N	Administrative and support service activities	77 – 82	✓	
O	Public administration and defence; compulsory social security	84		✓
P	Education	85		✓
Q	Human health and social work activities	86 – 88	✓	
R	Arts, entertainment and recreation	90 – 93	✓	
S	Other service activities	94 – 96	✓	

Notes:

* data for divisions 02-03 Forestry and logging and Fishing and aquaculture are aggregated

** data for division 72 Scientific research and development are available separately

Appendix Table 2. Economic Impact of NRRP by region. Output (mil. €). Detailed Results

Sector	North- West	Center	North- East	South- East	South- Muntenia	Bucharest- Ilfov	South- West	West	TOTAL
Crop and animal production, hunting and rel. serv.	25.6	27.0	31.6	37.0	58.3	2.6	28.5	21.7	232.3
Forestry and logging	186.7	235.9	242.2	95.3	112.1	3.5	166.2	197.6	1239.5
Fishing and aquaculture	0.5	0.3	0.7	4.7	1.1	0.1	0.7	0.4	8.5
Mining of coal and lignite	0.1	0.0	0.0	0.0	0.0	0.0	17.5	2.8	20.4
Extraction of crude petroleum and natural gas	89.1	349.3	100.9	81.0	323.2	396.6	125.6	30.9	1496.5
Mining of metal ores	44.7	99.7	12.1	0.0	0.3	16.0	0.0	13.8	186.6
Other mining and quarrying	52.4	38.6	33.5	39.0	32.1	27.1	31.1	26.3	280.0
Mining supp. serv.	3.4	9.1	4.0	11.5	21.2	8.1	5.9	1.1	64.2
Mfg. food prod.	54.0	79.8	52.1	53.7	92.6	129.5	37.7	36.0	535.4
Mfg. beverages	23.5	47.0	18.1	37.1	53.6	119.5	7.3	22.1	328.1
Mfg. tobacco prod.	0.0	0.0	0.0	0.1	4.9	9.8	0.0	0.0	14.8
Mfg. textiles	34.0	74.4	38.4	15.8	63.3	21.6	15.6	42.4	305.6
Mfg. wearing apparel	15.4	17.0	23.8	23.6	21.6	15.9	9.2	10.7	137.1
Mfg. leather and rel. prod.	15.3	16.3	3.9	2.0	1.7	13.4	1.5	7.5	61.6
Mfg. wood and wood & rel. prod.	91.5	180.1	104.2	28.7	52.7	18.0	28.2	57.8	561.2
Mfg. paper and paper prod.	40.6	48.6	27.2	22.3	39.8	42.8	9.9	14.4	245.7
Printing and reproduction of recorded media	13.1	8.1	4.5	2.5	3.7	53.7	2.5	1.7	89.8
Mfg. coke and refined petroleum prod.	0.5	33.8	1.7	112.2	289.5	25.2	1.4	0.2	464.4
Mfg. chemicals and chemical prod.	139.1	285.9	166.3	99.2	208.7	346.5	151.6	139.2	1536.5
Mfg. basic pharmaceutical prod.	10.7	18.3	14.7	1.0	9.5	75.7	0.0	3.3	133.1
Mfg. rubber and plastic prod.	175.0	88.5	58.3	59.6	179.8	146.8	136.9	182.7	1027.6
Mfg. other non-metallic mineral prod.	368.0	350.2	163.8	197.7	326.1	332.6	101.9	186.4	2026.7
Mfg. basic metals	344.8	127.9	73.3	335.5	257.0	110.9	307.7	114.6	1671.7
Mfg. fabricated metal prod.	260.1	271.6	79.1	165.8	306.9	223.3	112.4	153.4	1572.6
Mfg. computer, electr & optical prod.	261.4	239.2	66.0	18.0	79.3	251.3	4.7	380.1	1300.1
Mfg. electrical equip.	84.1	79.3	12.3	12.8	75.7	48.3	28.2	63.9	404.7
Mfg. machinery and equip. n.e.c.	113.2	478.7	138.6	56.1	268.6	257.6	23.3	110.7	1446.7
Mfg. motor vehicles, trailers and semi-trailers	244.9	411.7	52.9	43.9	442.6	82.2	181.6	489.7	1949.3
