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Cross-border investment expenditure spillovers in European gas infrastructure

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ABSTRACT

We investigate the implications of an integrated vis-à-vis a national perspective regarding investment in natural gas infrastructure. In particular, we analyze cross-border spillovers related to the investment expenditure of five Western European countries. We develop a practical approach to estimate such cross-border investment expenditure spillovers using a multi-regional input-output model. We find that international spillovers are generally larger for employment compensation compared to capital compensation and that the spillovers are unevenly distributed among the countries and the types of labor. Both high-skilled and medium-skilled labor is impacted most in the country where the investments take place, whereas low-skilled labor is mostly generated outside the EU. We argue that an integrated European gas infrastructure investment policy is to be recommended.

1. Introduction

European Union (EU) energy market projections show large variations in future gas flows, some even predict a decline in the total flow, but most models expect significant local demand growth (Smith, 2013). To facilitate these flows additional transport and storage facilities are required. One of the bottlenecks in the current infrastructure is the lack of interconnectivity between European countries. The European Commission actively pursues an integrated energy market (European Commission, 2015). Individual countries try to benefit by assigning priority to their national gas sector for which they define domestic infrastructural strategies. Moreover, these investments are generally assessed at the national level only. The economic impact in other countries is usually included in the national investment analysis as negative leakage (Eijgenraam et al., 2000). As a result, the international spillovers tend to be ignored. Especially since the turmoil in the Ukraine, politicians in Europe come to realize that their dependency on gas has a geopolitical dimension and that collaboration within the EU might be helpful (Cobanli, 2014; Richter and Holz, 2015). This warrants attention for the international effects of gas infrastructure investments in the EU. We try to contribute to the assessment of energy infrastructure investments by developing a practical method for estimating cross-border spillovers of these investments.

Gas transmission investment expenditures may entail large cross-border indirect effects. At a European level, these effects do not have an impact in case of a perfect market from the perspective of an overall cost-benefit analysis. However, the European labor and financial markets are subject to several frictions and imperfections. This suggests that the indirect cross-border effects need to be accounted for. In addition, investments do have distributional effects, both in geographical terms and across labor and capital. These effects need to be considered from an economic perspective. So far, such analysis is missing in the cost-benefit analysis that concentrates on the cross-border impacts after the project's implementation. We develop a practical approach to estimate these spillovers and investigate the indirect cross-border impact of investment expenditures related to gas transmission infrastructure. We use a multi-regional input-output (MRIO) model that tracks the impacts along the respective international value chains. This allows for reporting on the size and distribution of the cross-border spillovers by country (and sector) of impact. As such, we trace investment expenditures along the respective value chains of the sectors supplying the investment goods, where we

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distinguish between domestic impacts, impacts in other EU countries, and non-EU impacts. We analyze cross-border spillovers that are estimated based on the investment plans of Austria, Belgium, France, Germany and The Netherlands as published in the Ten Year Network Development Plan (TYNDP) of the European Network of Transmission System Operators of Gas (ENTSOG, 2013).[1] In general, we expect the cross-border spillovers to other EU countries to be a minor part of the total impact of gas infrastructure investments. However, especially for small countries, the cross-border impacts are expected to be larger due to their higher degree of international openness. We are also interested in the distribution of the impact. Any cross-border impacts are most likely to occur in the largest trading partners of the countries. Knowledge on the size and distribution of the cross-border spillovers may aid the discussion of who should contribute to financing the investment, especially when it is a project of EU-wide importance.

Therefore, we investigate the regional impact of gas infrastructure investments, instead of taking a national perspective and develop a practical approach to estimate the cross-border spillovers. We argue that there is a case to adjust the evidence base for investment decision-making to include cross-border stimulus as a perceived benefit, instead of viewing it as a leakage. We find substantial differences between countries regarding the impact of gas infrastructure investment on domestic value added and the cross-border leakages to other countries. The distribution of the intra-EU cross-border spillovers appears to be concentrated in only a few countries. We also find that the impacts on employment by skill levels are not evenly distributed for medium-skilled labor.

In the next section, we first give background information about large-scale EU gas infrastructure investment plans, before we turn to a description of our method, data and results.

2. EU gas market integration

Energy policy is listed high on the political agenda. For example, the Energy Union has been marked as a priority by the European Commission (2015). It focuses on creating an integrated internal energy market and on ensuring the security of energy supply. Working towards either objective requires adjustments of the institutional framework (regulation, policies) and technical alterations (such as investment in additional pipelines and interconnectors and storage to increase both capacity and flexibility). In this respect, the gas sector sees the EU-wide unbundling of utility companies into trading companies and transmission system operators (TSOs). Competition among the trading companies is facilitated by rules that aim to create a well-functioning internal market for gas. In contrast, the gas transmission operators were continued as state-owned enterprises under stringent regulation, next to European wide institutions like the Agency for the Cooperation of Energy Regulators (ACER) and ENTSOG.

