

// NO.23-012 | 04/2023

DISCUSSION PAPER

// JUSTUS NOVER

Local Labor Markets as a Taxable Location Factor? Evidence From a Shock to Foreign Labor Supply

LOCAL LABOR MARKETS AS A TAXABLE LOCATION FACTOR? EVIDENCE FROM A SHOCK TO FOREIGN LABOR SUPPLY

Justus Nover^{1,2*}

¹ZEW Mannheim, ²University of Mannheim

March 21, 2023

Abstract. This paper examines how municipal taxes respond to the local impact of a labor market shock. The analysis exploits a commuting policy that liberalized cross-border labor markets between Switzerland and the EU. The reform was implemented at a time of skilled labor shortages and led to a substantial inflow of cross-border workers into Swiss border municipalities. Identification rests on exogenous regional variation in treatment intensities based on commuting times. The results show that corporate tax changes are significantly larger than zero in highly-treated border municipalities after the reform and when compared to less-affected regions. This is consistent with the theory according to which governments can tax rents that arise from productive location factors – an interpretation supported by several model extensions and robustness tests. The results on personal income taxation indicate a similar yet smaller and lagged response.

JEL classification: H71, R23, J61

Keywords: productive amenities, agglomeration, cross-border commuting, skill shortage, tax competition, Swiss-EU agreement

*I would like to thank Andreas Beerli, Friedrich Heinemann, Eckhard Janeba, Raphaël Parchet, Sebastian Siegloch, and Michaela Slotwinski for helpful comments as well as Raphaël Parchet for the generous provision of Swiss tax data. I am also thankful to participants of the IIPF 2020, VfS Annual Conference 2020, 2nd Swiss Workshop on Local Public Finance and Regional Economics, 2021 Meeting of the EPCS, 10th European Meeting of the UEA, and 25th Spring Meeting of Young Economists for valuable feedback. The author gratefully acknowledges financial support from the Leibniz ScienceCampus MannheimTaxation. *Email address:* justus.nover@zew.de

1 Introduction

Location factors such as public infrastructure, natural resources, or agglomeration economies are critical for firms' performance and location choices (e.g., Devereux et al., 2007; Fisher-Vanden et al., 2015). Simultaneously, contributions from tax competition literature have shown how the presence of such factors of production leads to higher taxes, as they generate taxable corporate rents (e.g., Brülhart et al., 2015). More recently, due to the increased frequency of labor shortages, skilled labor has grown in importance relative to other factors of production (OECD, 2019), and the competitiveness of firms often hinges on their success in the race for skill and talent (e.g., Doms et al., 2010; Crook et al., 2011). Building on these insights from tax and labor market research, I examine whether and, if so, how local tax policies also incorporate changes in the labor supply that benefit firms. To this end, I exploit a regionally-confined labor market reform in the Swiss setting, where skilled labor shortages persist since the 2000s (Kägi et al., 2009).

The study exploits a commuting policy that permanently increased the labor supply in Swiss municipalities close to national borders in order to analyze whether the affected jurisdictions capitalized on the benefits of the reform for local firms. The main hypothesis argues that the labor supply shock boosts the attractiveness of such locales in the spirit of a productive amenity due to the sudden availability of this factor (see Section 2). As such, it allows Swiss border municipalities – generally disadvantaged due to their remote location (cf., Redding and Sturm, 2008) – to set higher *corporate* taxes after the reform and relative to more centrally-located municipalities with little access to foreign commuters. In Section 2, I also discuss potential adjustments to the municipal component of the *personal* income tax. Due to the presence of arguments for both an increase (e.g., positive spillover effects for domestic workers) and a decrease (e.g., competitive pressure on wages), the

personal income tax response likely hinges on local perceptions and is essentially an empirical question for which heterogeneous local conditions are studied.

The reform considered in this paper is the *Agreement on the Free Movement of Persons* (AFMP) between Switzerland and the EU from 1999. It eventually led to the liberalization of cross-border labor markets between both economies and, most importantly for this analysis, led to a substantial inflow of cross-border (CB) workers in Switzerland. In particular, the Swiss CB worker share in local 1998 employment increased from about 20% to 30% as a result of the reform in border locations most heavily affected (see Section 3).

As a result of this dramatic change in regional labor markets as well as the interaction between location characteristics, firm performance, and local taxes (as suggested by the literature), two questions arise: (i) what are the economic effects of the reform in the affected regions and (ii) how did fiscal policy respond. The first question is addressed in Beerli et al. (2021), who show that, in highly-treated border locations, the share of foreign workers increased by up to 10 percentage points through 2010 (previous restrictions on CB employment were fully abandoned by 2004). The authors also show that about two-thirds of new workers were high-skill, high-wage earners. In a second step, they identify a stimulating effect of the labor supply shock on the size, innovation performance, and productivity of skill-intensive incumbent firms, and even firm creation. Finally, the authors refute arguments about potential negative effects on domestic workers whose employment conditions remained largely unaffected. Furthermore, the real wages of highly-educated nationals even increased by 4.5% in response to the reform as some of them moved to managerial jobs at a higher level.¹

¹Few other studies relate to the research on the AFMP: Siegenthaler et al. (2016) seek to explain the Swiss “Job Miracle” since the early 2000s which “correlates with a substantial increase in the labor intensity of economic activity”, and identify immigration as the key driver. Others descriptively analyze the AFMP’s effects on the number and composition of immigrants, their

Building on this evidence regarding the direct effects of the AFMP, I focus on the second question and study a more indirect outcome, namely on local taxes. In particular, I track changes in *corporate* and *personal* income tax rates at the municipal level and argue that they are motivated by effects of the commuting policy. In so doing, this study provides first empirical evidence on how politicians internalize the characteristics of local labor markets as a productive force in their policy decisions. The Swiss setting is particularly well-suited, as Swiss municipalities exhibit significant tax autonomy. In addition, the country’s political institutions demonstrate exceptionally high levels of direct democracy (e.g., Brülhart and Jametti, 2019) such that population attitudes (e.g., fears about negative wage effects) are often reflected in local policies.

Similar to Dustmann et al. (2017) and Beerli et al. (2021), I use the fact that CB worker employment patterns vary with a location’s distance to the border (measured by driving time to the nearest border crossing) due to longer commuting times for more distant regions. Beyond facilitating the identification of causal effects, studying a rise in foreign commuters rather than migration flows has the advantage that results are not driven by foreigners’ integration into the political system, the unemployment scheme, or the local society, but instead can be ascribed predominantly to the labor market dimension. This supports a cleaner identification of the labor market effects as compared to a setting where foreigners actually migrate to another country and inevitably alter the political and social fabric of a society (compare, e.g., Burchardi et al., 2020).

integration into labor markets, and Swiss wage effects (Aeppli et al., 2008; Cueni and Sheldon, 2011; Henneberger and Ziegler, 2011; Abberger et al., 2015). Ramel and Sheldon (2012) study the fiscal incidence and find a positive balance for immigration from the EU-17/EFTA area and a zero balance overall. Von Stokar et al. (2015) summarize that the increase in foreign workers matches a demand by firms and led to almost exclusively positive outcomes for the Swiss economy.

Exploiting the as-good-as-random regional variation in treatment intensities in difference-in-differences and event study models supports the identification of three findings: First, in line with expectations, *corporate* income is taxed at a relatively higher rate in highly-treated border municipalities when compared to less affected hinterland jurisdictions. An extensive set of robustness tests and model extensions supports the interpretation of a more attractive economic environment as the crucial driver of this policy response due to the increase in local labor supply and the expansion of the skill mix. Second, I find some evidence of a relative increase, yet smaller and lagged, also for the *personal* income tax. The lagged response is in line with evidence from, for example, Haaland and Roth (2020), who show that labor market concerns in the context of migration are reduced when people learn about actual impact. This relates to the Swiss setting as the commuting policy’s impact on local residents was unclear and turned out to be predominantly positive only later. Third, as hypothesized in Section 2, local population attitudes play an important role in tax responses: Municipalities where a majority of citizens favored the labor market reform show a particularly strong and robust tax response. This may be taken as evidence for the presence of both local perceptions of negative effects of the AFMP for domestic workers (in places with no significant *personal* income tax response) and optimism about positive spillover effects on Swiss nationals (in locations with a positive tax response). The results on underlying mechanisms must, however, be treated with some caution: Given data restrictions, they are limited to a subsample of Swiss municipalities. For this subsample, the institutional framework prevents a conclusive judgment about whether the response is targeted at firms, households, or both, as the relevant tax parameters are linked in these cases.²

²This is due to differences in cantonal (i.e., state) tax laws. The details are discussed in Section 3 below.

The paper is structured as follows: Section 2 develops the hypotheses and summarizes the contributions to the extant literature. Section 3 details the design of the commuting policy and local taxation in Switzerland, followed by a description of the data and estimation strategy in Section 4. The main results, analyses into underlying mechanisms, and robustness tests are discussed in Section 5. Section 6 concludes.

2 Theoretical Framework and Contributions to the Literature

Corporate income tax. Studies from traditional tax competition and New Economic Geography (NEG) literature have explored extensively the determinants that affect local tax levels (see Brülhart et al., 2015, for an overview). These determinants can be categorized into factors that are under the direct influence of politicians such as publicly-provided goods (e.g., infrastructure, public R&D, or capital, labor, and environmental regulations; Pieretti and Zana, 2011) and factors that politicians can influence only indirectly (e.g., agglomeration). These studies establish that (endogenous) location characteristics can reduce competitive pressure to set low taxes in order to attract mobile capital or agents.

The way papers model the moderating effect of location factors on tax competition differs somewhat across studies. Zissimos and Wooders (2008), Hindriks et al. (2008), and Pieretti and Zana (2011) all develop models where two regions choose a level of public investment to improve firms' productivity and subsequently compete over tax rates in a second stage. Thereafter, Zissimos and Wooders (2008) assume heterogeneous requirements for public goods amongst firms. Sufficient differentiation in this set of goods is further posited to limit firms' incentives to relocate when confronted with high taxes. On the other hand, Pieretti and Zana

(2011) focus on the case of two unevenly-sized regions and show that, in contrast to the basic tax competition model, the smaller region does not have to set the lower tax to attract investments but can opt instead for higher public investments as long as capital is not perfectly mobile.

Turning to the NEG literature, numerous papers stress the relevance of agglomeration economies, a phenomenon that makes economies “lumpy” as firms benefit from geographic concentration (see, e.g., Duranton and Puga, 2004, for an overview). While agglomeration processes can have various drivers (knowledge spillovers, shared input or output markets, labor matching), Baldwin and Krugman (2004) model them by means of imperfect competition and increasing returns in the production of differentiated varieties of an industrial good. Their model shows that industry will cluster in one region (the core-periphery outcome) and is willing to accept a higher tax due to higher profits in the presence of agglomeration economies. Ludema and Wooton (2000) reach a similar conclusion but rely on a model with a homogeneous good and also consider imperfectly mobile manufacturing labor. Ottaviano and Van Ypersele (2005) focus on the size of the output market as a driver for capital concentration. In a model with mobile capital and *ex ante* asymmetric regions, firms agglomerate in the larger jurisdiction to save on trade costs. This larger region will end up with a more than proportionate capital share and trade costs create a taxable agglomeration rent. Borck and Pflüger (2006) generalize the finding of higher taxes in higher-agglomeration regions to less extreme cases where the economy is only partially-agglomerated. Charlot and Paty (2007), Koh et al. (2013), Jofre-Monseny (2013) Luthi and Schmidheiny (2014), and Brülhart and Simpson (2018) identify empirical evidence for these theoretical predictions in France, Germany, Spain, Switzerland, and the UK.³

³Empirical evidence to support the argument that agglomeration economies benefit firms is, for example, identified in Brülhart et al. (2012) in the case of Switzerland.