Mfg. other transp. equip.	5.9	34.8	26.6	286.1	21.3	75.3	44.8	47.8	542.5
Mfg. furniture	53.5	32.8	13.5	15.3	14.7	28.9	7.5	19.6	185.8
Other manufacturing	42.4	55.2	27.5	12.5	25.2	82.8	14.6	78.6	338.8
Repair and installation of machinery and equip.	12.6	17.5	14.8	53.4	23.8	39.8	18.5	13.8	194.3
Electricity, gas, steam and air conditioning supply	272.3	344.0	251.8	468.2	284.0	882.0	467.0	191.8	3160.9
Water collection, treatment and supply	10.8	11.1	8.7	12.3	12.3	9.3	8.3	7.3	80.0
Sewerage	1.2	1.7	3.5	3.0	3.0	6.5	1.5	2.3	22.8
Waste collection, treatment and disposal; materials recovery & Remediation and other waste mgmt. serv.	65.4	63.1	65.0	99.7	85.5	174.0	39.8	62.2	654.6
Construction	1789.9	1524.8	1624.6	1508.3	1345.0	4228.3	962.6	1057.8	14041.3
Wholesale and retail trade and repair of motor vehicles and motorcycles	634.7	563.0	490.7	469.9	487.4	2005.2	307.3	457.0	5415.3
Land transp. and transp. via pipelines	234.7	223.9	109.5	141.1	182.1	435.8	83.3	165.6	1576.0
Water transp.	0.0	0.0	0.0	62.8	8.9	12.8	6.2	0.1	90.8
Air transp.	6.5	2.2	3.2	1.3	0.4	40.3	1.8	5.6	61.3
Warehousing and supp. act. for transp.ation	50.3	39.4	33.4	134.0	60.9	185.4	39.5	57.7	600.5
Postal and courier act.	14.6	15.9	15.1	13.1	14.8	69.0	10.5	11.0	164.1
Accommodation, Food and beverage serv.	13.1	16.2	9.3	15.7	11.6	36.1	7.9	8.7	118.6
Publishing act.	33.9	9.2	8.3	3.0	7.2	159.6	3.1	15.9	240.2
Motion picture, video and tv. Progr. Prod.; sound recording and music publ. progr. & broadcasting	4.6	3.1	2.5	1.8	2.6	118.6	1.9	2.9	138.2
Telecommunications	23.2	26.0	21.2	21.3	24.7	210.9	15.8	62.4	405.4
Computer progr., consultancy and rel. &Inf. serv.	607.2	186.5	281.5	32.9	24.9	1750.3	36.7	336.3	3256.3
Financial serv. act.	118.2	43.0	39.0	42.7	50.7	774.8	29.9	30.4	1128.8
Insurance, reinsurance and pension funding, except compulsory social security	6.1	2.7	2.8	3.0	4.0	81.4	2.1	2.1	104.1
Act. auxiliary to financial serv. and insurance	12.4	7.7	6.4	6.1	7.3	76.4	5.0	6.7	128.0
Real estate	64.2	77.3	56.4	66.0	71.1	269.8	41.5	47.6	694.0
Professional, scientific and technical act	769.1	740.6	534.8	654.0	817.5	7955.5	375.5	608.3	12455.3
Scientific research and development	13.7	5.1	14.5	6.7	18.3	172.8	6.1	10.4	247.5
Admin. and supp. serv.	142.7	142.5	101.9	120.2	146.0	992.5	75.7	96.9	1818.3
Public admin. and defence; compulsory soc. sec.	34.2	39.9	37.1	43.6	59.0	147.5	35.5	27.0	423.7
Education	109.2	95.3	116.8	78.1	86.7	103.6	73.0	75.1	737.9
Health and social assist. serv.	52.8	51.5	47.1	45.7	48.8	112.2	38.7	41.0	437.9
Shows, culture and recreation	18.1	17.4	14.2	13.6	14.7	78.6	9.4	11.2	177.1
Repair of household goods and other serv.	23.3	14.1	19.1	15.8	16.5	65.4	8.5	13.2	175.9
TOTAL	7932.2	8023.7	5524.8	6007.3	7306.5	24160.2	4316.7	5885.4	69156.8