Investing in infrastructure is a means to increase the security of supply and to enhance competition. Low security of supply is in most cases due to a large dependence on one source and limited connectivity (see Le Coq and Paltseva, 2009). To address security of energy supply, the EU calls for more diversification in gas sources and transmission pipelines and for an increase in interconnection capacity as borders turn out to be bottlenecks (Gasmi and Oviedo, 2010; European Commission, 2012a).

Projections of gas demand show increasing gas flows in about half of the scenarios included in a study by Smith (2013). He finds that the difference between declining or rising demand hinges mostly on assumptions related to displacement rates. This can be the rate at which fossil fuels will be displaced by renewables and/or nuclear generation, or the rate at which gas will displace other fossil fuels as a (transitory) fuel for electricity generation. Other arguments that point at a potential increase in the demand for gas are the somewhat lower carbon content of gas compared to other fossil fuels and its higher production flexibility in electric power generation. Regarding the supply side, European domestic production is expected to decrease due to dwindling reserves. Then, higher demand coupled with decreasing domestic production will result in a substantial increase in import flows. Consequently, the transmission of these gas flows from outside the EU to the different nations will require additional investments. Further, even when aggregate EU gas demand growth is projected as moderate, the differences across nations can be significant. Adequate transmission capacity and flexibility to specific nations and regions will need to be ensured (Smith, 2013).

Transmission investment decisions are made by the TSOs. The risk related to gas infrastructure investments mainly lies in uncertainty about demand for future transport services. The European Union has set up a financial facility to support targeted infrastructure investment (European Commission, 2011). Of the total budget of € 50 billion for 2014–2020, € 9.1 billion is reserved for energy infrastructure investment. It is estimated that € 2.9 billion will be required to leverage gas infrastructure investments, of which investments will fall short by an estimated amount of € 16 billion. The amount needed to leverage gas infrastructure investments is estimated to be € 100 million for the West Europe corridor and € 1 billion for the Central Europe corridor (European Commission, 2012b). An objective and transparent assessment of each investment plan is required in order to ensure that social welfare is maximized. We argue it is crucial that this assessment is done from an EU-wide viewpoint, to properly account for cross-border effects and to ensure system-wide optimality, both in the short terms and in the long term.

ENTSOG compiles the TYNDPs and the 2013–2022 TYNDP lists projects for a total value of 72.77 billion euro (ENTSOG, 2013).[2] The largest share (83%) of the costs of investment plans relates to transmission projects, where the remaining 17% consists of storage and LNG projects. In terms of cost shares, for 87% of the projected costs the final investment decision has not yet been taken. Next to the biannual EU TYNDP, TSOs also have to publish Gas Regional Investment Plans, which promote further regional cooperation. We will use the information from these investment plans to arrive at cost estimates, which are then allocated to the sectors serving the investment demand. Investment plans also needs to be assessed regarding the optimal configuration of the network. This especially holds for projects of common interest. Currently, the developments at the EU level are at a stage where a framework is devised to assess investment plans in light of one integrated EU gas infrastructure. ENTSOG has developed the methodology to assess the impact of cross-border gas infrastructure investments (ENTSOG, 2015).[3] This methodology includes an assessment of cross-border impacts by analyzing the change in social welfare induced by a project in each impacted country. This change is captured by the change in the supply curve due to better access to a cheaper source (ENTSOG, 2015, p.29). However, this approach only focuses on the economic impacts of the project after implementation. We argue that a complete cost-benefit analysis should also include the cross-border impacts at the stage of implementation, i.e., the cross-border impacts of the investment expenditure.

3. Methodology and data

Investing in large-scale infrastructure projects creates international spillovers. A nationally focused assessment of the impacts usually

[1] ENTSOG TYNDP 2013–2022; http://www.entsog.eu/publications/tyndp/2013#ENTSOG-TEN-YEAR-NETWORK-DEVELOPMENT-PLAN-2013–2022.

[2] See Table 2.6 of the Main Report. Not all projects have made cost estimates available to ENTSOG, hence the total cost estimate covers only 35% of all projects. It is explicitly noted that this ratio cannot be extrapolated to calculate the total cost estimate for all projects.

[3] See for the documentation of the full process http://www.entsog.eu/publications/cba-methodology#CBA-METHODOLOGIES.