This analysis contributes to and extends this literature, studying changes in labor endowments as a crucial input factor which may equally limit firms' responsiveness to marginal tax changes. This argument relates particularly to the second strand of literature focusing on location characteristics largely exogenous to policy makers as well as other agglomeration literature identifying labor as a factor which greatly facilitates agglomeration (e.g., as an input factor or a determinant of knowledge spillovers and consumption). In fact, empirical studies commonly rely on some measure of employment (density) to proxy agglomeration (see, e.g., Nakamura and Paul, 2019). Both Rosenthal and Strange (2004) and Combes and Gobillon (2015) clarify in their handbook chapters that empirical estimates relying on employment measures constitute an upper bound for agglomeration economies. This can be attributed to the fact that the concentration of taxable economic factors results not only from agglomeration forces, but also due to exogenous advantages in natural endowments.

In the Swiss setting, the commuting policy gives rise to an increase in labor supply in all affected border regions. Pursuant to the discussion in the literature above, a positive impact on the *corporate* income tax rate in these highly-treated municipalities is to be expected relative to hinterland regions without access to commuters. Aside from factors stressed by the agglomeration literature,⁴ the shortage of (high-)skilled labor among Swiss businesses (see Kägi et al., 2009) and potentially lower wage costs due to increased competition on the labor market (see, e.g., Borjas, 2003; Dustmann et al., 2013) may further increase firms' preferences for a border location and, in turn, lead to higher *corporate* income tax rates in these jurisdictions. Importantly, there is anecdotal evidence to support the hypothesis that the

⁴For example, a more efficient matching of firms and workers due to the quantitative and qualitative increase in labor supply (e.g., Orefice and Peri, 2020) or performance enhancing intra-firm adjustments in factor intensities (e.g., Dustmann and Glitz, 2015).

increase in labor supply is considered to be an asset to border regions, both from the perspective of businesses⁵ and local politicians⁶.

Finally, the assumption of government appetite to tax firms' rents is in line with many tax competition models that assume governments to be revenue or rent (i.e., tax revenue minus public input costs) maximizers (e.g., Zissimos and Wooders, 2008). Borck and Pflüger (2006, p. 651) serve as an emblematic example from the NEG literature, modeling the government objective function as "representing either a government that acts benevolently (i.e. it cares for the tax proceeds in order to provide public goods that raise consumer welfare) or a 'Leviathan' government (i.e. one which maximizes the size of the state or its own utility)."⁷ What is important to understand is that the empirical analysis identifies *relative* tax changes between regions with different treatment intensities. Thus, a positive tax change can be (and indeed is in some cases) associated with a decline of local tax rates in absolute value. Put differently, taxing parts of the rents from the commuting policy may lead neither to an absolute increase in tax rates nor tax revenue (and, subsequently, public goods provided) but might simply prevent as

⁵Aside from the observed real effects on firms' performance and entrepreneurial behavior identified in Beerli et al. (2021), a survey that was conducted among Swiss businesses during the implementation phase of the reform confirms the high relevance of an access to skilled labor for the Swiss economy (see FEW-HSG, 2008). According to this survey, there is no other location factor more important, but also none that is less under-performing than the availability of skilled labor. The fiscal environment, in contrast, was rated as important but sufficiently attractive.

⁶Among politicians, there is evidence that CB workers are considered a valuable asset for Swiss border regions (Kreis, 2007) and that a withdrawal of the reform would be expected to seriously hamper the climate for investment (see, e.g., Hofmann, 2014; Brutschin, 2014).

⁷Taxing firms' rents is arguably not the only possible course of action for politicians. In case they follow a revenue-targeting strategy, higher firm productivity could already increase tax revenues and create incentives to decrease the *corporate* tax. However, a number of arguments might render this the less likely response: Politicians may have an incentive to raise taxes, e.g., (i) to compensate for their border location that put them at a relative disadvantage in terms of tax base size before the reform when compared with non-border locations with similar public good preferences, (ii) to move closer towards a situation of revenue sufficiency, or (iii) to satisfy the alleged preference of bureaucrats for a larger government along the lines of Niskanen (1975).

strong a decline in these parameters relative to municipalities which do not benefit from the additional labor supply.

Personal income tax. With respect to the impact of the reform on labor income and in particular *personal* income taxes, conflicting arguments exist which complicate the derivation of a clear hypothesis. Importantly, CB workers' income is *not* taxed at the tax rates set by municipalities, nor do CB workers add significant extra revenue for Swiss municipalities (details see Section 3.2). Taking this into account, in the presence of fears and perceptions about (potential) adverse effects on employment conditions or prospects,⁸ citizens are likely to oppose a higher tax burden on their part, regardless of benefits from improved public finances, and may even demand a redistribution of rents in the form of a lower *personal* and higher *corporate* income tax. In contrast, if the expected or perceived effects of the commuting policy on domestic workers are positive, largely immobile workers might also face, and be willing to accept a relatively higher *personal* income tax. A similar line of reasoning as for *corporate* taxation might therefore apply.⁹

Following Schumpeter's (1918) proposition about the investigation of fiscal policy as being the best way to understand a society and its priorities, I take a more exploratory approach regarding *personal* income tax responses and study local policy responses to learn about how the impact on domestic workers was perceived. The Swiss setting is particularly well-suited as the country's institutions demonstrate an exceptionally high level of direct democracy and residents have substantial power over local policies (Brühlhart and Jametti, 2019). To address

⁸Hainmueller and Hiscox (2010) find that people often oppose an increase in foreign workers, independent of the foreigners' skill level which is high among CB workers in Switzerland.

⁹Another possible channel for a relative increase in *personal* income taxes is modeled in the theoretical contribution of Andersson and Forslid (2003). They consider an NEG model with mobile skilled workers and immobile unskilled workers. In the presence of trade costs, firms in the growing (i.e., agglomerating) region experience a cut in trade costs such that prices shrink and real wages rise, increasing the attractiveness of the region for additional mobile workers.

potentially differing expectations and perceptions surrounding the impact of the reform across regions, I study heterogeneous policy responses with the expectation that relative tax changes are quantitatively more positive in municipalities with higher political support for the policy.

The paper most closely resembling the analysis here is Chevalier et al. (2018). In their working paper, the authors link the inflow of eight million poor migrants to West Germany after WWII – often called *expellees* – to higher taxes on farm and business owners, with no effects on labor income or residential property taxes. However, the setting differs significantly from the commuting scenario studied in this paper as migrants in Chevalier et al. (2018) had full voting rights and benefited from the welfare state. As a result, voting behavior is a critical driver for their results as migrants, who were rarely business owners, increased local support for a more generous welfare state. In addition, migration patterns were likely not exogenous. To the best of my knowledge, the analysis presented here is therefore the first to examine how exogenous changes in local labor supply affect fiscal policy, while being able to largely disregard confounding effects that inevitably accompany migration flows.

3 Institutional Setting

3.1 Agreement on the Free Movement of Persons

The reform that is exploited here to study local policy makers' response to an exogenous change in local labor supply is the *Agreement on the Free Movement of Persons* (AFMP) between Switzerland and the EU. It was signed in 1999 as part of a broader bilateral agreement (summarized under the term *Bilaterale I*) with the goal to link the Swiss economy closer to EU markets.

Table 1: Legal innovations for the employment of foreigners in Switzerland

| | | | Cross-border (CB) workers | | Immigrants | |
|--------------------------------|------|---------------------|--|-------------------------------|--|--|
| Phase | Year | Event | Border region (BR) | NBR | Entire country | |
| Pre-reform | 1995 | Announcement | Admission process (priority rule) and further restrictions | Employment ban by federal law | Admission process, annual quotas, and further restrictions | |
| | 1996 | | | | | |
| | 1997 | | | | | |
| | 1998 | | | | | |
| Transition | 1999 | AFMP signed | Anticipation & early effects | | | |
| | 2000 | Referendum | | | | |
| | 2001 | | | | | |
| | 2002 | AFMP enacted | Abolition of some restrictions | | Higher quotas, further changes ¹ | |
| | 2003 | | | | | |
| Post-reform (Free movement) | 2004 | Liberalization | Free | | Abolition of admission process | |
| | 2005 | in the BR | | | | |
| | 2006 | | Free | | Free | |
| | 2007 | Full liberalization | | | | |
| | 2008 | | | | | |

Notes: Based on Beerli et al. (2021). Columns BR and NBR document changes in employment regulations in the border region and non-border region (details see text below). A darker gray denotes periods of more restrictive legislation. ¹ Extended duration of some residency permits and admittance of family reunion for the majority of permit holders.

The major innovations of the AFMP are summarized in Table 1. Its ultimate outcome was the free mobility of workers amongst signatory countries. Following Beerli et al. (2021), the table differentiates between three phases: (i) pre-reform, (ii) transition, and (iii) post-reform. In addition to the differentiation along the time dimension, Table 1 distinguishes between legal innovations for CB worker employment, the focus of this study, and changes for resident immigrants. For the former, a further subdivision is required as the legal innovations differed for CB workers employed in the *border region* (BR) and the *non-border region* (NBR). Details of this regional component of the policy are discussed below.

The focus in this paper is on CB workers; people residing in one of the neighboring countries (France, Italy, Austria, Liechtenstein, Germany) and who commute

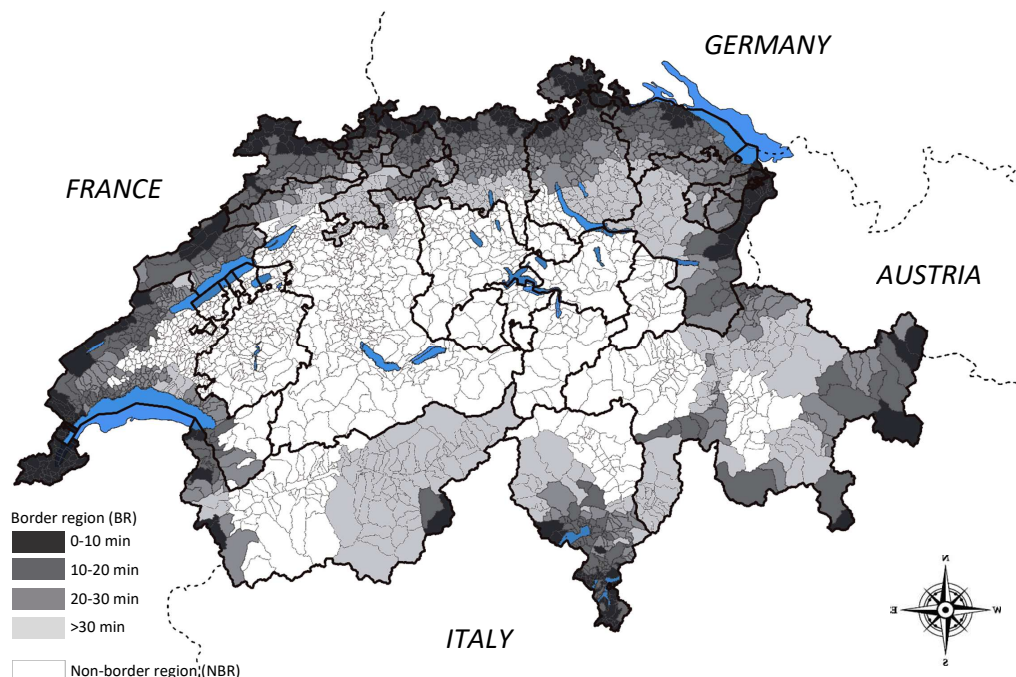
to their workplace in Switzerland on a regular basis. Before the reform, employment of such workers was heavily regulated by law and limited to the officially defined BR as depicted in Figure 1. This circumstance led to a region-dependent implementation, in addition to the step-wise implementation as discussed next.

As illustrated in Table 1, firms with a location in the NBR were subject to an employment ban for CB workers that was only lifted in 2007. In the BR, however, employment restrictions for these workers were gradually relaxed after the AFMP was enacted in June 2002. Beerli et al. (2021) describe this as two-step process. During the transition phase, starting from 1999, cantonal offices which handled the application process of CB workers, could do so largely at their discretion. Then, in 2002, some of the restrictions were lifted.¹⁰ Full liberalization was achieved in 2004 when the lengthy and costly admission process was abandoned. Most importantly, Swiss firms no longer had to prove that they did not find an equally-qualified domestic worker for a vacancy (the so-called *priority rule*). From an economic perspective, this converted CB workers from complements to Swiss workers into potential substitutes.¹¹

¹⁰First, firms could now also hire CB workers from countries other than the Swiss neighbors and living farther away from the border. Second, CB workers no longer had to prove that they had lived in one of the neighboring countries for at least six months. Third, CB worker permits were now valid for more than a year and were not automatically invalidated if an employment contract ended. Fourth, CB workers were only required to commute to their workplace on a weekly instead of a daily basis and could therefore rent an apartment in Switzerland.