Appendix Table 3. Economic Impact of NRRP by region. Value Added (mil. €). Detailed Results

Sector	South- Buchar								TOTAL
	North- West	Center	North- East	South- East	Munte- nia	est- Ilfov	South- West	West	
Crop and animal production, hunting and rel. serv.	5.3	6.4	7.3	12.2	18.2	3.5	6.7	5.6	65.2
Forestry and logging	125.9	149.9	218.9	43.1	101.4	10.1	137.1	88.8	875.3
Fishing and aquaculture	0.3	0.2	0.6	2.1	1.0	0.2	0.6	0.2	5.2
Mining of coal and lignite	0.1	0.0	0.0	0.0	0.0	0.0	29.6	2.4	32.1
Extraction of crude petroleum and natural gas	8.8	32.6	10.7	13.0	48.2	66.0	22.7	2.8	204.9
Mining of metal ores	4.5	9.5	1.3	0.0	0.0	2.7	0.0	1.3	19.3
Other mining and quarrying	15.6	10.8	10.7	18.9	14.4	13.5	16.9	7.1	107.9
Mining supp. serv.	2.9	7.4	3.7	16.2	27.6	11.7	9.3	0.9	79.7
Mfg. food prod.	6.1	8.5	6.3	9.8	15.7	24.6	7.8	3.7	82.5
Mfg. beverages	2.9	5.5	2.4	7.5	10.1	25.0	1.7	2.5	57.6
Mfg. tobacco prod.	0.0	0.0	0.0	0.0	0.2	0.4	0.0	0.0	0.6
Mfg. textiles	6.9	14.2	8.3	5.2	19.4	7.4	5.8	7.8	75.0
Mfg. wearing apparel	3.8	4.0	6.3	9.5	8.0	6.6	4.1	2.4	44.7
Mfg. leather and rel. prod.	2.8	2.8	0.8	0.6	0.5	4.1	0.5	1.3	13.3
Mfg. wood and wood & rel. prod.	19.3	35.9	23.5	9.9	16.8	6.4	10.9	11.1	133.7
Mfg. paper and paper prod.	7.5	8.5	5.4	6.7	11.1	13.4	3.4	2.4	58.5
Printing and reproduction of recorded media	4.7	2.7	1.7	1.4	2.0	32.3	1.7	0.6	47.1
Mfg. coke and refined petroleum prod.	0.0	0.4	0.0	2.4	5.8	0.6	0.0	0.0	9.3
Mfg. chemicals and chemical prod.	12.0	23.3	15.4	14.0	27.2	50.4	24.0	11.0	177.3
Mfg. basic pharmaceutical prod.	0.8	1.3	1.2	0.1	1.1	9.7	0.0	0.2	14.5
Mfg. rubber and plastic prod.	37.7	18.0	13.5	20.9	58.4	53.2	54.0	36.0	291.6
Mfg. other non-metallic mineral prod.	57.1	51.3	27.2	49.9	76.3	86.8	28.9	26.4	403.8
Mfg. basic metals	42.6	14.9	9.7	67.3	47.8	23.0	69.4	12.9	287.7
Mfg. fabricated metal prod.	67.5	66.5	21.9	69.9	119.9	97.4	53.3	36.3	532.7
Mfg. computer, electr & optical prod.	53.7	46.3	14.5	6.0	24.5	86.7	1.8	71.2	304.8
Mfg. electrical equip.	13.3	11.9	2.1	3.3	18.1	12.9	8.2	9.2	78.9
Mfg. machinery and equip. n.e.c.	24.2	96.6	31.7	19.5	86.5	92.6	9.1	21.6	381.7
Mfg. motor vehicles, trailers and semi-trailers	52.1	82.6	12.0	15.2	141.9	29.4	70.6	95.1	498.9
Mfg. other transp. equip.	2.3	12.6	10.9	178.4	12.3	48.6	31.4	16.7	313.2
Mfg. furniture	14.9	8.6	4.0	6.9	6.2	13.5	3.8	5.0	63.0
Other manufacturing	6.8	8.4	4.7	3.3	6.1	22.4	4.3	11.6	67.7
Repair and installation of machinery and equip.	3.5	4.6	4.4	24.2	10.0	18.6	9.4	3.5	78.3
