

# CEDRE Capital Investment Plan: Scrutinizing the Allocation of Projects and Funds Across Regions

Sami Atallah, Georgia Dagher, and Mounir Mahmalat

## About the authors

Mounir Mahmalat is a Ph.D. (c.) in economics at Dublin City University, Ireland; fellow at Harvard University, Department of Government; American University of Beirut, Center for Arab and Middle Eastern Studies; and a doctoral fellow at LCPS. His scholarship focuses on the political economy of reform, specifically in the Middle East and Lebanon. He holds a master's degree in International Management and two bachelor's degrees in Engineering and Music Performance.

Georgia Dagher is a researcher at the Lebanese Center for Policy Studies. She graduated from the University of Edinburgh with a degree in Political Science and Quantitative Methods. Her work at LCPS focuses mainly on studying voter behavior, parliamentary elections, as well as monitoring the Lebanese government's reform programs.

Sami Atallah is the director of the Lebanese Center for Policy Studies. He is currently leading several policy studies on youth social identity and political engagement, electoral behavior, political and social sectarianism, and the role of municipalities in dealing with the refugee crisis. He is the co-editor of *Democracy, Decentralization, and Service Delivery in the Arab World* (with Mona Harb, Beirut, LCPS 2015), co-editor of *The Future of Petroleum in Lebanon: Energy, Politics, and Economic Growth* (with Bassam Fattouh, I.B. Tauris, 2019), and co-editor of *The Lebanese Parliament 2009-2018: From Illegal Extensions to Vacuum* (with Nayla Geagea, 2018).

## Executive Summary

Large disparities in infrastructure quality have exacerbated persistent regional inequalities in economic development. In order to tackle this issue, the government developed a Capital Investment Plan (CIP), outlining 269 projects in all major infrastructure sectors of the economy. The plan was presented at the *Conférence économique pour le développement, par les réformes et avec les entreprises* (CEDRE), and received funding pledges amounting to \$11.06 billion, equivalent to roughly a fifth of the national GDP. As the prevailing patterns of resource allocation have failed to reduce regional inequality in the past, the geographical distribution of funds outlined in the CIP warrants scrutiny. To that end, this brief analyzes the allocation of infrastructure projects summarized in the CIP and maps the distribution of funds across regions and districts. We test the relationship of a set of socio-economic variables to the allocation of funds per district to assess the extent to which the distribution of projects follows assessments of need. We find that a poorer quality of infrastructure, lower level of economic development or amount of municipal funding, as well as a higher prevalence of poverty or presence of refugees fail to explain the large variation in the allocation of funds across districts.

1

The number of projects and their allocation to governorates our analysis identifies slightly deviate from prior analyses published by the World Bank. These differences relate to the analytical perspective we take in this brief, which focuses on the distribution of funds on a district level, rather than an in-depth sectoral assessment. The geographic distribution of projects has—to our knowledge—not been studied in extant literature. See the annex of this brief for more details on the methodology and: World Bank. 2018. 'Strategic Assessment: A Capital Investment Plan for Lebanon.'

2

Including \$10.2 billion in loans (out of which \$9.9 billion are on concessional terms) and \$0.86 billion in grants (which include grants to subsidize loans).

3

Government of Lebanon. 2018. 'Capital Investment Program Report,' p. i. <http://www.pcm.gov.lb/Admin/DynamicFile.aspx?PHName=Document&PageID=11231&published=1>

4

Ibid.

5

Alesina, A., S. Michalopoulos, and E. Papaioannou. 2016. 'Ethnic Inequality.' *Journal of Political Economy*. <https://doi.org/10.1086/685300>

6

Assouad, L. 2010. 'Rethinking the Lebanese Economic Miracle: The Extreme Concentration of Income and Wealth in Lebanon 2005-2014.' WID. World Working Paper Series; Salti, N. and J. Chaaban. 2010. 'The Role of Sectarianism in the Allocation of Public Expenditure in Postwar Lebanon.' *International Journal of Middle East Studies*. <https://doi.org/10.1017/S0020743810000851>

7

Leenders, R. 2012. 'Spoils of Truce: Corruption and State-Building in Postwar Lebanon.' (Ithaca: Cornell University Press); Diwan, I. and J. I. Haidar. 2017. 'Do Political Connections Reduce Job Creation? Evidence from Lebanon.' <http://scholar.harvard.edu/files/haidar/files/diwanhaidar-pjcc-01142017.pdf>

## Introduction

When the international community convened on 6 April 2018 for the *Conférence économique pour le développement, par les réformes et avec les entreprises* (CEDRE), the Lebanese government presented the Capital Investment Plan (CIP). The plan provides details on 269 infrastructure projects,<sup>1</sup> worth roughly \$23 billion, in all key sectors of the economy including electricity, water, and transportation, in order to ameliorate Lebanon's dilapidated public infrastructure. The aim of the conference was for the Lebanese government to seek funding from international donors, who eventually pledged more than \$11.06 billion in soft loans to finance the CIP.<sup>2</sup>

In the CIP, the government claims that 'reducing inequality' was the central rationale for the choice and allocation of projects.<sup>3</sup> According to the plan, new infrastructure in key sectors should help alleviate structural deficiencies of poorer districts and 'mitigate the impacts of the Syrian crisis [sic].'<sup>4</sup> As a large body of literature shows, the reduction of inequality has a number of positive effects on economic and political development.<sup>5</sup> With a size of more than 40% of Lebanon's total GDP—which was roughly \$52 billion in 2017—the CIP offers a unique opportunity to address existing shortages in the provision of public infrastructure and ensure a balanced development across regions and constituencies. However, as the prevailing patterns of resource allocation have failed to ensure balanced economic development and a reduction of inequality in the past,<sup>6</sup> the allocation of funds in the CIP warrants scrutiny.

This brief analyzes the allocation of infrastructure projects outlined in the CIP. We review all 269 projects to identify their investment volume, location at the district level, sector, and implementation cycle. Analyzing the allocation of funds and infrastructure projects matters for two main reasons. First, like other public resources, the assignment of infrastructure projects can be used as a patronage tool by political elites.<sup>7</sup> Influential politicians and individuals might abuse their power to allocate funds to connected firms and regions, which then undermines the officially stated goal of combatting regional inequalities. Second, infrastructure projects have positive spillover effects on the local economy by directly and indirectly creating jobs, generating additional revenues for local businesses through the influx of external funds, and, eventually, ameliorating local infrastructure. The mere size of the program in relation to national GDP therefore constitutes a significant source of revenue that can spur economic growth and employment.