¹¹Note that restrictions were also lifted for Swiss CB workers seeking employment in EU member states. Thus, the reform could also lead to a reduction in labor supply on the Swiss side if Swiss residents were to seek employment abroad as a result of the reform. However, “the change in employment of CBW [CB workers] in Switzerland was about nine times larger than the change of CBW from Switzerland working in neighboring countries” (Beerli et al., 2021), so that the access of foreign workers to the Swiss labor market was the main outcome of the reform.

Figure 1: Boundaries of Swiss border regions according to bilateral agreements

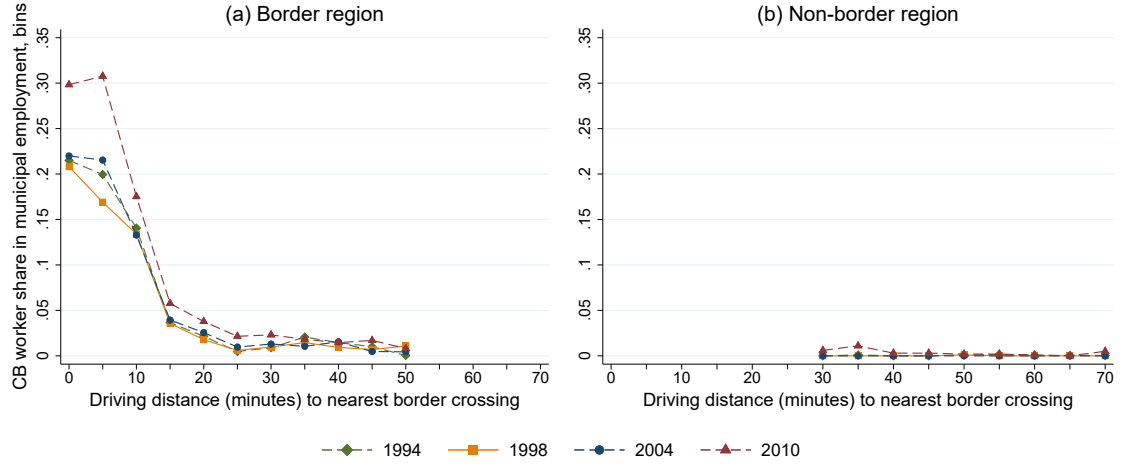


Notes: Categorization of BR municipalities into treatment groups by bins of 10 minutes driving time. Driving time measures workforce-weighted distances of all establishments in a municipality to the nearest border crossing. Data comes from Beerli et al. (2021) and relates to the road infrastructure in 2010 (Henneberger and Ziegler, 2011). Thicker black lines denote cantonal borders. National borders from neighboring countries are depicted as dashed lines.

These changes remained a privilege for firms located in the official BR.¹² Figure 1 maps all BR municipalities in gray. The different gray scales indicate the driving time to the nearest border crossing and define the treatment groups for the empirical analysis. Municipalities close to the border are most significantly affected by the commuting policy as proximity to their location of residence heavily determines CB workers' willingness to commute (see Figure 2 below). The BR sample therefore lends itself to the analysis of reform effects and is the focus of

¹²These regions were defined in four bilateral agreements between Switzerland and Austria (1973), France (1946), Germany (1970), and Italy (1928). The geographical definition of the BR was unchanged by the reform. Importantly, frontiers of the BR do not always coincide with cantonal borders, nor do they follow religious or cultural patterns.

Figure 2: Increase of CB worker employment by distance to the border



Notes: Number of CB workers relative to total employment in 1998 at the municipal level, shown separately for the BR (panel a) and NBR (panel b). Municipalities grouped into bins of 5min driving distance to the nearest border crossing. Bins with very few workers are omitted. Source: based on Beerli et al. (2021).

this study. Identification rests on the differentiation between municipalities with varying treatment intensities, based on driving time to national borders.

Finally, as shown by the last column of Table 1, restrictions for resident immigrants were also loosened step-by-step. Unlike CB workers, migrants were not bound to certain regions and distance to the border has no obvious effect on immigrants' choice of location. In addition, the timing of the new rules was different for CB workers and immigrants, implying that a potential effect of new immigrant workers would become visible in a year-by-year analysis.¹³ Lastly, as detailed in Section 3.2, newly-arriving immigrants are not subject to the normal tax schedule in the first years and therefore have no direct impact on the tax bases relevant for

¹³Beerli et al. (2021) show that, somewhat contrary to expectations, the increase in CB workers led to some crowding-in of immigrants in Swiss border municipalities that started in 2008. This timing is in line with the repeal of restrictions for this group that took place in 2007. Importantly, results of the main analysis, which ends in 2008, do not seem to be affected by this circumstance.

the analysis of this paper. I am thus confident that legal changes for immigrants have no relevant confounding effect on the results.

3.2 Municipal taxation

Switzerland is a highly-decentralized country with three major government layers: the federal state, 26 cantons (states), and roughly 2,865 municipalities (as of 2002). The cantons have full authority over the legal framework for cantonal and municipal taxes. They grant municipalities substantial freedom to tax local residents and economic activity such that own taxes constitute about 60% of total municipal revenue. The most important taxes in terms of revenue are those on *personal* and *corporate* income.

With a few exceptions, municipalities do not decide on the whole tax scheme but instead set a multiplier which shifts the (progressive) cantonal tax scheme. The amount of taxes to be paid to a municipality is thus determined as a multiple of the basic statutory tax rate. This is particularly convenient, as municipal tax policies are therefore reduced to a single instrument: the tax multiplier.¹⁴

Importantly, the definitions for various tax bases are not only identical within but also across cantons. This is the outcome of a federal law implemented in 1993. It harmonized the procedural details as the information required to determine the national tax base is drawn from cantonal records (Brühlhart and Jametti, 2006).

Corporate income tax. In 12 of the 18 BR cantons, municipalities can levy their own *corporate* tax (see columns 4 and 5 of Table 2). These include a tax on corporate profit/income and (equity) capital. The latter is, however, largely

¹⁴ An exception is the canton of Basel-Stadt, where the tax rate of the three municipalities is included in the cantonal tax rate. I therefore drop this canton for the analysis. Due to data availability issues, I also drop all municipalities from the canton Neuchâtel. Finally, I exclude one municipality which changed affiliation from the canton of Bern to Jura in 1996.

Table 2: Municipal taxes in Swiss BR cantons

| Canton | Municipalities (in BR) | Tax on personal income | Tax on personal & corporate income | |
|---|---------------------------|------------------------------|------------------------------------|-------------------------|
| | | | same multiplier | separate multipliers |
| type 1 (35 % of BR observations) | | | | |
| Aargau | 197 | x | | |
| Graubünden | 106 | x | | |
| St. Gallen | 81 | x | | |
| Valais | 81 | x | | |
| Appenzell-Ausserrhoden | 20 | x | until 2000 | |
| type 2 (49% of BR observations) | | | | |
| Appenzell-Innerrhoden | 6 | x | until 2006 | |
| Bern | 65 | x | x | |
| Genève | 45 | x | x | |
| Jura | 59 | x | x | |
| Thurgau | 63 | x | x | |
| Ticino | 118 | x | x | |
| Vaud | 182 | x | x | |
| Zürich | 145 | x | x | |
| type 3 (16% of BR observations) | | | | |
| Schaffhausen | 25 | x | until 2003 | since 2004 |
| Basel-Landschaft | 73 | x | | x |
| Solothurn | 119 | x | | x |
| Total | 1,385 | | | |

Notes: 18 of 26 Swiss cantons officially belong to the BR. Most (11) are entirely in the BR. The territory of the remaining 7 belongs only partly to the BR. Information displayed in the table taken from cantonal tax laws. The number of municipalities corresponds to the number of observations in the BR sample. The cantons Basel-Stadt and Neuchâtel are excluded due to data issues (see Footnote 14).

superfluous, as it is small and firms can in most cases deduct it from the income tax. The decisive local tax parameter for legal persons, including the most common legal forms like stock companies, limited liability companies, and cooperatives, is therefore the *corporate* income tax multiplier (c.f., Krapf and Staubli, 2020).¹⁵ It is determined on a yearly basis by local policy makers.

¹⁵The canton of Basel-Landschaft is an exception in this regard as municipalities in this canton levy a simple tax in the range of 2-5% uniformly on corporate income (without any progressivity) instead of specifying a multiplier.

Personal income tax. Municipalities can set a tax on *personal* income of those residents registered in the jurisdiction. The respective multipliers also apply to taxation of private wealth, but revenue from this tax base is small.¹⁶ Personal income is taxed by all Swiss municipalities. However, as the last three columns of Table 2 show, differences in cantonal laws led to the emergence of three municipality/canton types. Municipalities of *type 1* can only tax *personal* income,¹⁷ whereas *type 2* and *type 3* municipalities levy a local tax on both *personal* and *corporate* income. These municipalities differ in the flexibility granted to them to set different rates for *personal* and *corporate* income, with the latter able to set different rates for each. The empirical analysis exploits the existence of these three tax regimes to shed some light on considerations regarding local tax policies in this two tax instrument environment.¹⁸

Tax on foreigners. Foreigners – including individuals who do not hold a permanent residence permit or who are not married to a Swiss national – are not subject to the aforementioned *ordinary tax scheme* but are taxed instead *at the source* (Quellensteuer). Only after living in Switzerland for at least five years can foreigners can be granted a permanent residence permit, with which they are taken up into the *ordinary tax scheme*. Contrary to the *ordinary tax scheme*, there is no variation in *source taxes* across municipalities, as it is based on a weighted average of the previous year’s municipal tax multipliers (details see Schmidheiny

¹⁶I ignore church taxes for both private and corporate income, as the focus is on politicians’ response, who do not decide on church taxes.

¹⁷In these cases, corporate taxes are either collected at the canton level and municipalities are allocated a share of the revenue or the tax is collected by municipalities but a uniform rate applies that is set at the canton level. Thus, there is no variation in taxes across municipalities.

¹⁸The two small BR cantons Appenzell-Ausser rhoden and Appenzell-Innerrhoden changed their tax regime during the considered period (see Table 2). I therefore exclude both in the main analyses and only consider municipalities from these cantons in robustness checks.

and Slotwinski, 2018). The municipal *personal* income tax therefore only applies to local residents.

Tax on CB workers. For CB workers, a *special taxation scheme* exists, based on double taxation agreements between Switzerland and its neighbors. These treaties remained unchanged by the commuting policy. Depending on where they are registered, CB workers are taxed in their country of residence, Switzerland, or both. The crucial commonality is that when taxes in Switzerland apply, no heterogeneity in terms of tax rates exists among municipalities. Hence, they cannot directly incentivize CB workers to (not) seek employment in their jurisdiction.

Despite having no say in the taxation of CB workers, municipalities do benefit to some extent from the CB worker tax as they receive a share of the fiscal revenue. The allocated amount is significantly smaller compared to the revenue from a wage earner taxed in the *ordinary tax scheme*. The details of the double taxation agreements are summarized in Appendix Table A1.¹⁹

4 Data & estimation strategy

The main variables of interest are the municipal tax multipliers for legal and private persons between 1995 and 2008. Data on *personal* income tax multipliers comes from Parchet (2019). To collect information on *corporate* tax multipliers, I relied on both official cantonal websites and statistical yearbooks, or, where necessary, I contacted the cantonal tax authorities.

¹⁹In the context of the commuting policy, an additional CB worker category was created. These are foreigners who commute only on a weekly rather than a daily basis (this was not permitted before the reform). As this does not match the definition of a CB worker as set out in the double taxation agreements, these (very few) workers are taxed *at the source* like any other resident immigrant.