Electricity, gas, steam and air conditioning supply	31.3	37.3	31.0	87.5	49.2	170.6	98.2	20.1	525.4
Water collection, treatment and supply	12.8	12.4	11.0	23.7	22.1	18.5	18.1	7.9	126.6
Sewerage	0.5	0.6	1.5	1.9	1.8	4.3	1.1	0.8	12.4
Waste collection, treatment and disposal; materials recovery & Remediation and other waste mgmt. serv.	24.2	22.0	25.7	59.9	47.6	108.2	26.9	21.0	335.4
Construction	525.6	444.9	526.4	512.4	482.0	1276.1	343.8	278.2	4389.4
Wholesale and retail trade and repair of motor vehicles and motorcycles	355.5	305.7	313.4	248.3	308.1	836.4	201.8	278.6	2847.8
Land transp. and transp. via pipelines	53.4	49.4	28.4	30.3	46.8	73.8	22.2	41.0	345.2
Water transp.	0.0	0.0	0.0	10.1	1.7	1.6	1.2	0.0	14.6
Air transp.	3.9	1.3	2.2	0.7	0.3	17.8	1.3	3.6	30.9
Warehousing and supp. act. for transp.ation	26.9	20.5	20.4	67.7	36.8	74.0	24.8	33.6	304.6
Postal and courier act.	12.0	12.6	14.2	10.2	13.8	42.2	10.1	9.8	124.9
Accommodation, Food and beverage serv.	7.2	8.7	5.8	8.2	7.2	14.8	5.1	5.2	62.3
Publishing act.	32.9	9.7	8.2	3.1	6.1	166.5	3.1	14.7	244.2
Motion picture, video and tv. Progr. Prod.; sound recording and music publ. progr. & broadcasting	2.0	1.4	1.1	0.8	1.0	54.6	0.9	1.2	63.0
Telecommunications	6.7	8.1	6.1	6.5	6.2	65.0	4.7	17.0	120.3
Computer progr., consultancy and rel. & Inf. serv.	362.0	120.4	169.2	20.8	13.1	1121.6	22.7	190.4	2020.3
Financial serv. act.	100.2	36.8	30.6	34.4	46.0	638.5	26.2	30.4	943.1
Insurance, reinsurance and pension funding, except compulsory social security	2.7	1.2	1.2	1.3	1.9	34.9	0.9	1.1	45.1
Act. auxiliary to financial serv. and insurance	6.0	3.7	2.9	2.8	3.8	35.6	2.5	3.8	60.9
Real estate	63.8	67.6	67.8	53.1	79.6	124.8	32.0	44.2	533.0
Professional, scientific and technical act	242.9	233.9	174.7	209.7	256.3	2656.9	117.0	194.6	4086.1
Scientific research and development	7.3	2.7	8.0	3.6	9.8	98.3	3.2	5.6	138.7
Admin. and supp. serv.	114.8	114.7	84.8	98.1	116.6	844.5	60.1	79.0	1512.7
Public admin. and defence; compulsory soc. sec.	16.8	20.8	18.3	22.4	30.7	84.7	18.0	14.0	225.7
Education	106.4	98.6	114.3	79.7	89.8	118.2	73.7	77.3	758.1
Health and social assist. serv.	31.7	32.8	28.4	28.7	31.1	78.9	24.0	26.0	281.7
Shows, culture and recreation	11.5	12.5	9.2	10.5	9.6	51.2	6.5	9.0	120.0
Repair of household goods and other serv.	8.3	5.7	7.0	6.8	6.1	23.9	3.3	6.0	67.1
TOTAL	2775.2	2432.4	2192.9	2280.5	2662.0	9710.5	1780.4	1912.0	25745.8