Our analysis proceeds in two steps. First, we map out the variation in the allocation of projects across sectors and regions. We show that the transport and electricity sectors receive the largest shares of projects and funds, while solid waste, telecommunication, and infrastructure for cultural sites receive the least. On a regional basis, Mount Lebanon receives most funds and projects across all sectors, while the Bekaa, Beirut, and Akkar receive the fewest. Moreover, the government prioritizes national projects, such as the expansion

of the Rafic Hariri International Airport, the rehabilitation of the Rene Mouawad Air Base in Tripoli, and the improvement of telecommunication infrastructure. Lastly, projects in Metn, Akkar, and Batroun are more likely to be implemented, as the CIP assigns them earlier investments cycles and thereby a higher likelihood of receiving funding.

Second, we examine the drivers of project allocation across districts, and test whether their geographical variation can be explained by need assessments. Following the CIP's official rationale, less developed regions should receive more funds and projects than wealthier ones in order to decrease inequality and ensure balanced development. Our results indicate that contrary to the government's narrative, assessments based on need fail to explain the varia-

tion of funds and projects across regions. We find that districts with higher poverty rates or share of Syrian refugees, as well as those with lower levels of economic development, poorer

**Contrary to the government's narrative, assessments based on need fail to explain the variation of funds and projects across regions**

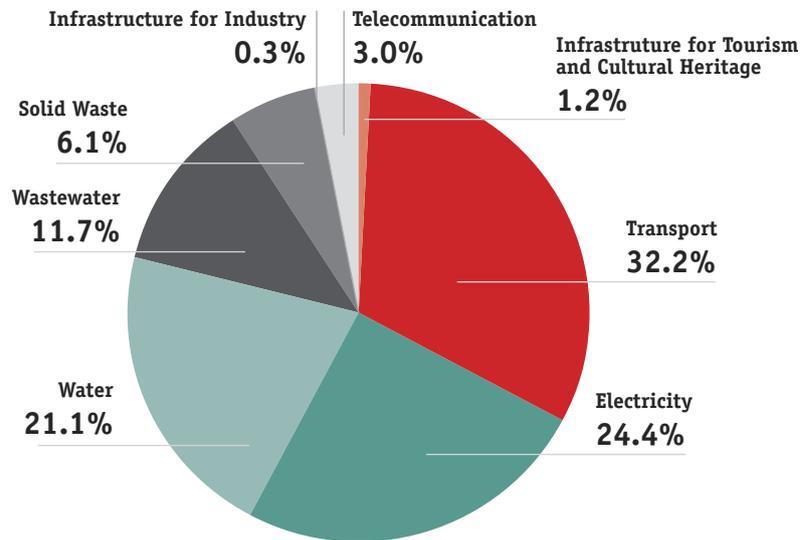
infrastructure quality, and lower levels of municipal revenues do not receive a higher share of funds for projects.

These results suggest that factors other than regional levels of development seem to have influenced on the decisions for resource allocation in the elaboration of the CIP. Whether this influence relates to technical, political, or institutional factors requires further analysis. Although the CIP has yet to be implemented, the underlying rationale for the choice of projects and the firms that will be executing them should be scrutinized in order to prevent potential elite capture.

### **CIP Projects: Mapping Variation**

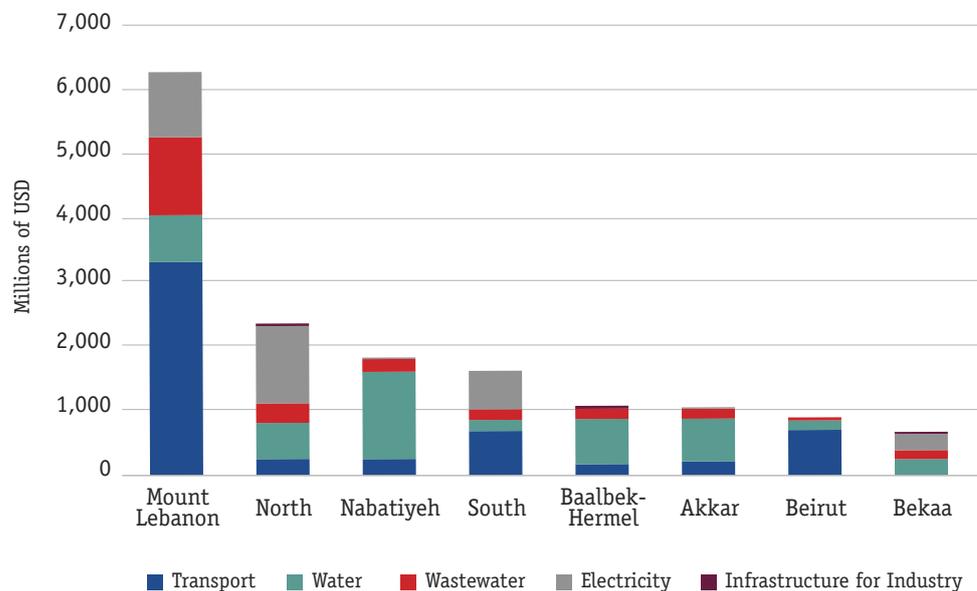
The CIP comprises 269 infrastructure projects in eight sectors (figure 1): Water (124 projects); wastewater (82); transport (24); electricity (17); infrastructure for tourism and cultural heritage (11); telecommunication (8); infrastructure for industry (2); and solid waste (1). The largest share of funds allocated to a sector—more than \$7.3 billion, 32% of the total value of the CIP—is for the transportation sector. The electricity sector receives the second largest share with \$5.6 billion—or 25% of the total value—while infrastructure for tourism and cultural heritage and the industry sectors receive the least, with \$265 million and \$75 million.

Figure 1

**Allocation of project values across sectors**

The project value and composition of projects across sectors vary across governorates (figure 2). We review the number and value of projects allocated to districts, as reported in the CIP. Mount Lebanon receives the largest share of funds (\$6.3 billion), half of which are for transportation projects. The Bekaa receives the least amount of funds (\$675 million), and is followed by Beirut, Akkar, and Baalbek-Hermel (between \$900 and \$1,001 million each), which are mostly for water projects. In a similar vein, Nabatiyeh receives the majority of its funds for water-related projects.