For municipality background characteristics I also rely on data from Parchet (2019). This data is available for jurisdictions that did not dissolve due to municipal mergers during the period considered (i.e., 1995-2008). The final sample is therefore balanced and includes 1,385 municipalities located in the Swiss BR, which results in 19,390 municipality-year observations.

4.1 Descriptive statistics

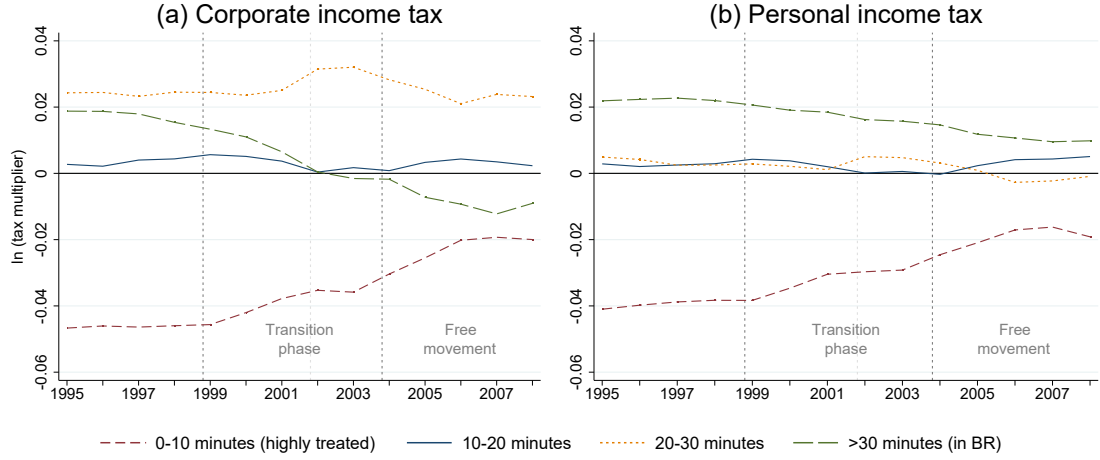
Intra-national variation in taxes is exceptionally large across Swiss municipalities. In 2005, combined cantonal and municipal tax rates for the average firm in cantonal capitals differed by a factor of almost four with a maximum tax rate of 23.5% in Genève and the smallest tax rate in Zug (6.4%) (Bacher and Brülhart, 2013). Variation in the combined *personal* income tax rate is similarly high.²⁰ As shown in Figure 3, there is also considerable variation over time in the tax multipliers, which is crucial to identify the response to the labor market reform.

Figure 3 plots yearly averages of tax multipliers by distance group and by tax base. The numbers are residualized based on a canton-year interaction to take into account canton-specific regulations and changes thereof. According to the figure, in the pre-reform phase (before 1999), municipalities with a shorter distance to the border exhibit lower taxes but followed a similar trend as jurisdictions in greater distance of national borders. These lower tax levels are in line with results from the literature that show how the remote location of border regions negatively affects their economic performance and fiscal capacity as they are partially cut off from neighboring markets (e.g., Niebuhr and Stiller, 2004; Redding and Sturm, 2008).²¹

²⁰Cantonal taxes account for a somewhat larger share of the combined tax rate. From the respective *corporate* (*personal*) income tax revenue, cantons received 64% (60%) in 2010.

²¹Border regions are believed to be at a disadvantage due to smaller markets, longer distances, less diversity, and a limited labor supply – all due to their regional remoteness.

Figure 3: Average of residualized tax multipliers, by distance group



Notes: Yearly average of residualized tax multipliers (in logs), separately for both tax bases. Canton-specific trends as well as details of the different legal tax systems are taken into account by regressing tax multipliers on $\text{canton} \times \text{year}$ fixed effects.

Already the descriptive figures suggest a convergence of local tax multipliers in the course of the transition and post-reform phase.

A development not visible in Figure 3 but documented in the results section, is the general downward trend observable for Swiss tax multipliers over the considered period.²² This decline is due to at least two factors. The first is a mechanical effect and relates to the fact that municipalities set a multiplier that shifts the respective canton's tax scheme rather than directly setting a tax rate (see Section 3.2). In those cases where a canton adjusts its tax scheme, municipalities also need to adjust their tax multiplier should they want to keep taxes constant. A second factor is the economic upsurge in Switzerland during the considered period, especially in the 2000s, which, on average, even led to slightly increasing tax revenues despite the decline in tax rates (e.g., Pittet, 2014). As already noted above, with this downward trend, it is particularly important that any identified tax effect is

²²The methodology of residualizing the tax multipliers to control for canton-specific trends and institutional differences that would otherwise bias the cross-canton perspective taken in Figure 3 eliminates such general trends.

interpreted in *relative* terms as a difference in policy responses between municipalities with varying treatment intensities, and does not necessarily correspond to an actual, for example, tax increase.

A crucial requirement for the analysis is the comparability of municipalities in the specified distance groups with respect to factors other than exposure to the labor market reform (i.e., distance to the border). For this purpose, the main analysis excludes locations with a driving time of more than 30 minutes to the border. This assures that I focus on locations that exhibit more similar background characteristics. As a robustness check, I also run regressions including more distant locations. Hence, the control group consists either of municipalities in the distance group *20-30 minutes* (in the main analysis) or *>30 minutes (in BR)* (in a robustness check). The direct effects of the commuting policy are very limited for both distance groups, as they experienced almost no change in commuter flows in response to the labor market reform (see also Figure 2) and both are likely to be affected only indirectly by spillover effects.

To evaluate the comparability of the main distance groups, Table 3 reports summary statistics for a number of municipality background characteristics and migration-related variables by distance category. The last four columns document differences between the subgroups. Where statistically significant, most differences either reflect characteristics of the local geography (i.e., more lakes but lower altitudes closer to the borders) or are relatively small in terms of absolute and mean deviations such that I do not expect them to affect my conclusions. Yet, some differences are larger (in particular employment in the primary sector) and need to be controlled for by including municipality fixed effects as well as all time-varying background characteristics from Table 3 as covariates in the regressions.

Table 3: Summary statistics by distance group

| Variable | 0-10 min | 10-20 min | 20-30 min | (0-10) – (20-30) | | (10-20) – (20-30) | |
|---|----------|-----------|-----------|--------------------|----------------|--------------------|----------------|
| | | | | absolute deviation | mean deviation | absolute deviation | mean deviation |
| Background characteristics | | | | | | | |
| Population (in 1,000) | 3.835 | 2.320 | 4.240 | -0.404 | -9.95% | -1.920* | -58.29% |
| % Young (≤ 20) | 18.66 | 19.61 | 19.16 | -0.503* | -2.66% | 0.449* | 2.32% |
| % Old (≥ 80) | 3.086 | 3.153 | 3.010 | 0.075 | 2.46% | 0.143 | 4.64% |
| % Primary sector | 6.309 | 10.58 | 8.506 | -2.197*** | -29.13% | 2.073*** | 21.76% |
| % Secondary sector | 29.70 | 31.09 | 31.82 | -2.116** | -6.85% | -0.723 | -2.30% |
| % Tertiary sector | 3.990 | 58.33 | 59.68 | 4.313*** | 7.01% | -1.350 | -2.29% |
| Unemployment rate | 2.317 | 1.830 | 1.791 | 0.525*** | 25.96% | 0.038 | 2.10% |
| Total employment (per capita) | 0.317 | 0.273 | 0.310 | 0.007 | 2.24% | -0.037* | -12.67% |
| % Votes for left-of-center parties (nat. elections) | 22.56 | 20.72 | 21.65 | 0.913 | 4.14% | -0.930 | -4.39% |
| Urban area | 0.622 | 0.445 | 0.518 | 0.104*** | 18.44% | -0.073* | -15.11% |
| Center of urban area | 0.027 | 0.028 | 0.042 | -0.015 | -42.86% | -0.014 | -40.00% |
| Tourist destination | 0.031 | 0.040 | 0.036 | -0.005 | -15.15% | 0.004 | 10.53% |
| No. of movie theaters within 10km | 6.332 | 3.071 | 4.473 | 1.859** | 35.16% | -1.403*** | -37.10% |
| Lake shore | 0.198 | 0.117 | 0.089 | 0.109*** | 79.56% | 0.027 | 26.21% |
| Altitude (m.a.s.l.) | 441.47 | 520.83 | 556.66 | -115.19*** | -22.76% | -35.83** | -6.65% |
| Productive area (km ²) | 430.65 | 460.59 | 470.05 | -39.39 | -8.70% | -9.454 | -2.03% |
| Migration-related characteristics | | | | | | | |
| % Foreign nationals | 16.46 | 12.47 | 13.37 | 3.089*** | 20.98% | -0.897 | -6.94% |
| Per capita income in top 10 percentile | 0.174 | 0.092 | 0.147 | 0.027 | 16.98% | -0.055** | -45.45% |
| Per capita income in bottom 50 percentile | 0.330 | 0.492 | 0.396 | -0.066* | -17.98% | 0.096** | 21.72% |
| Gini index | 0.363 | 0.338 | 0.329 | 0.034*** | 9.88% | 0.009** | 2.69% |
| % High education | 0.270 | 16.748 | 16.49 | 3.783*** | 20.85% | 0.261 | 1.48% |
| % Intermediate education | 75.85 | 79.21 | 79.21 | -3.364*** | -4.33% | -0.006 | -0.01% |
| % No education | 3.881 | 4.045 | 4.300 | -0.420*** | -10.20% | -0.255* | -6.11% |
| No. of municipalities | 262 | 326 | 336 | | | | |

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Summary statistics correspond to the pre-reform period (1995-1998). The distance group 20-30 minutes functions as the comparison group in the last four columns. Cantons that switched between tax regimes (see Table 2) are excluded. Standard errors clustered by municipality.

4.2 Estimation & identification

As the number of CB workers employed in a given location is likely endogenous to local tax rates,²³ any coefficient estimate based on this explanatory variable will be biased (e.g., Koethenbuerger, 2014). The categorization of municipalities based on their driving distance to the border and, hence, treatment intensity, supports the estimation of causal effects by using event study models and a difference-in-differences (DiD) design. A crucial requirement for this approach is that municipalities closer to the border are more heavily exposed to the reform than more

²³For example by means of firms' location decisions and their demand for labor.

centrally-located ones. This pattern, which emerges due to a limited willingness of CB workers to commute long distances, is clearly confirmed by the results of Beerli et al. (2021) and is descriptively documented in Figure 2 above.²⁴

The outlined identification strategy is operationalized by comparing tax policy changes in municipalities close to the border with those of more distant jurisdictions. Specifically, I estimate the following event study model:

$$\ln(mult_{i,t}) = \sum_{t=1995}^{2008} \delta_{d_1,t} \times \mathbb{1}\{year = t\} \times \mathbb{1}\{0 \leq d_i \leq 10\} + \alpha_i + \alpha_c \times \alpha_t + \sum_{t=1995}^{2008} \delta_{d_2,t} \times \mathbb{1}\{year = t\} \times \mathbb{1}\{10 < d_i \leq 20\} + \theta' \mathbf{X}_{i,t} + \varepsilon_{i,t}, \quad (1)$$

where the dependent variable is the municipal tax multiplier, either for *corporate* or *personal* income. The coefficients $\delta_{d_1,t}$ and $\delta_{d_2,t}$ capture the reform effects for highly-treated (0-10min) and slightly-treated (10-20min) municipalities for $t \geq 1999$, and should be zero for the pre-treatment years. Throughout the analysis, the year 1998 is used as a baseline by excluding it in the sum operator.

Unobserved determinants of local tax policies are controlled for by the municipality fixed effects α_i , whereas $\alpha_c \times \alpha_t$ captures differences in cantonal institutions as well as canton-specific trends. Finally, \mathbf{X} includes municipal-level variables to control for compositional changes. These include all time-varying background characteristics listed in Table 3 above. The migration-related characteristics from the table are excluded from the regressions as they are likely to be endogenous. Standard errors are clustered at the level of municipalities.²⁵

²⁴Note that the distance variable only captures CB workers' driving time on the Swiss side of the border and therefore does not document their total commuting time.