Appendix Table 4. Economic Impact of NRRP by region. Earnings (mil. €). Detailed Results

Sector	North- West	Center	North- East	South- East	South- Muntenia	Bucharest- Ilfov	South- West	West	TOTAL
Crop and animal production, hunting and rel. serv.	1.2	1.3	1.5	1.8	2.8	0.1	1.4	1.0	11.0
Forestry and logging	27.6	34.9	35.8	14.1	16.6	0.5	24.5	29.2	183.1
Fishing and aquaculture	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.3
Mining of coal and lignite	0.0	0.0	0.0	0.0	0.0	0.0	5.5	0.9	6.5
Extraction of crude petroleum and natural gas	3.6	14.2	4.1	3.3	13.2	16.2	5.1	1.3	61.0
Mining of metal ores	1.7	3.8	0.5	0.0	0.0	0.6	0.0	0.5	7.2
Other mining and quarrying	6.7	5.0	4.3	5.0	4.1	3.5	4.0	3.4	36.0
Mining supp. serv.	1.1	2.9	1.3	3.6	6.7	2.6	1.9	0.3	20.3
Mfg. food prod.	2.9	4.3	2.8	2.9	4.9	6.9	2.0	1.9	28.6
Mfg. beverages	1.0	2.1	0.8	1.6	2.4	5.3	0.3	1.0	14.4
Mfg. tobacco prod.	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.2
Mfg. textiles	3.6	7.9	4.1	1.7	6.7	2.3	1.7	4.5	32.4
Mfg. wearing apparel	2.3	2.6	3.6	3.6	3.2	2.4	1.4	1.6	20.6
Mfg. leather and rel. prod.	1.2	1.3	0.3	0.2	0.1	1.1	0.1	0.6	4.9
Mfg. wood and wood & rel. prod.	8.4	16.6	9.6	2.6	4.8	1.7	2.6	5.3	51.7
Mfg. paper and paper prod.	3.1	3.8	2.1	1.7	3.1	3.3	0.8	1.1	19.0
Printing and reproduction of recorded media	1.8	1.1	0.6	0.3	0.5	7.2	0.3	0.2	12.1
Mfg. coke and refined petroleum prod.	0.0	0.3	0.0	1.0	2.5	0.2	0.0	0.0	4.0
Mfg. chemicals and chemical prod.	4.9	10.2	5.9	3.5	7.4	12.3	5.4	4.9	54.6
Mfg. basic pharmaceutical prod.	0.3	0.6	0.5	0.0	0.3	2.4	0.0	0.1	4.3
Mfg. rubber and plastic prod.	16.6	8.4	5.5	5.6	17.0	13.9	12.9	17.3	97.2
Mfg. other non-metallic mineral prod.	22.4	21.3	10.0	12.0	19.9	20.3	6.2	11.3	123.4
Mfg. basic metals	24.4	9.1	5.2	23.8	18.2	7.9	21.8	8.1	118.4
Mfg. fabricated metal prod.	30.6	31.9	9.3	19.5	36.1	26.2	13.2	18.0	184.8
Mfg. computer, electr & optical prod.	25.4	23.3	6.4	1.8	7.7	24.5	0.5	37.0	126.5
Mfg. electrical equip.	8.5	8.0	1.2	1.3	7.6	4.9	2.9	6.4	40.8
Mfg. machinery and equip. n.e.c.	10.4	44.2	12.8	5.2	24.8	23.8	2.1	10.2	133.5
Mfg. motor vehicles, trailers and semi-trailers	22.4	37.6	4.8	4.0	40.4	7.5	16.6	44.7	178.0
Mfg. other transp. equip.	1.2	7.3	5.6	60.0	4.5	15.8	9.4	10.0	113.8
Mfg. furniture	8.5	5.2	2.1	2.4	2.3	4.6	1.2	3.1	29.6
Other manufacturing	3.1	4.0	2.0	0.9	1.8	6.0	1.1	5.7	24.7
Repair and installation of machinery and equip.	2.8	3.9	3.3	11.9	5.3	8.9	4.1	3.1	43.2
Electricity, gas, steam and air conditioning supply	16.0	20.2	14.8	27.4	16.6	51.7	27.4	11.2	185.2
Water collection, treatment and supply	4.5	4.6	3.6	5.1	5.1	3.8	3.5	3.0	33.2
Sewerage	0.2	0.3	0.7	0.6	0.6	1.3	0.3	0.5	4.6
Waste collection, treatment and disposal; materials recovery & Remediation and other waste mgmt. serv.	10.0	9.7	9.9	15.3	13.1	26.6	6.1	9.5	100.2
Construction	205.2	174.8	186.3	173.0	154.2	484.8	110.4	121.3	1610.1
Wholesale and retail trade and repair of motor vehicles and motorcycles	125.6	111.4	97.1	93.0	96.5	396.9	60.8	90.5	1071.8
Land transp. and transp. via pipelines	30.8	29.4	14.4	18.5	23.9	57.2	10.9	21.7	206.9
Water transp.	0.0	0.0	0.0	9.0	1.3	1.8	0.9	0.0	13.0
Air transp.	0.7	0.2	0.3	0.1	0.0	4.2	0.2	0.6	6.4
Warehousing and supp. act. for transp.ation	8.1	6.4	5.4	21.7	9.8	30.0	6.4	9.3	97.1
Postal and courier act.	2.9	3.2	3.0	2.6	2.9	13.7	2.1	2.2	32.6
Accommodation, Food and beverage serv.	2.0	2.4	1.4	2.4	1.8	5.5	1.2	1.3	17.9
Publishing act.	10.7	2.9	2.6	0.9	2.3	50.4	1.0	5.0	75.8
Motion picture, video and tv. Progr. Prod.; sound recording and music publ. progr. & broadcasting	0.8	0.5	0.4	0.3	0.4	19.3	0.3	0.5	22.5
Telecommunications	3.0	3.3	2.7	2.7	3.2	27.1	2.0	8.0	52.0
Computer progr., consultancy and rel. &Inf. serv.	175.2	53.8	81.2	9.5	7.2	505.2	10.6	97.1	939.8
Financial serv. act.	28.6	10.4	9.4	10.4	12.3	187.7	7.3	7.4	273.5
Insurance, reinsurance and pension funding, except compulsory social security	0.6	0.3	0.3	0.3	0.4	8.6	0.2	0.2	11.0
Act. auxiliary to financial serv. and insurance	1.5	0.9	0.8	0.7	0.9	9.2	0.6	0.8	15.5
Real estate	1.7	2.0	1.5	1.7	1.8	7.0	1.1	1.2	18.0
Professional, scientific and technical act	111.0	106.9	77.2	94.4	118.0	1148.3	54.2	87.8	1797.8
Scientific research and development	3.1	1.2	3.3	1.5	4.2	39.6	1.4	2.4	56.7
Admin. and supp. serv.	42.5	42.5	30.4	35.8	43.5	295.8	22.6	28.9	542.0
Public admin. and defence; compulsory soc. sec.	18.3	21.3	19.8	23.3	31.5	78.8	19.0	14.4	226.6
Education	61.5	53.7	65.8	44.0	48.8	58.4	41.1	42.3	415.6
Health and social assist. serv.	22.0	21.5	19.6	19.0	20.3	46.8	16.1	17.1	182.5
Shows, culture and recreation	3.0	2.9	2.4	2.3	2.5	13.3	1.6	1.9	29.9
Repair of household goods and other serv.	5.4	3.3	4.5	3.7	3.9	15.3	2.0	3.1	41.1
TOTAL	1143.1	1006.9	804.9	814.8	892.2	3821.1	560.2	822.3	9865.5

Appendix Table 5. Economic Impact of NRRP by region. Employment (person-year FT jobs). Detailed Results.