Figure 2

**Cost of projects by governorate and sector (in millions of USD)**

Both the absolute value of allocated funds as well as the number of projects exhibit significant variation within governorates and across districts. In fact, within each governorate, one district will receive the majority of funds. Figure 3 maps the allocation of funds to the districts and sectors in which they will be deployed. While the Mount Lebanon governorate receives the highest amount of funds, a third of it, or almost \$2 billion, will go to the Metn district, mainly to finance transportation projects. By contrast, Aley receives less than \$600 million, which will finance mainly water and wastewater projects. In the Bekaa governorate, which receives the lowest amount of funds, West Bekaa and Rachaya districts receive less than \$80 million each, while Zahle will receive over five times as much (\$531 million), as well as over half the projects that will go to the area. In the North governorate, over half the investment, or \$1.4 out of \$2.3 billion, will go to Batroun, while Bcharre will receive less than \$100 million. Similarly, in the South governorate, Saida receives the majority of funds (\$1.1 billion out of \$1.6), making it one of the districts that receive the highest share, while Jezzine will receive less than \$50 million, and is the district that will receive the lowest share. In the Nabatiyeh governorate, the Nabatiyeh district receives the majority of the investment (\$1 billion), while Bint Jbeil only receives \$142 million. Moreover, although the governorates of Beirut and Akkar are among those that will receive the lowest amount of funds, each of the two will receive significantly more than the majority of districts.<sup>8</sup>

Overall, across districts, Metn receives the highest amount of funds (\$1.9 billion), followed by Batroun (\$1.4 billion), Saida (\$1.1 billion), Akkar, and Nabatiyeh (\$1 billion each). These five districts are also among the few that have projects costing more than \$300 million, with Batroun and Saida having two each, and the three others having one each. Other districts with high cost projects are Keserwan, Chouf, Sour, Marjayoun, and Hermel, which have one each. By contrast, Bcharre, Jezzine, West Bekaa, and Rachaya receive less than \$100 million each, with no single project costing more than \$65 million (most fall under the \$0-\$10 million range), and in sectors other than water and wastewater.

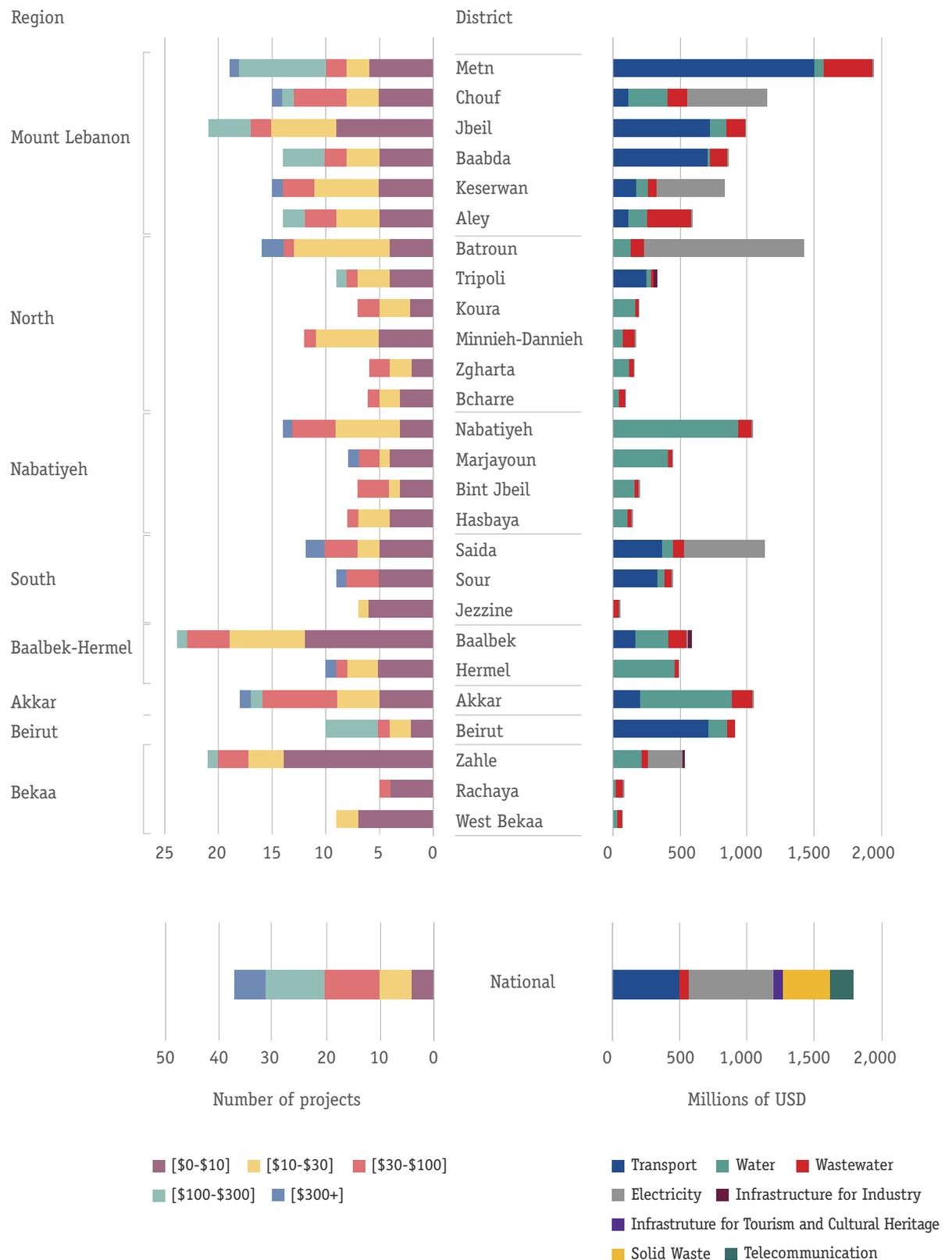
While Baalbek, followed by Zahle and Jbeil, have the highest number of projects (23, 19, and 19), all of these also have the highest number of projects that will cost less than \$10 million (12, 14, and 9). Rachaya, Zgharta, and Bcharre receive the lowest number of projects (5, 6, and 6), more than half of which do not exceed \$10 million.

### 8

In this view, we only consider projects that are explicitly allocated to a specific district. We exclude projects that are assigned the label of 'national.'

Figure 3

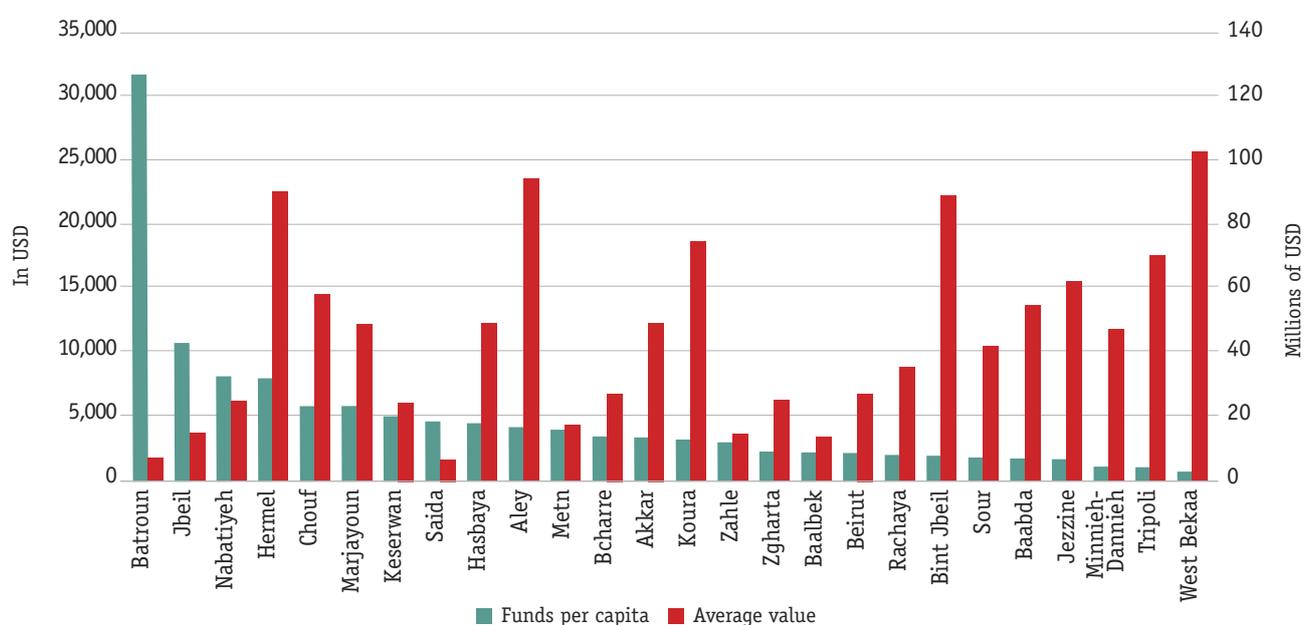
### Number (left) and cost in millions of USD (right) of CIP projects by qada and sector