²⁵The results are robust to using two-way clustering, by municipality and by year, which allows for arbitrary correlations between observations of the same municipality or year. Results are available upon request.

The crucial identifying assumption is the standard parallel trends assumption in DiD models: within municipalities and conditional on controls, one would have observed the same average change in tax policies in the three specified distance groups, absent the commuting policy. The event study model presents an important way to assess this assumption as it supports a comparison of the relative changes in tax multipliers in the distance groups *before* treatment.

To get a better idea of the overall magnitude of the policy response, I estimate a second model with a DiD design to determine the average change in taxes for the transition phase (1999-2003) and post-reform phase (≥ 2004) rather than estimating yearly changes. For this purpose, the following model specification is used, where the pre-reform years (< 1999) represent the baseline:

$$\begin{aligned} \ln(mult_{i,t}) = & \beta_{d_1}^T [Transition_t \times \mathbb{1}\{0 \leq d_i \leq 10\}] + \beta_{d_1}^F [Post_t \times \mathbb{1}\{0 \leq d_i \leq 10\}] + \\ & \beta_{d_2}^T [Transition_t \times \mathbb{1}\{10 < d_i \leq 20\}] + \beta_{d_2}^F [Post_t \times \mathbb{1}\{10 < d_i \leq 20\}] \\ & + \theta' \mathbf{X}_{i,t} + \alpha_i + \alpha_c \times \alpha_t + \varepsilon_{i,t} \end{aligned} \quad (2)$$

Before turning to the results, a clarifying note concerning the interpretation of the estimation results for both models shall be reiterated here. As discussed in Section 2, municipalities set their taxes in an environment where they compete for mobile factors by offering attractive bundles of location characteristics, public goods, and taxes. Any positive or negative deviation in local taxes from the general (downward) trend should therefore not be interpreted as a unilateral change in tax policies of municipalities close to the border. Instead, the effects might partly also be driven by changes in tax setting behavior of more centrally-located municipalities which forgo the opportunity to benefit from the improvements in labor supply and could lower their taxes to remain attractive. The outlined estimation approach simply focuses on *relative* differences between municipalities' tax parameters as the outcome of this interactive tax setting process.

5 Results

Section 5.1 presents the main results on how municipalities respond to the free mobility of CB workers and analyzes changes in their *corporate* and *personal* income tax. Section 5.2 covers four extensions to the analysis to shed light on the underlying mechanisms. The robustness of the results is discussed in Section 5.3.

5.1 Main results

The main results cover the heterogeneous response of municipalities, distinguishing amongst them by their tax base and legal setup due to differing discretion afforded to municipalities in their setting of *corporate* and *personal* income taxes (details see Section 3.2). I therefore follow a sample split strategy and separately discuss policy responses in: (i) the *corporate* income tax (*type 3*), (ii) the *personal* income tax (*types 1* and *3*), and (iii) municipalities where the tax applies to both income groups simultaneously (*type 2*).

Figure 4 shows the yearly estimates of the event study models and presents results with both excluded (left) and included (right) year fixed effects to also illustrate the downward trend of tax multipliers (see discussion in Section 4.1). In light of this overall tax decline, the research question is essentially whether policy makers in Swiss border regions follow this declining trend or adopt a less aggressive tax policy where local conditions permit.

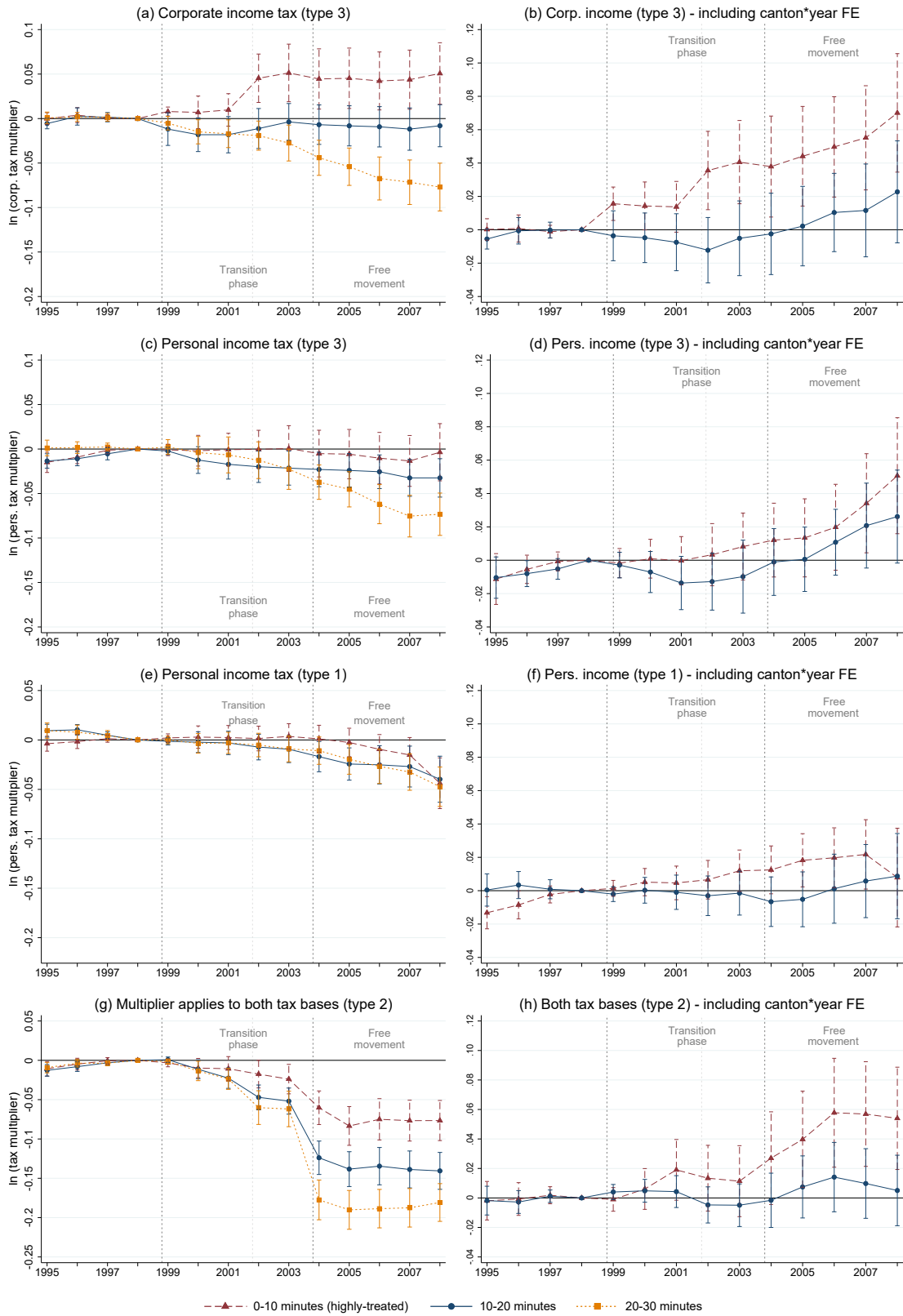
Corporate income tax. Panels (a) and (b) of Figure 4 present the response in *corporate* tax multipliers. The underlying sample includes only the most flexible municipalities that can set different multipliers for both tax bases (*type 3*). Independent of excluding (Panel a) or including (Panel b) year fixed effects, the graphs show a constant co-movement in the tax during the pre-reform phase across distance groups. This supports the identifying assumption of parallel trends. The

transition phase then shows first differences in the evolution of tax multipliers between the distance groups with coefficients turning statistically significant from 2002 onward when the first employment restrictions were lifted. In line with expectations, this relative increase in *corporate* taxes is positive, largest for municipalities closest to the border, and largest after 2004 when cross-border employment was completely liberalized. This is evidence in favor of the hypothesis that the labor supply shock constitutes a favorable and taxable location factor.

Personal income tax. The results on policy responses in the *personal* income tax initially appear mixed. The analysis looks at two different samples: Panels (c) and (d) focus on the same sample of municipalities as above (i.e., *type 3*) but concentrate on their *personal* income tax multiplier, whereas panels (e) and (f) focus on the group of least flexible municipalities (i.e., *type 1*) which can only tax *personal* income at their individual rate.

For the former sample of *type 3* municipalities, no significant pre-trends are observed and the results show a similar policy response in the *personal* income tax as identified for the *corporate* tax above. However, the response is lagged by about five years and smaller in magnitude. The lagged response is in line with evidence from, for example, Haaland and Roth (2020) who show that labor market concerns in the context of migration are reduced when people learn about actual impact. This relates to the Swiss setting as the commuting policy’s impact on local residents was unclear and turned out to be predominantly positive only later. The estimates for the latter sample (i.e., *type 1*) in panels (e) and (f) cannot confirm this finding and are problematic due to the presence of significant pre-trends. Putting this fact aside for a moment, the observed patterns suggest that taxes in highly-treated border municipalities have not evolved differently than in less-affected municipalities. To make sense of this result, Figure A1 in the Appendix offers additional evidence and shows that the sample of municipalities considered

Figure 4: Tax policy response by tax base



Notes: Coefficient estimates and 95% confidence intervals for municipalities in the distance groups with 0-10min, 10-20min, and 20-30min driving time to the nearest border crossing. Results correspond to Equation (1). Municipality controls as well as municipality and canton*year (right) fixed effects included. Standard errors clustered by municipality.

in panels (e) and (f) of Figure 4 happens to be almost entirely unaffected by the commuting policy insofar as municipalities close to the border did not experience an increase in CB worker numbers.²⁶ This is line with official statistics which document that CB worker employment is largely concentrated along the French and German border (as well as the canton of Ticino at the Italian border, see BFS, 2023) where few *type 1* municipalities are located.²⁷ It also explains why Figure 4 shows no meaningful pattern for this small subsample and I abstain from including it in the further analysis.²⁸

Combined tax multiplier. Policy makers in the final sample of municipalities (i.e., *type 2*) face a complex task as they can set only one multiplier that applies to both tax bases. Thus, a balance must be struck that takes into account anticipated effects of a change in the tax parameter on revenue from both sources. Panels (g) and (h) of Figure 4 confirm that all distance groups in this sample followed a common trend in the pre-reform phase. Starting in the transition phase, and even more so in the post-reform phase, municipalities closer to the border set higher taxes than less-affected municipalities farther away from the border. Compared to the evidence on *corporate* income taxation discussed above, the policy response from this sample of municipalities is quite similar. However, the first significant differences occurred about three years later and are slightly smaller – a pattern

²⁶Naturally, Swiss border regions did not experience an equally large inflow of CB workers in response to the commuting policy. It seems that municipalities of *type 1* are an extreme example for this. In some cases it is their geography with high mountains (e.g., Valais) or large lakes (e.g., Appenzell-Ausserrhoden, St. Gallen) at the border that prevents an increase in CB workers even with liberalized CB labor markets (c.f., Appendix Figure A2). In other cases, it is likely that demand and supply side effects on the local labor markets in Switzerland and its neighboring countries prevented a relevant change in the number of CB workers.

²⁷One of the two *type 1* cantons located at the French or German border that did experience significant inflows of CB workers is Neuchâtel. Unfortunately, this canton does not provide sufficient data on local taxes to be included in the analysis.

²⁸Various robustness checks that use alternative model specifications or definitions of the underlying sample, as deployed in Section 5.3 for the other main results, support the conclusion of no differential tax response for this group of municipalities. Results are available upon request.

also observed for the *personal* income tax (see Panels (c) and (d) in Figure 4), where it is even more pronounced. In this sense, *type 2* municipalities that set a combined tax multiplier show an intermediate tax response.

