

SCENARIOS FOR LONG-TERM ECONOMIC CITY GROWTH – MODELS AND RESULTS FOR SELECTED CORFU CASE STUDIES

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EXTENDED SUMMARY

Future flood risk and resilience of a city is distinctively affected by economic growth. Growth in economic output and changes in the sector structure determine urban development, e.g. in the settlement structure, the type and location of industries and the development of infrastructure. Thus, economic development drives the demand for land and the type of its use. Furthermore, it drives the monetary value of potential physical damages by flooding and it may affect public spending on flood protection. Overall, strategies for facing future risks emanating from flooding should consider possible changes in the economic state of a city.

This paper presents a methodological tool to create long-term scenarios for the economic development on the regional scale. The methodology of the economic growth scenarios was developed for the application in selected case studies of the CORFU project (Collaborative Research on Flood Resilience in Urban Areas (CORFU), funded within FP7 by the European Commission). The case study areas in the CORFU project comprise a mixture of very heterogeneous cities. On the one hand, there are cities in highly developed countries, exhibiting a high level of wealth and relatively low dynamics in terms of population and GDP growth. On the other hand, there are very rapidly growing cities in developing and emerging countries, which are marked by relatively weak institutions and extremely high social inequalities. The cities in highly developed countries of Europe may follow different growth patterns than the highly dynamic cities in the emerging countries of South-East Asia. Another major challenge for modelling regional economic growth in general is the limitation in the availability of regional level data. In some of the case studies the problem of data restrictions is more severe than in others. Therefore, the model is designed to produce good scenario results based on a minimum amount of data. Overall, the presented tool provides a common methodology for scenario building in heterogeneous areas. However, the regional growth models may differ in design and the quality of the outcome, mainly depending on the quality of the data available. In any case, long-term economic projections are associated with immense uncertainty. Therefore, it is essential to consider that the scenario results are not to be interpreted as predictions with a certain probability of occurrence, but as a plausible description of the future.

The procedure of our projections for regional economic growth represents a regionalisation of national economic development. That is, we apply socio-economic scenarios on the national level as underlying macroeconomic development, but taking into account regional deviations from the national growth paths. The development of long-term economic growth scenarios is conducted in a two-step procedure:

- Step1 - Ex-post analysis: Firstly, the analysis applies regression analysis on ex-post data in order to identify the impact of specific drivers on regional economic growth as well as region-specific trends that deviate from the national development.
- Step 2 - Projections: Secondly, estimated ex-post relationships are extrapolated into the future applying the estimation results from Step 1 in combination with socio-economic projections that are available mainly on the national level.

The ex-post analysis aims at identifying key drivers and long-term growth trends in order to extrapolate regional growth deviations from the national level. Therefore, we conduct a regression analysis applying panel data structure, thus comprising time-series observations for a cross-section of regions within a country. We emphasise the importance of the local sector composition in regional growth processes by estimating regional employment growth and productivity for each sector

separately. Thus, the outcome of the future scenarios for the case study areas depends crucially on the local sector structure. Furthermore, in order to account unobserved local characteristics we estimate region-specific fixed effects controlling idiosyncratic regional characteristics that are invariant over the observed time period. In Step 2, we built scenarios for regional employment, productivity and output (by economic sector) until 2050. Starting point is the most recent ex-post observation in our data set. In order to simulate the development of employment and productivity by sector and the development of working age population, we extrapolate the ex-post development by applying the estimates received in Step 1 in combination with different scenarios for the socio-economic development at the national level. The product of employment and productivity yields the projected level of output in each sector.

This paper presents the results of model applications in two selected CORFU case studies. One is Hamburg, Germany, a City with a highly developed economy, relatively low dynamics and a comparatively good availability of suitable data. The other is Dhaka, Bangladesh, representing an extremely dynamic developing economy and limited data availability.

Table 1 shows the projected changes in GVA, employment and population in Hamburg between 2012 and 2050. Because of the relative attractiveness of Hamburg, the demographic change in Hamburg is less pronounced than in Germany as a whole. However, working age population and employment in 2050 will be below the current levels in all scenarios. Nevertheless, economic output in Hamburg is subject to continuous growth in all scenario variants throughout the projected horizon. Thus, the decline in total employment is assumed to be compensated by increasing productivity.

Table 1. Summary of scenario results, Hamburg

	high growth		medium growth		low growth	
	av. annual growth rate,		av. annual growth rate,		av. annual growth rate,	
	2050	2012 to 2050	2050	2012 to 2050	2050	2012 to 2050
GVA(billion Euro, 2005 prices)	140020	1.5%	119321	1.1%	100069	0.6%
Employment (total, tsd.)	1133	-0.1%	1019	-0.4%	899	-0.7%
Population (aged 15-64,tsd.)	1122	-0.3%	1070	-0.4%	1015	-0.5%
Population (total, tsd.)	1918	0.2%	1828	0.0%	1735	-0.1%

Due to the lack of regional employment data by economic sectors, the projections for Dhaka are limited to population and aggregate output (Table 2). Dhaka is a fast growing city. In all three scenario variants population is strongly increasing until 2050. Starting from a low level Dhaka is subject to high economic dynamics. In all three scenarios real output will grow significantly. While the speed of output growth remains at a more or less constant level in the low growth variant throughout the projection horizon, GDP growth picks up pace after 2020 in the medium and the high growth variant. Overall, the scenarios of real GDP growth in Dhaka are subject to a wide range comprising average annual growth rates between 3.3 % in the low growth scenario and 7.1 % in the high growth scenario.

Table 2. Summary of scenario results, Dhaka

	high growth		medium growth		low growth	
	av. annual growth rate,		av. annual growth rate,		av. annual growth rate,	
	2050	2012 to 2050	2050	2012 to 2050	2050	2012 to 2050
GDP(million Taka, 1996 prices)	8636337	7.1%	5885176	6.0%	2156532	3.3%
Population (aged 15-64,tsd.)	31765	2.5%	26173	2.0%	21937	1.6%
Population (total, tsd.)	25046	2.7%	20883	2.2%	17214	1.7%

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