Accordingly, the average value of projects across districts is highest in Metn (\$103 million), followed by Saida (\$94 million), and Beirut (\$91 million) (figure 4), and lowest in Jezzine and West Bekaa—where each project will cost \$7 million on average. When distributed according to population size in a given district, however, this variation is less pronounced. The allocation of funds per capita is highest in Batroun and Jbeil (roughly \$30,000 and \$10,000) and lowest in West Bekaa, Tripoli, and Minnieh-Dannieh (around \$1,000). The majority of districts, however, receive funding within a 50% range of the average across all districts (\$4,300).

Figure 4

**Average value of projects per capita in USD (right) and by district in millions of USD (left)**



## National Projects a Priority

The CIP will span over eight to 12 years in total, and will be implemented in three phases, or ‘cycles’. Each project proposal was placed into one of the three cycles, based on a priority score assigned by a governmental committee tasked with identifying and selecting the projects. According to the CIP report, the ‘[p]rojects were prioritized based on their readiness for implementation and their expected positive impacts to provide adequate basic services to households, enable sustainable urban development, and improve social security, stability and wellbeing [...] and mitigation of the impacts of the Syrian crisis [sic].’<sup>9</sup>

The pledges made from international donors, however, will not cover all three phases but the first two at most. Moreover, the donors made the disbursement of pledges contingent on the successful implementation of a reform agenda, which adds uncertainty to the full disbursement of the funds.<sup>10</sup> The allocation of funds per cycle, therefore, is important to analyze, as projects in cycle 1

<sup>9</sup> Government of Lebanon. 2018. ‘Capital Investment Program Report.’ p. i <http://www.pcm.gov.lb/Admin/DynamicFile.aspx?PHName=Document&PageID=11231&published=1>

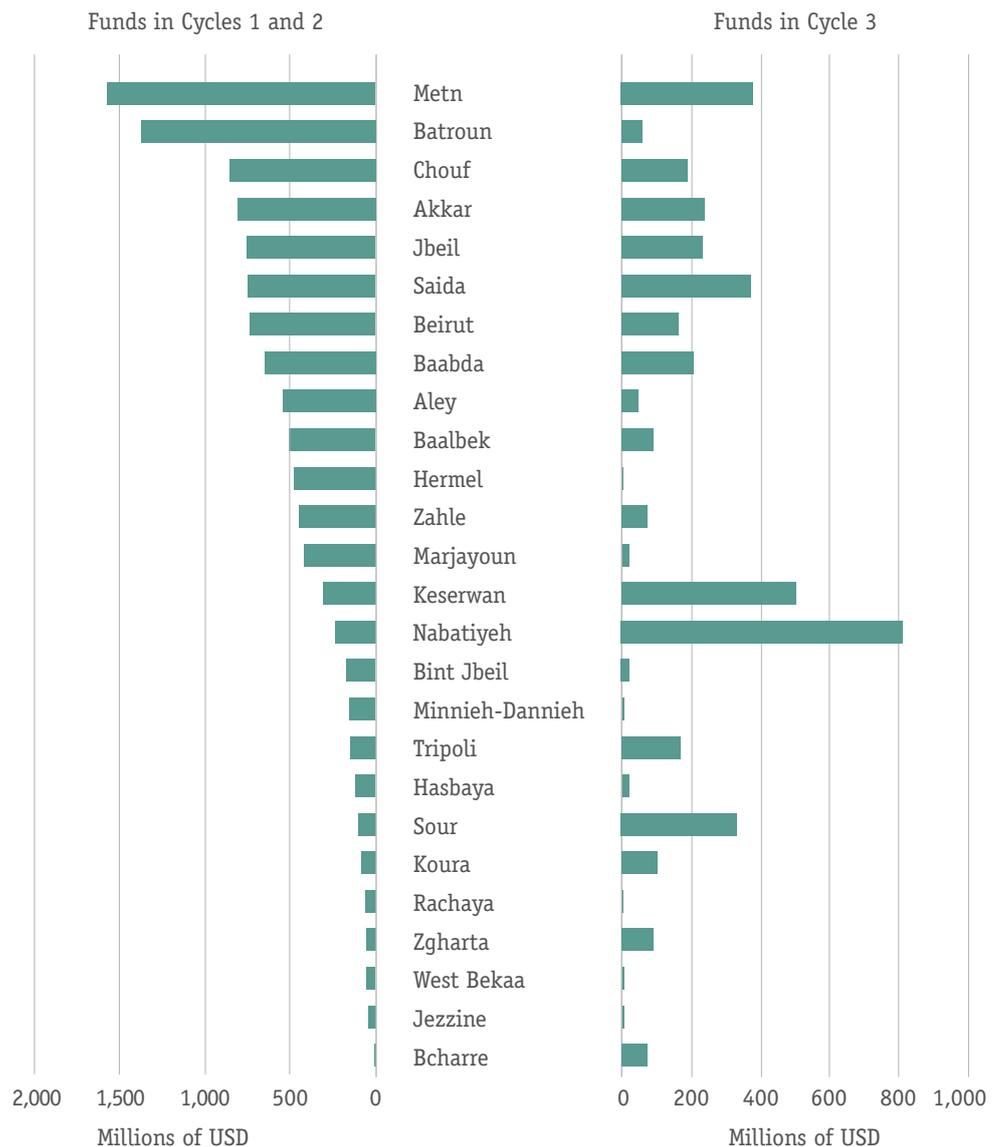
<sup>10</sup> Atallah, S., G. Dagher, and M. Mahmalat. 2019. ‘The CEDRE Reform Program Needs a Credible Action Plan.’ Lebanese Center for Policy Studies. [www.lcps-lebanon.org/publications/1557930590-policy\\_brief\\_42\\_eng\\_web.pdf](http://www.lcps-lebanon.org/publications/1557930590-policy_brief_42_eng_web.pdf)

and 2 have a higher likelihood of being implemented as part of the CIP than projects in cycle 3.