In sum, the event study models in Figure 4 support the hypothesis about a relative increase in *corporate* income taxes in locations where CB worker inflows benefit firms. In addition, Figure 4 documents relative increases also for *personal* income taxes in highly-treated border municipalities. This may be taken as evidence that, on average, CB workers' impact on domestic workers is perceived as positive, as *personal* income in municipalities close to national borders is apparently expected to be able to cope with a tax that declines less than in more centrally-located regions with fewer CB workers. The fact that the response in the *personal* income tax was lagged (and smaller) may be natural as the effect on domestic workers was less clear *a priori* compared to the impact on firms and potential positive effects likely not as pronounced.

In addition to the yearly estimates, Table 4 presents average effects for the transition and post-reform period with the pre-reform period as the baseline. The previous results are confirmed: (i) a statistically significant upward deviation in taxes is only observed for the distance group closest to the border, (ii) the response is strongest in the post-reform phase, (iii) it is particularly strong in municipalities where the multiplier (also) applies to corporate income, and (iv) it is largest in *type 3* municipalities.

Table 4 also shows that these findings are robust when extending the sample to include (i) two smaller cantons that switched between tax regimes (see Table 2 for details) and (ii) observations from the entire BR in the control group. The latter modification redefines the baseline to include municipalities even more distant to the border, yet still located within the BR, to assure that the same legal standards apply. Including these observations increases the identified tax response in the

Table 4: Tax policy response by tax base and treatment phase

| | Corporate income tax (type 3) | | | Personal income tax (type 3) | | | Multiplier applies to both tax bases (type 2) | | |
|---|----------------------------------|---------------------|---------------------|---------------------------------|--------------------|---------------------|--|---------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| $\mathbb{1}\{0 \leq d_i \leq 10\}$ *Transition | 0.024*** (0.007) | 0.022*** (0.007) | 0.031*** (0.008) | 0.006 (0.007) | 0.007 (0.007) | 0.006 (0.007) | 0.010 (0.009) | 0.009 (0.009) | 0.015* (0.008) |
| $\mathbb{1}\{0 \leq d_i \leq 10\}$ *Post-reform | 0.051*** (0.015) | 0.050*** (0.015) | 0.067*** (0.017) | 0.030** (0.013) | 0.028** (0.013) | 0.035** (0.014) | 0.047*** (0.017) | 0.047*** (0.017) | 0.053*** (0.016) |
| $\mathbb{1}\{10 < d_i \leq 20\}$ *Transition | -0.005 (0.007) | -0.003 (0.006) | 0.005 (0.007) | -0.003 (0.007) | -0.0003 (0.007) | -0.0003 (0.007) | 0.002 (0.005) | 0.000 (0.005) | 0.007 (0.005) |
| $\mathbb{1}\{10 < d_i \leq 20\}$ *Post-reform | 0.011 (0.012) | 0.012 (0.012) | 0.032** (0.014) | 0.017* (0.010) | 0.018* (0.010) | 0.033*** (0.011) | 0.008 (0.011) | 0.007 (0.011) | 0.015 (0.010) |
| Post-reform effect (0-10min) | (5.0 – 6.7%) | | | (2.8 – 3.5%) | | | (4.7 – 5.3%) | | |
| No. of observations | 1,750, | 2,100 | 2,688 | 1,750, | 2,100 | 2,688 | 7,770 | 7,854 | 9,478 |
| Municipality controls | × | × | × | × | × | × | × | × | × |
| Municipality fixed effects | × | × | × | × | × | × | × | × | × |
| Canton*year fixed effects | × | × | × | × | × | × | × | × | × |
| Including switching states | | × | | | × | | | × | |
| Contr. group: >20min (in BR) | | | × | | | × | | | × |

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The pre-treatment period from 1995 to 1998 represents the baseline in all models. *Transition* corresponds to the years 1999-2003 during which CB worker employment restrictions were partially lifted. The *Post-reform* period starts in 2004, when CB worker employment was completely liberalized in the border region (BR). Results correspond to Equation 2. Standard errors clustered by municipality.

first distance group across all models which could suggest that the impact of the commuting policy declines further with the distance to the border and beyond the 30-minutes boundary.

5.2 Mechanisms

The data presented in Section 5.1 suggests that observed differences in tax changes among Swiss municipalities are due to the exogenous inflow of foreign workers and their impact on the local economy. According to this interpretation, the increase in local labor supply and the skill-mix improves the affected municipalities' attractiveness for firms (and potentially local residents). In turn, this reduces incentives to relocate by increasing relocation costs, which allows politicians to maintain higher taxes than nearby municipalities that are not directly affected by the reform.

This section provides further evidence in support of this hypothesis and shows that the effects are largest in municipalities with (i) an *a priori* higher expected exposure to the reform and (ii) higher electoral support for the treaty to capture voter sentiments (see second hypothesis in Section 2). Moreover, two further extensions are presented which suggest that the results are not driven by alternative explanations. All four heterogeneity analyses focus on only the largest subsample of municipalities where the multiplier applies to both tax bases (i.e., *type 2*) in order to achieve sufficient power for the heterogeneity analyses.²⁹

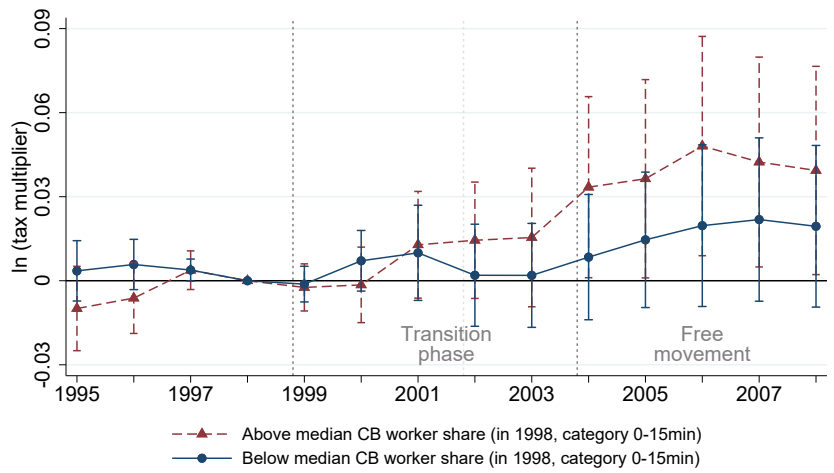
First, I use a sample split based on whether the local employment share of CB workers was below or above the median in 1998 (the last pre-reform year). The hypothesis is that in municipalities with an *ex ante* higher CB worker employment share, the conditions for the employment of CB workers are better than in below-median municipalities (e.g., more firms within commuting distance or more supply of CB workers from across the border). Accordingly, the inflow of CB workers should be higher, which is confirmed by the numbers, and tax changes should be larger in municipalities with a pre-reform higher CB worker share.

Figure 5 shows the results which support the claim of reform-induced inflows of CB workers constituting a crucial driver for the identified changes in municipal taxes. The results document a positive, statistically significant, and robust effect for locations where the pre-reform CB worker share was above the median – an indication of higher exposure to new CB worker inflows.³⁰ The converse argument then says that, under the assumption that local conditions were sub-optimal for the employment of CB workers in municipalities with below-median CB worker

²⁹To have sufficient observations in each subsample, I rely on a slightly more crude distance categorization with bins of 15 minutes driving time (instead of 10 minutes) in this section. The conclusions from Section 5.1 also hold with this categorization approach (see Section 5.3 below).

³⁰Appendix Table A2 reports the results as an average across the reform stages based on Equation 2 and shows their robustness to alternative definitions of the control groups.

Figure 5: Tax policy response by pre-reform CB worker employment share

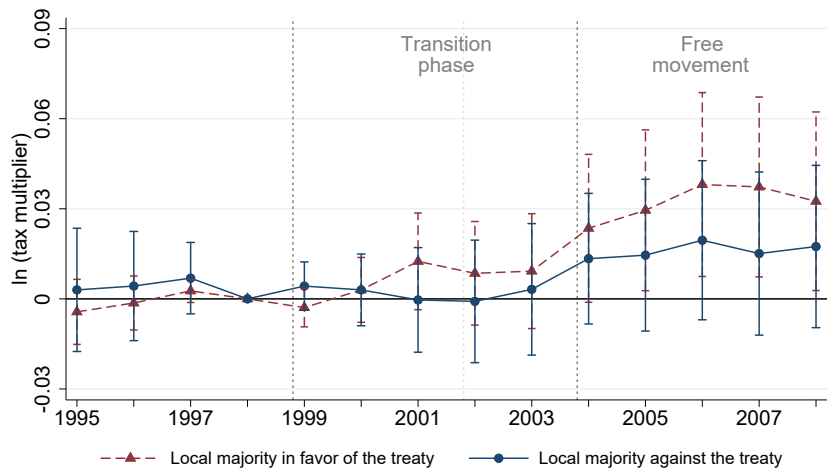


Notes: Coefficient estimates and 95% confidence intervals for highly-treated municipalities in the distance group with 0-15min driving time to the nearest border crossing relative to observations in the distance category 15-30min. Coefficient estimates based on separate regressions. The comparison group includes all municipalities, irrespective of their CB worker share. Results correspond to Equation (1). Municipality controls as well as municipality and canton*year fixed effects included. Standard errors clustered by municipality.

employment shares in 1998, these jurisdictions would not experience a noticeable impact of the commuting policy, irrespective of their driving time to the nearest border crossing. The absence of a significant tax policy response in these municipalities substantiates this interpretation.

The second extension exploits the electoral support for the AFMP. In 2000, there was a national referendum and all Swiss citizens were asked to vote on the treaty between Switzerland and the EU. The referendum outcomes are available at the municipal level and can help to better understand the local expectations towards the reform, its economic impact, and, thus, the drivers for the observed tax responses. Figure 6 shows the policy response, separately for municipalities where the majority of citizens voted in favor or against the reform. In line with expectations, a relative tax increase is only identified for jurisdictions close to the border and with a local majority in favor of the AFMP. Wherever citizens opposed the treaty, no significant policy response is identified. This evidence supports the hy-

Figure 6: Tax policy response by municipal-level support for the treaty



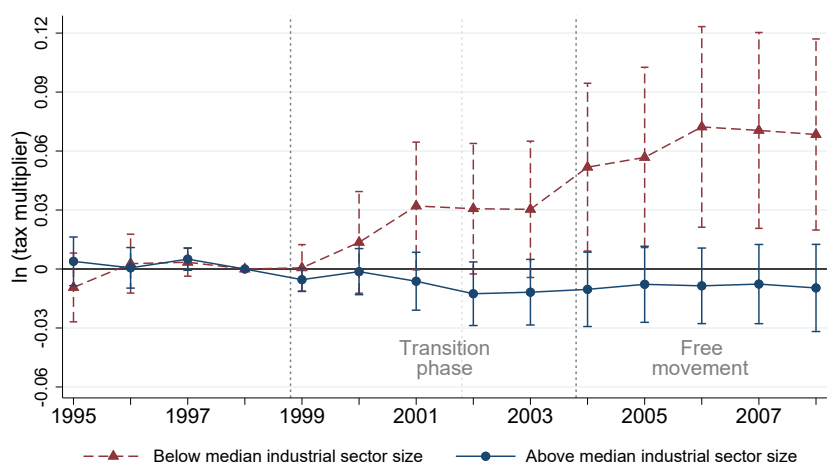
Notes: Coefficient estimates and 95% confidence intervals for highly-treated municipalities in the distance group with 0-15min driving time to the nearest border crossing relative to observations in the distance category 15-30min. Coefficient estimates based on separate regressions. Local support for the treaty measured by support rates in the 2000 national referendum. Results correspond to Equation (1). Municipality controls as well as municipality and canton*year fixed effects included. Standard errors clustered by municipality.

pothesis that more optimistic views about the local economic impact of the reform were the critical drivers behind the policy response.³¹

Next, I discuss two extensions to address concerns about alternative explanations potentially driving the observed tax adjustments. A first concern might be that some of the other legal adjustments that were part of the treaty between Switzerland and the EU could have initiated an adjustment of tax policies by Swiss border municipalities. In particular, the agreement to cut back technical barriers to trade between the economies might affect strong exporting regions more heavily. The overall argument – that tax adjustments are a response to an (expected) improvement of local economic conditions – would then still be the same. Yet, the channel would be different and policy adjustments might be due to a stronger performance

³¹This conclusion is supported by the results of Appendix Table A3. It shows the average response for each reform stage based on Equation 2, tests the robustness w.r.t. to an extension of the control group to the entire BR, and reports the results of interaction models.