Sector	North- West	North- Center	North- East	South- East	South- Muntenia	Bucharest- Ilfov	South- West	West	TOTAL
Crop and animal production, hunting and rel. serv.	114	114	140	159	240	9	138	74	988
Forestry and logging	2042	2837	2246	1054	1136	28	1789	2117	13250
Fishing and aquaculture	1	1	2	14	3	0	2	1	25
Mining of coal and lignite	3	0	0	0	0	0	249	56	307
Extraction of crude petroleum and natural gas	131	443	168	141	468	254	213	49	1867
Mining of metal ores	129	185	33	0	1	24	0	31	404
Other mining and quarrying	603	463	410	458	394	214	322	333	3197
Mining supp. serv.	59	112	63	138	208	82	91	22	775
Mfg. food prod.	298	366	276	302	468	488	213	188	2599
Mfg. beverages	82	132	58	124	143	236	22	56	852
Mfg. tobacco prod.	0	0	0	0	3	4	0	0	6
Mfg. textiles	355	661	439	193	567	269	188	398	3070
Mfg. wearing apparel	256	273	401	434	399	236	171	185	2355
Mfg. leather and rel. prod.	131	111	40	19	15	115	16	60	508
Mfg. wood and wood & rel. prod.	920	1666	929	359	498	155	321	551	5400
Mfg. paper and paper prod.	236	275	148	138	209	192	73	74	1346
Printing and reproduction of recorded media	150	101	66	38	51	494	40	27	967
Mfg. coke and refined petroleum prod.	0	7	2	30	63	11	1	0	115
Mfg. chemicals and chemical prod.	373	606	406	226	439	754	373	245	3422
Mfg. basic pharmaceutical prod.	19	31	27	3	19	114	0	6	220
Mfg. rubber and plastic prod.	1179	638	516	539	1242	816	831	967	6728
Mfg. other non-metallic mineral prod.	1725	1645	879	963	1361	1038	532	832	8975
Mfg. basic metals	1270	622	372	1543	863	456	1225	496	6847
Mfg. fabricated metal prod.	2264	2275	878	1691	2600	1624	1114	1226	13673
Mfg. computer, electr & optical prod.	1384	1315	486	197	649	1254	51	1992	7327
Mfg. electrical equip.	614	523	92	108	645	304	192	437	2916
Mfg. machinery and equip. n.e.c.	651	2373	797	365	1381	1313	173	647	7699
Mfg. motor vehicles, trailers and semi-trailers	1431	2154	410	405	2284	293	1206	2378	10561
Mfg. other transp. equip.	86	293	331	3194	322	718	694	686	6325
Mfg. furniture	768	528	263	317	274	502	149	287	3088
Other manufacturing	334	426	227	104	174	520	123	458	2367
Repair and installation of machinery and equip.	223	295	267	967	393	417	349	247	3157
Electricity, gas, steam and air conditioning supply	749	850	717	945	758	1857	1219	541	7636
Water collection, treatment and supply	319	325	252	403	385	163	287	226	2361
Sewerage	18	27	50	46	52	82	26	32	333
Waste collection, treatment and disposal; materials recovery & Remediation and other waste mgmt. serv.	904	860	964	1417	1222	2054	640	842	8903
Construction	19145	16019	17457	16241	14238	35225	11416	11691	141433
Wholesale and retail trade and repair of motor vehicles and motorcycles	10631	9588	9299	9412	8693	20462	6286	8098	82468
Land transp. and transp. via pipelines	2953	2405	1357	1581	2042	3263	1049	1946	16596
Water transp.	0	0	0	565	83	92	52	2	794
Air transp.	22	8	13	9	2	149	6	25	233
Warehousing and supp. act. for transportation	525	418	357	1165	634	1090	422	567	5179
Postal and courier act.	336	322	314	294	334	920	249	234	3003
Accommodation, Food and beverage serv.	237	284	179	287	217	498	150	169	2021
Publishing act.	370	215	129	88	140	1432	69	162	2606
Motion picture, video and tv. Progr. Prod.; sound recording and music publ. progr. & broadcasting	56	44	37	32	51	966	28	38	1253
Telecommunications	183	219	199	195	260	989	131	310	2487
Computer progr., consultancy and rel. & Inf. serv.	4824	2052	2799	662	425	13258	513	2892	27426
Financial serv. act.	1111	542	508	572	661	5491	424	387	9696
Insurance, reinsurance and pension funding, except compulsory social security	24	14	15	15	20	264	10	10	372
Act. auxiliary to financial serv. and insurance	140	97	84	91	96	432	75	85	1100
Real estate	166	192	145	184	210	459	123	130	1610
Professional, scientific and technical act	7564	8291	5995	6982	8698	46169	4778	6111	94588
Scientific research and development	149	67	141	87	210	1650	77	115	2495
Admin. and supp. serv.	3631	4081	2812	3934	4848	20524	2726	2803	45359
Public admin. and defence; compulsory soc. sec.	841	1012	935	1128	1580	2803	917	722	9937
Education	3731	3475	4125	2865	3286	3572	2722	2693	26468
Health and social assist. serv.	1291	1259	1235	1216	1329	2320	962	1028	10640
Shows, culture and recreation	244	240	199	208	223	864	133	158	2269
Repair of household goods and other serv.	576	336	456	450	433	1415	225	331	4221
TOTAL	78571	74715	62148	65298	68642	181398	46578	57475	634823