Similar to the distribution of projects across districts, the allocation of funds across cycles varies widely (figure 5). National projects will receive a total of \$7.2 billion, \$5.7 billion of which are scheduled for the first and second cycles. These projects are considered to be of national benefit and include, for example, the restoration of airports, or that of telecommunication infrastructure. The geographic location of many of these projects is fixed and therefore non-negotiable. On a regional basis, most districts, or 19 out of the 26, receive the majority of their funds in cycles 1 and 2. In particular, Metn, Batroun, Chouf, Beirut, and Akkar receive most funds in cycles 1 and 2. On the other hand, Nabatiyeh, Sour, Bcharre, Koura, Zgharta, Tripoli, and Keserwan receive the majority of their allocated funds in cycle 3.

Figure 5

**Value of CIP projects by cycle of implementation (in millions of USD), left: cycle 1 and 2, right: cycle 3**



The most valuable projects are dispersed over all sectors and regions. The only budget-line addressing the solid waste sector allocates \$1.4 billion on a national scale for the establishment of Waste to Energy (WtE) plants. These projects, however, do not provide any information about location or tendering processes, and give contradictory information about the nature of the necessary investments.<sup>11</sup> Electricity projects cover the largest single projects and include new power plants in Batroun, Saida, Chouf, and Keserwan, as well as a new plant in a so-far undisclosed location. Transportation projects include the expansion of the Beirut Rafic Hariri International Airport and the completion of several highways across the country. The biggest water projects include dams and irrigation networks in Hermel, Akkar, and Nabatiyeh.

**11**

The CIP states that the 'capital investment in these WtE plants is expected to be covered by the private sector, with the return on investment achieved through fees, imposed on the waste treatment processes' (p. 125). That way, the rationale and details for the expenditure of the allocated budget remains unclear, in particular as long as no sites for WtE plants are selected. [www.pcm.gov.lb/Admin/DynamicFile.aspx?PHName=Document&PageID=11231&published=1](http://www.pcm.gov.lb/Admin/DynamicFile.aspx?PHName=Document&PageID=11231&published=1)

Table 1

**Overview of top projects**

Sector	District(s)	Implementation cycle	Cost (in millions of USD)	Description
Solid Waste	National	1	1,400	Solid waste management to cover all of Lebanon including collection, sorting, treatment, and landfill sites
Electricity	National (unspecified location)	3	1,200	New power plants on longer term (capacity of 1,000MW)
Transport	Beirut, Metn, and Baabda	2	648	Beirut Périphérique Highway (Phase 2)
Water	Nabatiyeh	3	635	Construction of irrigation and water supply dam on the Khardali segment of the Litani River
Electricity	Batroun (Salaata)	1	600	New power plants on medium term (capacity of 1,000MW)
Electricity	Saida (Zahrani)	1	600	New power plants on medium term (capacity of 1,000MW)
Electricity	Batroun (Salaata)	2	600	New power plant on longer term (capacity of 500MW)
Transport	Saida and Sour	3	600	Southern Coastal Highway (Saida Bypass and Sour Link)
Transport	National	1	509	Rehabilitation of classified roads and municipal roads
Transport	National	1	500	Rehabilitation and development of Beirut Rafic Hariri International Airport (Phase 1)
Transport	Beirut, Metn, and Baabda	1	500	Bus rapid transit system - Greater Beirut public transport project
Transport	National	2	500	Beirut-Damascus Highway completion
Electricity	Chouf (Jiyeh)	2	500	New power plant (capacity of 500MW)
Electricity	Keserwan (Zouk)	3	500	New power plant (capacity of 500MW)
Transport	Metn and Jbeil	2	496	Dbaye-Nahr Ibrahim Motorway (Phase 2)
Transport	Beirut, Metn, and Baabda	1	486	Beirut Périphérique Highway (Phase 1)
Transport	Beirut, Metn, and Baabda	3	486	Beirut Périphérique Highway (Phase 3)
Transport	National	2	430	New and upgrading of road network on a multiregional scale

Sector	District(s)	Implementation cycle	Cost (in millions of USD)	Description
Transport	Metn and Jbeil	1	372	Dbaye-Nahr Ibrahim Motorway (Phase 1)
Transport	Metn and Jbeil	3	372	Dbaye-Nahr Ibrahim Motorway (Phase 3)
Water	Hermel	2	340	Construction of Assi water and irrigation dam (15 MCM) (Phase 2)
Transport	Keserwan, Jbeil, Aley, and Chouf	2	314	Service road for the coastal highway, from Jounieh to Jbeil, and Khalde to Damour (Phase 2)
Wastewater	Metn	1	300	Upgrade of Daoura wastewater treatment plant
Water	Akkar	1	300	Construction of El-Bared water supply dam and associated water treatment plant and networks
Water	Marjayoun	2	300	Construction of irrigation and water supply dam on the Hasbani river next to Ibl es-Saqi
Water	Nabatiyeh, Bint Jbeil, Marjayoun, and Hasbaya	1	300	Construction of distribution networks for irrigation and water supply on the Litani River

12

Anderson, L. R., J. M. Mellor, and J. Milyo. 2008. 'Inequality and Public Good Provision: An Experimental Analysis.' *Journal of Socio-Economics*. <https://doi.org/10.1016/j.soc.2006.12.073>; Beach, B. and D. B. Jones. 2017. 'Gridlock: Ethnic Diversity in Government and the Provision of Public Goods.' *American Economic Journal: Economic Policy*. <https://doi.org/10.1257/pol.20150394>

13

Collier, P. and A. Hoeffler. 2004. 'Greed and Grievance in Civil War.' *Oxford Economic Papers*. <https://doi.org/10.1111/j.1468-2346.2012.01100.x>

14

Alesina, Michalopoulos, and Papaioannou. 2016. 'Ethnic Inequality.'

15

Assouad. 2010. 'Rethinking the Lebanese Economic Miracle.'

16

See Annex for detailed methodological explanations.

17

Unfortunately, detailed and standardized assessments of the quality of infrastructure across districts is not available for Lebanon.

## Allocation of Funds Unrelated to Need Assessments

The government claims that the project allocation's guiding principle in the CIP is the reduction of inequalities in development across regions and communities. The negative effects of persisting inequalities across social groups, for example, reduce the provision of public goods, which further aggravates unequal development.<sup>12</sup> The reduction of such inequalities therefore contributes to multiple developmental goals, including increasing political stability<sup>13</sup> and economic development.<sup>14</sup> Ameliorating the infrastructure for the provision of public goods is a crucial prerequisite to ensure balanced development across geographical areas and group boundaries.