Figure 7: Tax policy response by local importance of the secondary sector



Notes: Coefficient estimates and 95% confidence intervals for highly-treated municipalities in the distance group with 0-15min driving time to the nearest border crossing relative to observations in the distance category 15-30min. Coefficient estimates based on separate regressions. Local importance of industrial production measured by employment in the secondary sector at the municipal level. Results correspond to Equation (1). Municipality controls as well as municipality and canton*year fixed effects included. Standard errors clustered by municipality.

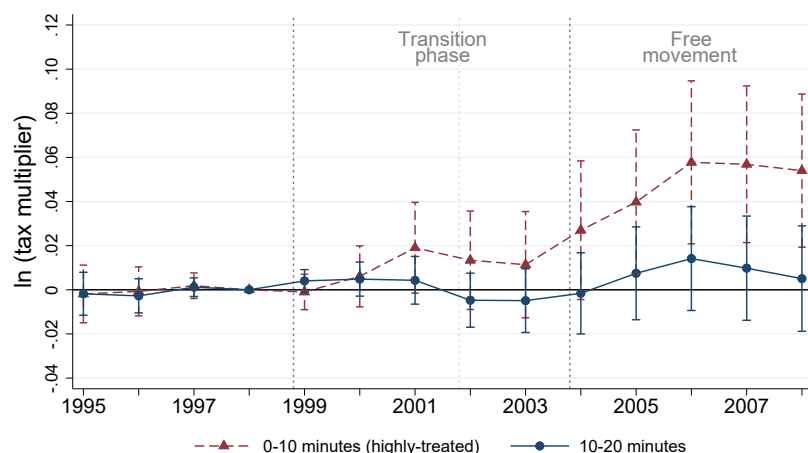
of exporting firms rather than firms in need of the newly incoming foreign workers. I therefore analyze the policy response separately for municipalities with an above versus below median share of industrial sector size, as firms in this sector are the strongest exporters.³²

Figure 7 shows the results which clearly speak against the hypothesis of stronger exports as the key determinant for the observed policy responses. Instead, they corroborate the argument that the sharp increase in the inflow of foreign workers against the backdrop of a shortage of skilled labor – a particularly important factor for the tertiary sector – are the decisive drivers behind the tax adjustments.³³

³²(Beerli et al., 2021, p. 1008) use a similar approach to show that the implementation of the treaty did not have a stronger effect on firms with higher exports. In fact, their results suggest that the positive effects on firms “are similar, if anything even stronger, if we exclude all two-digit industries that were directly affected by the other bilateral agreements”.

³³I again report the average response for each reform stage, test the robustness w.r.t. to an extension of the control group to the entire BR, and report the results of interaction models. These results are documented Table A4 and confirm the above-drawn conclusions.

Figure 8: Tax policy response by tax base – accounting for changes at the country-border*year level



Notes: Coefficient estimates and 95% confidence intervals for municipalities in the distance groups with 0-10min and 10-20min driving time to the nearest border crossing, relative to the group 20-30min. Results correspond to Equation (1) but in addition include country-border*year fixed effects. Standard errors clustered by municipality.

Finally, a second concern might be that policy changes and in particular tax competition with neighboring jurisdictions across national borders could explain the results. However, the observation of a downward trend in international corporate taxation over the period in question, including in the countries neighboring Switzerland (see, e.g., Spengel et al., 2020), renders this a rather unlikely scenario. In a classical tax competition model, declining tax rates across the border result in downward pressure on taxes in Swiss border municipalities when compared to more centrally-located municipalities. Yet, the results show the opposite which suggests that the presented analysis rather underestimates the true effects of the commuting policy on local taxation in Switzerland.

To test the possibility of tax competition with jurisdictions across the border empirically, Figure 8 presents results when including country-border times year fixed effects in the regression to capture average adjustments across the border for each national border separately. The results are almost identical to the main

specification and suggests that the observed local policy responses are not due to developments across the border.

Overall, the presented model extensions all lend support to the conclusion that the inflow of foreign workers allows policy makers to maintain higher levels of *corporate* (and to some extent also *personal* income) taxes compared to less-affected municipalities, as the reform effects increase the attractiveness of municipalities close to the border and relocation costs of mobile factors and agents increase.

5.3 Robustness tests

The sensitivity of the results is tested by applying a number of adjustments to the model specification and the definition of the underlying data sample. First, Appendix Table A5 evaluates the results' robustness to using a cruder categorization into bins of 15-minutes driving time (rather than 10-minute bins) while extending the sample to the entire BR. The results confirm the previous findings and show that municipalities closer to the border deviate the most from the overall downward trend in local taxes.

Second, the specification behind the results in Appendix Figure A3 abstains from a categorization into distance groups altogether. Instead, a continuous driving time variable is considered. These results again support the previous findings: the response is statistically significant and robust for the *corporate* income tax and most pronounced for the period after 2004 when labor markets were completely liberalized. The effect on the *personal* income tax is smaller and statistically significant only in some specifications.

Third, Table A6 in the Appendix investigates whether a restriction in one of the *type 3* cantons' tax laws affects the results in the respective municipalities. According to tax laws in the canton of Solothurn, the municipal tax multipliers for *corporate* and *personal* income must differ by at most 30% of the cantonal tax.

Only a small share of municipalities is restricted by this law, but the legal requirement might either exert upward pressure on *personal* income taxes or depress *corporate* income taxes in the respective municipalities. To test this possibility, Appendix Table A6 compares the previous results with an adjusted sample in which all municipalities affected by this restriction were excluded. As the results show, this adjustment has almost no effect on the coefficient estimates.

Fourth, Figure A4 in the Appendix extends the sample period until 2012 to analyze the persistence of relative differences in tax multipliers. For the main results, the sample ended in 2008 to avoid that the global financial crisis (GFC) could confound the results. The extended sample results suggest that the differences in tax multipliers persist also ten years after the implementation of the commuting policy, even though differences seem to decrease to some extent for *corporate* income taxes in *type 3* municipalities with the advent of the GFC.

6 Concluding remarks

The analysis in this paper establishes a link between changes in local labor supply and local taxes. Building on, and extending, established lines of reasoning from the traditional tax competition and NEG literature, it is argued that a quantitatively larger or qualitatively better labor supply pool constitutes a favorable location factor which can, in principle, be taxed. For identification, I exploit a commuting policy that liberalized cross-border labor markets between Switzerland and the EU. This facilitates the estimation of event study and DiD models that compare highly-treated municipalities close to the national border with more centrally-located locations where firms miss out on the benefits of CB workers.

The empirical results show that highly-treated municipalities close to the border set higher *corporate* taxes after the reform compared to less-affected jurisdictions.

Various model extensions and robustness tests speak for the interpretation that municipalities used the favorable effects of the commuting policy for their local economies to maintain higher tax levels. Among other things, I provide suggestive evidence that policy responses are not driven by tax competition with jurisdictions across the national border or by exporting firms which benefited from a cut back of technical barriers to trade that occurred around the same time as the liberalization of cross-border labor markets. The results on the local *personal* income tax indicate a similar yet smaller and lagged response. This might not come as a surprise, as the impact of the commuting policy on domestic workers was less clear *a priori* but also turned out to be predominantly positive. Finally, local electoral support for the reform constitutes a critical factor for the differential tax changes, a finding that is likely particularly relevant for the adjustments in the *personal* income tax.

In conclusion, the findings of this paper call for paying careful attention to potential (policy) responses at lower government levels as well as to local attitudes, as they will affect the overall impact of any market-integration agreement like the AFMP reached at the national level. Importantly, the argumentation in this paper and the findings regarding local tax responses build on the positive effects of the reform for Swiss firms (and workers) that have been identified in a recent paper (see Beerli et al., 2021). Yet, similar conclusions regarding the economic effects of (highly-skilled) migration have been reached for other settings (see, e.g., Peri, 2012, on US states; Hornung, 2014, on historical Prussia; Mitaritonna et al., 2017, on France) which suggests a broader validity of the conclusions that are to be confirmed by future research.

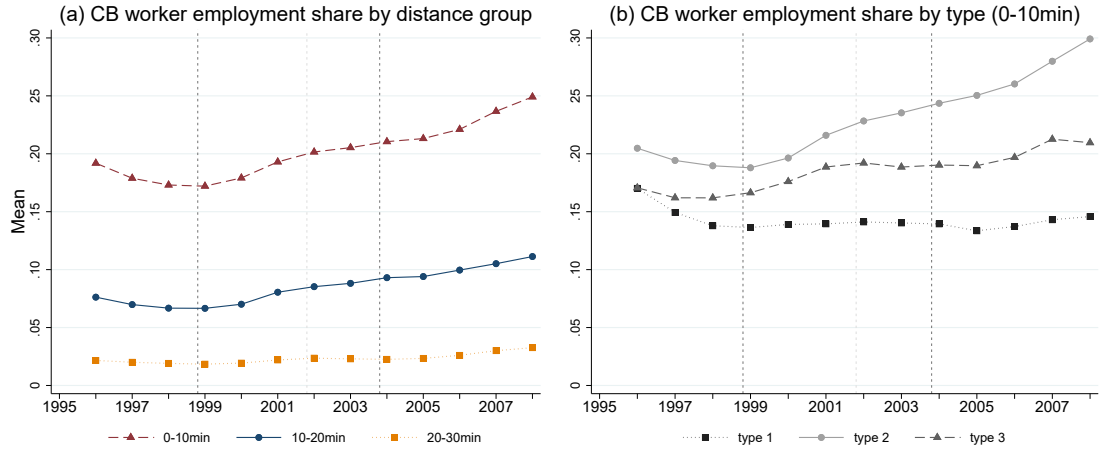
Appendix

Table A1: Taxation of CB workers according to double taxation agreements

| Country of residence | Regulation |
|----------------------|---|
| Germany | <ul style="list-style-type: none"> • A max. of 4.5% of gross income has to be paid to cantonal tax authorities (taxation at the source). • Usual income tax to be paid in Germany (the amount due to Swiss tax authorities is accounted for). |
| France | <ul style="list-style-type: none"> • CB workers' income is only taxed in France • The usual income tax applies. French tax authorities transfer 4.5% of gross income to the respective Swiss canton (if the CB worker is employed in the border cantons Basel-Stadt, Basel-Landschaft, Jura, Neuchâtel, Solothurn, Vaud, Valais, or Bern). • Exception 1: when employed in the canton of Genève, CB workers are taxed at the source. The French border Departments Ain or Haute-Savoie receive 3.5% of gross income as compensation. • Exception 2: when employed in another canton, French CB workers are taxed at the source. French tax authorities grant a tax break on the amount taxable in France. |
| Italy | <ul style="list-style-type: none"> • CB workers' income is only taxed in Switzerland (taxation at the source). • The Swiss border cantons (Valais, Ticino, Graubünden) then transfer 40% (38.5% for Ticino) of the tax amount to the home municipality in Italy as compensation. |
| Austria | <ul style="list-style-type: none"> • CB workers' are taxed in Switzerland and Austria. • Austrian CB workers are taxed at the source in Switzerland. Swiss tax authorities transfer 12.5% of the tax amount to Austria as compensation. • The amount paid to Swiss authorities is deducted when calculating the Austrian income tax. • Before 2006, CB workers only had to pay a tax of 3% to the respective canton which was then deducted when calculating their income tax due to Austrian tax authorities. |