Appendix Table 6. NRRP Impact: Changes in Employment by Occupation. Detailed Results.

Sector	North- West	North- Center	North- East	South- East	South- Muntenia	Bucharest- Ilfov	South- West	West	TOTAL
Top executives	2226	2092	1764	1802	1893	5606	1278	1593	18253
Advertising, marketing, promotions, public relations, and sales managers	481	447	355	360	406	1529	248	366	4191
Operations specialties managers	1364	1259	940	974	1133	4098	688	1029	11486
Other management occupations	1510	1388	1293	1311	1387	3889	938	1058	12774
Business operations specialists	3767	3571	2890	3141	3446	12632	2195	2779	34421
Financial specialists	2274	1629	1522	1136	1259	7927	811	1529	18087
Computer occupations	2506	2494	1830	2002	2387	11063	1362	2097	25740
Mathematical science occupations	155	137	109	110	130	689	77	115	1523
Architects, surveyors, and cartographers	146	155	119	136	160	758	95	113	1684
Engineers	1460	1693	999	1333	1584	4146	918	1375	13509
Drafters, engineering technicians, and mapping technicians	594	659	416	512	618	1815	360	516	5490
Life scientists	206	245	187	168	205	745	151	177	2084
Physical scientists	144	166	116	132	170	656	102	113	1598
Social scientists and related workers	74	80	62	73	90	363	53	57	852
Life, physical, and social science technicians	186	207	151	177	218	793	135	143	2009
Occupational health and safety specialists and technicians	118	121	93	110	119	284	80	85	1009
Counselors, social workers, and other community and social service specialists	434	444	410	405	491	1426	325	323	4259
Religious workers	23	23	20	20	22	73	14	16	212
Lawyers, judges, and related workers	465	494	361	422	521	2637	291	366	5557
Legal support workers	290	305	223	258	320	1667	178	225	3466
Postsecondary teachers	115	137	126	151	210	381	123	98	1341
Preschool, elementary, middle, secondary, and special education teachers	314	360	346	384	523	920	317	260	3424
Other teachers and instructors	51	52	46	48	55	162	36	39	490
Librarians, curators, and archivists	54	60	47	59	73	251	43	46	633
Other educational instruction and library occupations	148	169	157	177	238	469	144	122	1622
Art and design workers	373	371	296	314	348	1262	209	282	3453
Entertainers and performers, sports and related workers	186	158	133	130	158	587	100	123	1576
Media and communication workers	254	249	184	205	241	1087	141	191	2550
Media and communication equipment workers	108	88	64	63	79	451	45	67	966
Healthcare diagnosing or treating practitioners	1183	1123	1209	967	1110	2242	839	863	9535
Health technologists and technicians	750	723	723	635	707	1792	508	562	6399
Other healthcare practitioners and technical occupations	27	26	26	23	27	71	19	20	240
Home health and personal care aides; and nursing assistants, orderlies, and psychiatric aides	855	802	929	668	770	1036	622	619	6301
Occupational therapy and physical therapist assistants and aides	32	30	36	25	29	35	24	24	236
Other healthcare support occupations	362	352	365	298	347	856	253	270	3103
Supervisors of protective service workers	106	117	84	113	137	555	79	82	1274
Firefighting and prevention workers	108	122	84	118	145	609	81	84	1351
Law enforcement workers	400	450	311	434	535	2255	301	309	4995
Other protective service workers	293	282	240	268	309	995	199	221	2806
Supervisors of food preparation and serving workers	87	85	80	79	88	213	61	65	758
Cooks and food preparation workers	323	307	299	291	309	709	219	241	2698
Food and beverage serving workers	434	419	397	391	427	1002	295	320	3685
Other food preparation and serving related workers	74	73	70	68	77	180	54	55	651
Supervisors of building and grounds cleaning and maintenance workers	36	34	33	33	39	122	25	27	348
Building cleaning and pest control workers	401	387	351	352	417	1135	267	296	3606
Grounds maintenance workers	200	188	179	184	204	621	138	148	1861
Supervisors of personal care and service workers	58	56	52	52	58	150	40	44	509

Appendix Table 6 (Continued). NRRP Impact: Changes in Employment by Occupation. Detailed Results.