To that end, the CIP offers a unique opportunity to reduce the persistent inequalities that have marked the Lebanese post-war reconstruction period.<sup>15</sup> It could provide less privileged constituencies with much needed financial and technical expertise to catch up with more developed districts in areas such as electricity supply, waste management, or transportation. Officially, the allocation of projects within the CIP follows these considerations and prioritizes underdeveloped communities and those hosting a larger share of Syrian refugees.

In order to examine whether the allocation of funds and projects across regions follows the stated considerations of need assessments, we analyze the relationship between fund allocation per capita and a set of socio-economic factors.<sup>16</sup> These factors proxy the degree to which a district needs additional investments to ensure a balanced development and a reduction of inequality, vis-à-vis other districts. To that end, we use five variables:<sup>17</sup>

1. The level of economic development, as indicated by the Nightlight Intensity Index provided by the National Oceanic and Atmospheric Administration;
2. An aggregate index of infrastructure quality, constructed by the authors and based on a variety of sources;

3. The number of Lebanese households living below the poverty line, based on the number of Lebanese National Poverty Targeting Program recipients;
4. The amount of municipal revenues obtained by the Ministry of Interior and Municipalities;
5. The number of Syrian refugees per capita, as provided by the UNHCR.

In the absence of more detailed and disaggregated data about regional economic development and infrastructure quality, these indicators can only provide a tentative indication of a district’s developmental needs. However, if the allocation of funds followed the officially stated goal of reducing inequality, districts with lower levels of economic development, quality of infrastructure, or municipal revenues, but higher poverty rates and number of refugees per capita, should receive a higher share of funds.

**Contrary to the governmental narrative and official targets, the allocation of funds and projects does not appear to be driven by assessments of needs**

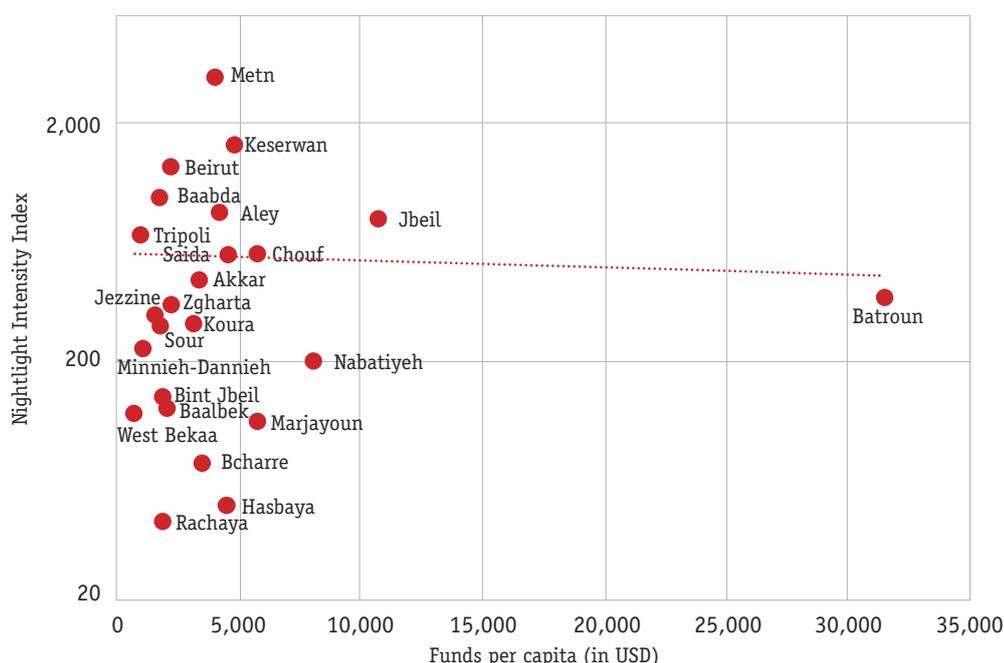
However, mapping the allocation of funds to these indicators shows that none of these five indicators drive the allocation of funds. Instead, districts with a higher level of economic development, more municipal revenues, or a better infrastructure quality will enjoy, on average, a slightly higher amount of funds (figure 6).<sup>18</sup> Similarly, districts with a higher prevalence of poverty and with a higher number of refugees per capita do not receive a higher share of funds.<sup>19</sup> Contrary to the governmental narrative and official targets, the allocation of funds and projects does not appear to be driven by assessments of needs.

**18**  
Pearson correlation (0.03), (0.1), and (0.09), not statistically significant.

**19**  
Pearson correlation (0.24) and (0.05), not statistically significant.

**Figure 6**  
**Correlation of project value with selected indicators of development per qada**

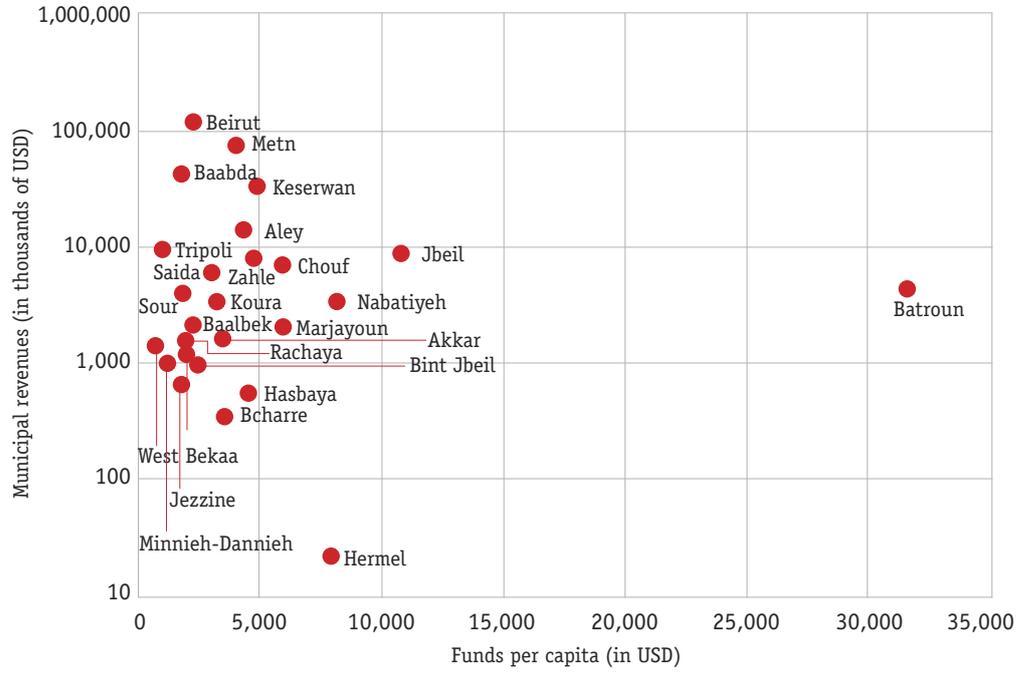
**a) Funds and level of economic development<sup>20</sup>**



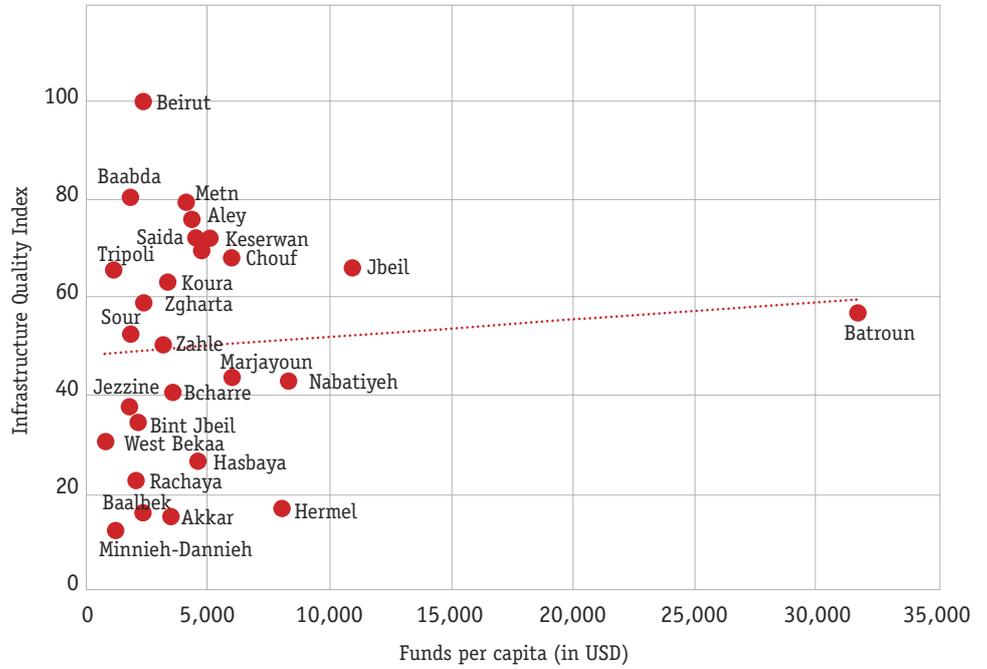
**20**  
y-axis in logarithmic scale.

21  
y-axis in logarithmic scale.

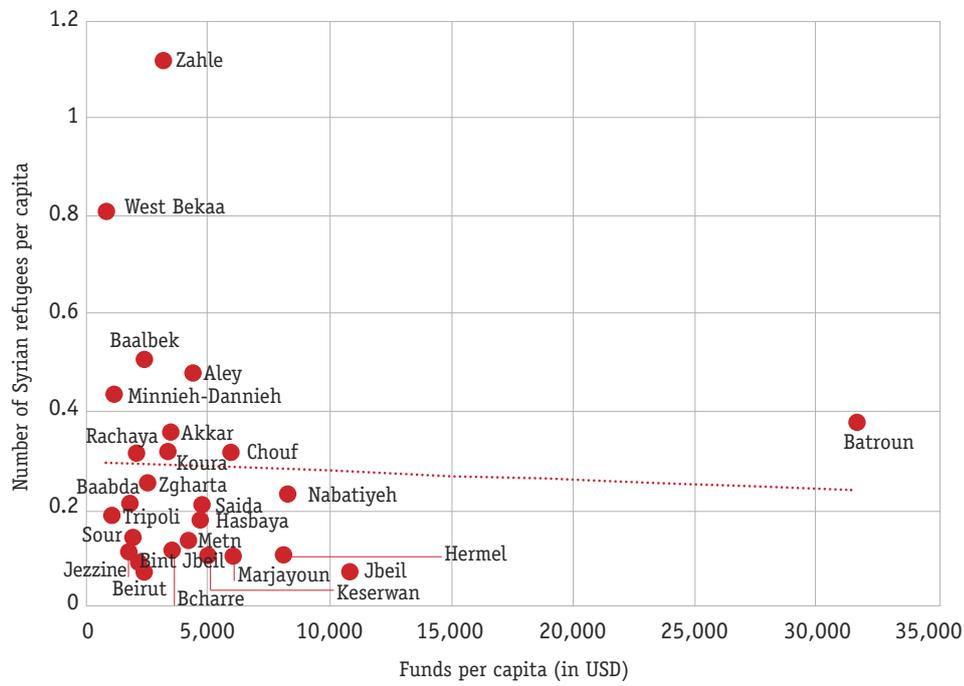
**b) Funds and municipal revenues<sup>21</sup>**



**c) Funds and infrastructure quality**

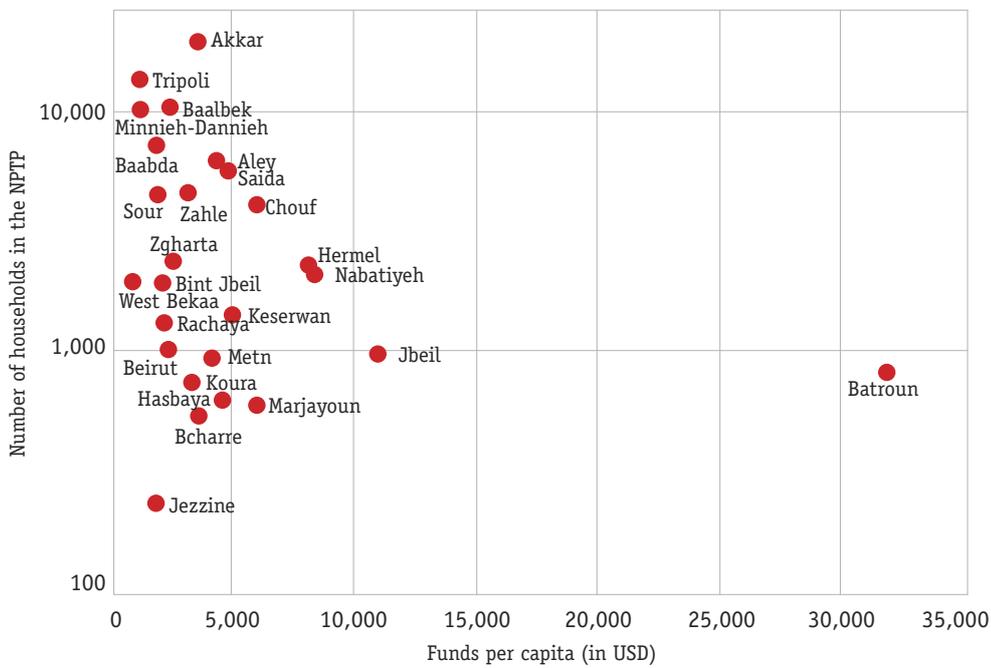


**d) Funds and number of Syrian refugees per capita**



**e) Funds and poverty<sup>22</sup>**

22  
y-axis in logarithmic scale.