Sector	North- West	North- Center	North- East	South- East	South- Muntenia	Bucharest- Ilfov	South- West	West	TOTAL
Animal care and service workers	89	84	76	81	90	309	55	66	851
Entertainment attendants and related workers	217	207	192	194	218	520	151	165	1864
Funeral service workers	3	3	2	2	2	10	1	2	25
Personal appearance workers	38	36	33	33	33	101	22	27	322
Baggage porters, bellhops, and concierges	7	7	6	6	6	15	4	5	56
Tour and travel guides	16	15	14	14	16	33	11	12	132
Other personal care and service workers	304	301	296	278	319	666	225	233	2622
Supervisors of sales workers	727	641	612	605	573	1535	407	542	5642
Retail sales workers	3652	3302	3185	3239	3012	7176	2165	2773	28504
Sales representatives, services	1404	961	953	762	781	4757	532	879	11029
Sales representatives, wholesale and manufacturing	1020	1024	785	818	890	1802	555	776	7670
Other sales and related workers	214	197	165	163	180	644	112	157	1832
Supervisors of office and administrative support workers	785	653	589	558	581	2158	391	544	6259
Communications equipment operators	11	9	9	8	9	33	6	8	94
Financial clerks	1982	1576	1472	1220	1273	5416	885	1351	15175
Information and record clerks	2556	2064	1887	1803	1843	7671	1233	1774	20832
Material recording, scheduling, dispatching, and distributing workers	1337	1344	931	1196	1312	3018	803	1018	10958
Secretaries and administrative assistants	1410	1311	1161	1157	1268	4301	838	998	12443
Other office and administrative support workers	2005	1854	1619	1633	1704	5210	1183	1385	16592
Supervisors of farming, fishing, and forestry workers	162	213	173	91	98	45	135	160	1076
Agricultural workers	475	365	421	404	443	908	272	310	3597
Fishing and hunting workers	1	1	1	8	2	0	1	1	14
Forest, conservation, and logging workers	1087	1514	1193	561	607	33	942	1118	7055
Supervisors of construction and extraction workers	1463	1263	1313	1256	1138	2715	895	901	10944
Construction trades workers	9970	8513	8935	8487	7558	18124	5998	6162	73747
Helpers, construction trades	508	427	461	432	381	935	303	312	3759
Other construction and related workers	395	370	349	391	386	1168	257	278	3594
Extraction workers	341	368	254	276	325	322	276	192	2354
Supervisors of installation, maintenance, and repair workers	414	398	345	424	388	820	300	294	3383
Electrical and electronic equipment mechanics, installers, and repairers	352	332	297	347	321	908	242	260	3059
Vehicle and mobile equipment mechanics, installers, and repairers	969	949	790	1094	872	1650	658	762	7744
Other installation, maintenance, and repair occupations	2737	2626	2270	2567	2486	5061	1885	1897	21529
Supervisors of production workers	699	783	427	580	712	759	422	538	4919
Assemblers and fabricators	1841	2362	977	1674	2005	1631	1051	1975	13516
Food processing workers	220	227	197	207	246	411	140	157	1806
Metal workers and plastic workers	2285	2392	1115	2153	2467	1951	1542	1752	15656
Printing workers	105	90	60	50	71	289	41	48	753
Textile, apparel, and furnishings workers	467	581	468	391	531	449	228	371	3486
Woodworkers	527	662	398	247	266	244	206	313	2863
Plant and system operators	268	300	238	318	328	644	266	201	2562
Other production occupations	2257	2466	1353	1686	2233	2454	1233	1668	15349
Supervisors of transportation and material moving workers	333	312	243	315	298	569	191	248	2509
Air transportation workers	36	35	23	272	71	141	43	29	650
Motor vehicle operators	3333	3087	2252	2601	2637	4431	1747	2411	22500
Rail transportation workers	81	67	39	47	59	113	32	53	491
Water transportation workers	67	57	37	42	50	97	28	45	423
Other transportation workers	114	105	82	115	102	236	67	85	907
Material moving workers	3529	3436	2724	3378	3230	5976	2112	2670	27055
TOTAL	78571	74715	62148	65298	68642	181398	46578	57475	634823