### Politicizing Equality?

The CIP represents an encompassing effort to integrate previous developmental plans and strategies into an actionable plan. In this plan, the government reviews extant studies and acknowledges deficits in the development of sectors. That way, the CIP offers an important approach to prioritize the many developmental challenges Lebanon faces, and could contribute to a more balanced economic development across geographical areas. However, the fact that development indicators fail to explain the allocation of funds and projects across regions casts doubt on the potential contribution of the CIP to the goal of reducing interregional inequality across the country.

Moreover, many important budget-lines remain unspecified and do not provide full details of the projects that need financing. While the CIP is particularly elaborate for the transportation, water, and wastewater sectors,

**Many important budget-lines remain unspecified and do not provide full details of the projects that need financing**

it does not provide details of a single concrete project for the solid waste sector and remains unclear about the detailed financing requirements across regions. In the

transportation sector, the CIP describes many projects as the ‘rehabilitation of roads’ without specifying any location. Regarding the electricity sector, while most projects have been assigned a location, the one that will require the highest investment—the construction of a new power plant—remains without detail. The lack of specificity for major projects hinders to forecast the socio-economic impact of the plan, the monitoring of the distribution of funds across regions, as well as the implementation of a significant part of the CIP.

Further research is necessary to fully understand the extent to which technical, institutional, and political factors determined the allocation of projects across regions. In order to identify and minimize potential political capture and the squandering of funds, it is important to identify the mechanisms by which political considerations and administrative obstacles influenced the selection of projects in the CIP. In this vein, it becomes imperative for the civil society and the international community to monitor the tendering processes.

## Annex

### Methodology: Cost allocation in the Capital Investment Plan

The list of CIP projects and their respective costs were prepared by the Lebanese government for the CEDRE conference. The document, titled the 'Capital Investment Program Report' and published in 2018, specifies the sector, implementation cycle, and district in which each project will be located.<sup>23</sup> However, some projects were classified as multi-regional, but we were able to identify the specific location from the description of these projects. Accordingly, we divided the costs for these projects by the number of district and allocated an equal share of costs to each. Moreover, while the CIP Report lists 269 single projects, our analysis includes 354 projects given that we divide multi-regional ones across different districts.

Our calculation of the allocation of funds across governorates also differs from an earlier report by the World Bank.<sup>24</sup> This is due to the report's exclusion of multi-regional and national projects that specify a location.

### Description of variables

#### Infrastructure quality index

The index of infrastructure quality was constructed based on the average of three indices: (1) Number of hours of electricity per day, (2) Local transport connectivity, and (3) Percentage of households with access to public water networks, all disaggregated regionally.<sup>25</sup>

In order to construct the index, we first transformed the three variables into comparable units by standardizing them, then averaged the converted scores of each, and re-scaled the final score so that the average is 50 and the maximum is 100.<sup>26</sup>

#### Population

The population by district was taken from the Ministry of Public Health's 2016 statistical bulletin.<sup>27</sup>

#### Total municipal revenues by district

The total municipal revenues by district were calculated based on the direct revenues by municipalities obtained from the Ministry of Interior and Municipalities in 2016.<sup>28</sup>

#### Economic development

We used nighttime light intensity as a proxy for economic development. Evening hour and nighttime lights can be referred to as a proxy for economic activity, in data-sparse countries, because consumption and production during the evening require some form of lighting.<sup>29</sup> The data was obtained from the National Oceanic and Atmospheric Administration.<sup>30</sup>

23

Government of Lebanon. 2018. 'Capital Investment Program Report.' <http://www.pcm.gov.lb/Admin/DynamicFile.aspx?PHName=Document&PageID=11231&published=1>

24

World Bank. 2018. 'Strategic Assessment: A Capital Investment Plan for Lebanon.' <http://documents.worldbank.org/curated/en/935141522688031167/pdf/124819-REVISE-D-CIP-Assessment-Final.pdf>

25

The numbers for hours of electricity per day were obtained from the World Bank's 2015 Lebanon Economic Monitor; that for transport connectivity were obtained from the 2017 Open Street Maps; and the access to water supply from the Central Administration of Statistics' Multiple Indicator Cluster Survey from 2009.

26

This methodology is based on: Sanchez, D. G. 2018. 'Perpetuating regional inequalities in Lebanon's infrastructure: The role of public investment. Lebanese Center for Policy Studies. Available at: [https://www.lcps-lebanon.org/publications/1545041988-policy\\_brief\\_36\\_eng.pdf](https://www.lcps-lebanon.org/publications/1545041988-policy_brief_36_eng.pdf).

27

Republic of Lebanon Ministry of Public Health. 2016. 'Statistical Bulletin.' <https://www.moph.gov.lb/en/Pages/8/327/statistical-bulletins>

28

Ministry of Interior and Municipalities. 2017. 'Direct Revenues of Municipalities Database.'

29

Beyer, R. et al. 2018. 'Measuring Districts' Monthly Economic Activity from Outer Space.' Policy Research Working Paper No. 8523. <https://doi.org/10.1596/1813-9450-8523>.

30

National Oceanic and Atmospheric Administration. 2017. 'Nighttime Lights Time Series data.' National Geophysical Data Center. <http://www.ngdc.noaa.gov/dmsp/downloadV4composites.html>

**31**  
Ministry of Social Affairs  
(MOSA). 2017. 'Beneficiaries  
of the National Poverty  
Targeting Program Database.'  
Accessed December 2017.

**32**  
United Nations High  
Commissioner for Refugees  
(UNHCR). 2017. 'Syria  
Refugee Response:  
Distribution of the Registered  
Syrian Refugees at the  
Cadastral Level.'

### Poverty rate

The poverty rate is based on the number of vulnerable Lebanese households in the National Poverty Targeting Program, from the Ministry of Social Affairs.<sup>31</sup>

### Refugees

The number of Syrian refugees by district was obtained from the UNHCR.<sup>32</sup>

## LCPS

### About the Policy Brief

A Policy Brief is a short piece regularly published by LCPS that analyzes key political, economic, and social issues and provides policy recommendations to a wide audience of decision makers and the public at large.

### About LCPS

Founded in 1989, the Lebanese Center for Policy Studies is a Beirut-based independent, non-partisan think-tank whose mission is to produce and advocate policies that improve good governance in fields such as oil and gas, economic development, public finance, and decentralization.

### Contact Information Lebanese Center for Policy Studies

Sadat Tower, Tenth floor  
P.O.B 55-215, Leon Street,  
Ras Beirut, Lebanon  
T: + 961 1 799301  
F: + 961 1 799302  
info@lcps-lebanon.org  
www.lcps-lebanon.org