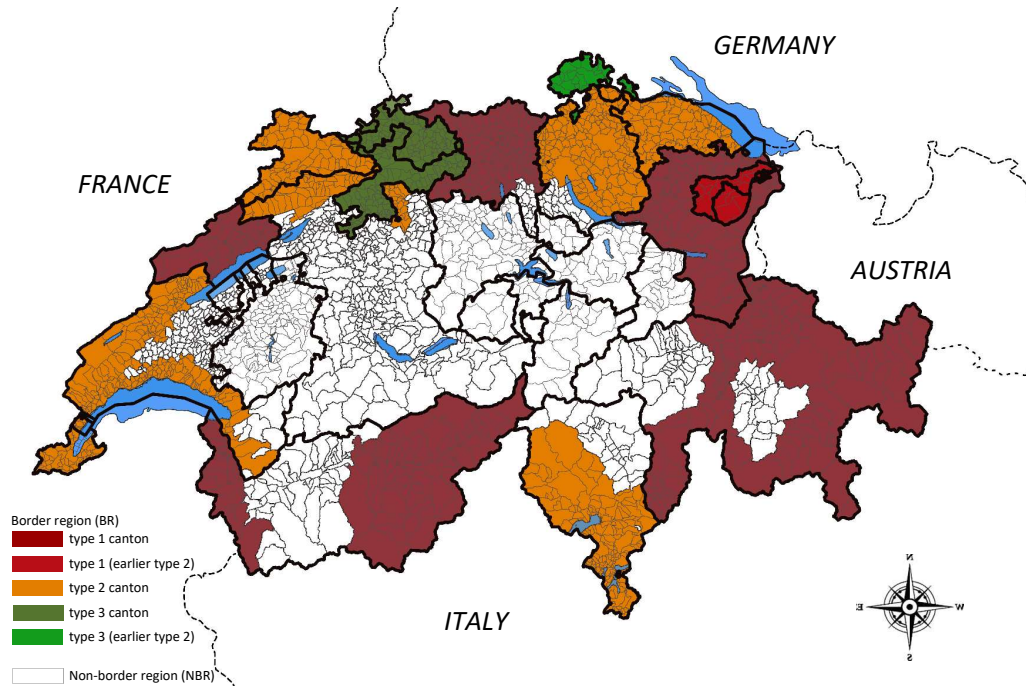
Notes: When not returning to Germany (France) for more than 60 (45) working days, the CB worker status is lost and the individual gets fully taxed at the source.

Figure A1: Evolution of CB worker employment shares by distance group and municipality type



Notes: Panel (a) plots the yearly CB worker employment shares relative to total municipal employment in 1998 across municipality types (see Table 2). Panel (b) focuses only on the highly-treated group right at the border (0-10min) and plots the employment shares by municipality type.

Figure A2: Border region cantons by municipality type



Notes: Thicker black lines correspond to cantonal borders. Thinner lines highlight municipal borders. National borders from neighboring countries are depicted as dashed lines.

Table A2: Tax policy response by treatment phase – pre-reform CB worker share

| | Total | CB worker share | | Total | CB worker share | |
|--|--------------------|------------------|--------------------|---------------------|---------------------|---------------------|
| | | below median | above median | | below median | above median |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $1\{0 \leq d_i \leq 15\} * \text{Transition}$ | 0.004 (0.006) | 0.001 (0.007) | 0.011 (0.009) | 0.022** (0.007) | 0.020** (0.008) | 0.028*** (0.010) |
| $1\{0 \leq d_i \leq 15\} * \text{Post-reform}$ | 0.026** (0.012) | 0.013 (0.013) | 0.043** (0.018) | 0.053*** (0.012) | 0.045*** (0.013) | 0.069*** (0.017) |
| No. of observations | 7,770 | 5,824 | 5,936 | 9,478 | 7,532 | 7,644 |
| Municipality controls | × | × | × | × | × | × |
| Municipality fixed effects | × | × | × | × | × | × |
| Canton*year fixed effects | × | × | × | × | × | × |
| Contr. group: 15-30min | × | × | × | | | |
| Contr. group: >30min (in BR) | | | | × | × | × |

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The *pre-reform* period 1995-1998 represents the baseline in all models. *Transition* corresponds to the years 1999-2003 during which CB worker employment restrictions were partially lifted. The *Post-reform* period starts in 2004, when CB worker employment was completely liberalized in the border region. Coefficient estimates for municipalities with below/above median CB worker shares based on separate regressions. The table focuses on the response by highly-treated municipalities in the first distance category. CB worker shares relative to 1998 employment. The comparison groups include all municipalities in the respective category, irrespective of their CB worker share. Municipality controls as well as municipality and canton*year fixed effects included. Standard errors clustered by municipality.

Table A3: Tax policy response by treatment phase – municipality-level support for the treaty in the 2000 referendum

| | In favor of treaty | Against treaty | In favor of treaty | Against treaty | | |
|---|--------------------|-------------------|---------------------|------------------|-------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| A: Sample splits | | | | | | |
| $1\{0 \leq d_i \leq 15\} * \text{Transition}$ | 0.006 (0.008) | -0.008 (0.012) | 0.024*** (0.009) | 0.011 (0.012) | | |
| $1\{0 \leq d_i \leq 15\} * \text{Post-reform}$ | 0.032** (0.016) | 0.005 (0.018) | 0.070*** (0.016) | 0.019 (0.017) | | |
| B: Interaction models | | | | | | |
| $1\{0 \leq d_i \leq 15\} * \text{Transition}$ | | | | | 0.005 (0.008) | 0.022** (0.009) |
| $1\{0 \leq d_i \leq 15\} * \text{Post-reform}$ | | | | | 0.031* (0.016) | 0.068*** (0.016) |
| $1\{0 \leq d_i \leq 15\} * \text{Transition} * \text{Against}$ | | | | | -0.018 (0.013) | -0.016 (0.013) |
| $1\{0 \leq d_i \leq 15\} * \text{Post-reform} * \text{Against}$ | | | | | -0.031 (0.023) | -0.061*** (0.021) |
| No. of observations | 5,796 | 1,358 | 7,014 | 1,554 | 7,182 | 8,582 |
| Municipality controls | × | × | × | × | × | × |
| Municipality fixed effects | × | × | × | × | × | × |
| Canton*year fixed effects | × | × | × | × | × | × |
| Contr. group: 15-30min | × | × | | | × | × |
| Contr. group: >30min (in BR) | | | × | × | | × |

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The *pre-reform* period 1995-1998 represents the baseline in all models. *Transition* corresponds to the years 1999-2003 during which CB worker employment restrictions were partially lifted. The *post-reform* period starts in 2004, when CB worker employment was completely liberalized in the border region. The table focuses on the response by highly-treated municipalities in the first distance category. Standard errors clustered by municipality.

Table A4: Tax policy response by treatment phase – share of secondary sector employment at the municipality level

| | Industry presence | | Industry presence | | (5) | (6) |
|--|---------------------|-------------------|---------------------|------------------|---------------------|----------------------|
| | below median | above median | below median | above median | | |
| | (1) | (2) | (3) | (4) | | |
| A: Sample splits | | | | | | |
| $1\{0 \leq d_i \leq 15\} * \text{Transition}$ | 0.022 (0.014) | -0.009 (0.006) | 0.051*** (0.015) | 0.002 (0.006) | | |
| $1\{0 \leq d_i \leq 15\} * \text{Post-reform}$ | 0.063*** (0.023) | -0.001 (0.009) | 0.104*** (0.023) | 0.006 (0.011) | | |
| B: Interaction models | | | | | | |
| $1\{0 \leq d_i \leq 15\} * \text{Transition}$ | | | | | 0.016 (0.013) | 0.057*** (0.015) |
| $1\{0 \leq d_i \leq 15\} * \text{Post-reform}$ | | | | | 0.052** (0.022) | 0.115*** (0.023) |
| $1\{0 \leq d_i \leq 15\} * \text{Transition} * \text{Industrial}$ | | | | | -0.024* (0.014) | -0.053*** (0.016) |
| $1\{0 \leq d_i \leq 15\} * \text{Post-reform} * \text{Industrial}$ | | | | | -0.059** (0.024) | -0.115*** (0.026) |
| No. of observations | 4,174 | 3,591 | 4,739 | 4,734 | 7,770 | 9,478 |
| Municipality controls | × | × | × | × | × | × |
| Municipality fixed effects | × | × | × | × | × | × |
| Canton*year fixed effects | × | × | × | × | × | × |
| Contr. group: 15-30min | × | × | | | × | × |
| Contr. group: >30min (in BR) | | | × | × | | × |

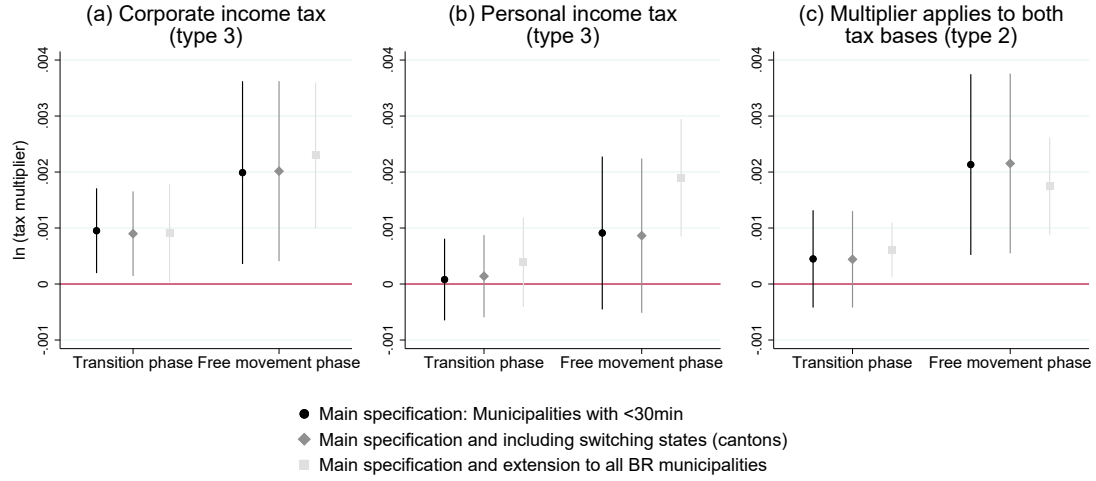
Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The *pre-reform* period 1995-1998 represents the baseline in all models. *Transition* corresponds to the years 1999-2003 during which CB worker employment restrictions were partially lifted. The *post-reform* period starts in 2004, when CB worker employment was completely liberalized in the border region. The table focuses on the response by highly-treated municipalities in the first distance category. Standard errors clustered by municipality.

Table A5: Tax policy response by tax base and treatment phase – alternative categorization with bins of 15 minutes driving time

| | Corporate income tax (type 3) | | Personal income tax (type 3) | | Multiplier applies to both tax bases (type 2) | |
|---|----------------------------------|---------------------|---------------------------------|---------------------|--|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $\mathbb{1}\{0 \leq d_i \leq 15\}$ *Transition | 0.022* (0.013) | 0.026** (0.013) | 0.006 (0.011) | 0.011 (0.010) | 0.022*** (0.007) | 0.022*** (0.007) |
| $\mathbb{1}\{0 \leq d_i \leq 15\}$ *Post-reform | 0.068*** (0.020) | 0.068*** (0.020) | 0.034** (0.015) | 0.036** (0.015) | 0.053*** (0.012) | 0.053*** (0.012) |
| $\mathbb{1}\{15 < d_i \leq 30\}$ *Transition | 0.021** (0.010) | 0.023** (0.010) | 0.014 (0.009) | 0.016* (0.009) | 0.019*** (0.006) | 0.018*** (0.006) |
| $\mathbb{1}\{15 < d_i \leq 30\}$ *Post-reform | 0.051*** (0.016) | 0.055*** (0.016) | 0.041*** (0.012) | 0.044*** (0.013) | 0.029*** (0.010) | 0.029*** (0.010) |
| Post-reform effect (0-15min) | (6.8%) | | (3.4 – 3.6%) | | (5.3%) | |
| No. of observations | 2,688 | 3,038 | 2,688 | 3,038 | 9,478 | 9,562 |
| Municipality controls | × | × | × | × | × | × |
| Municipality fixed effects | × | × | × | × | × | × |
| Canton*year fixed effects | × | × | × | × | × | × |
| Including switching states | | × | | × | | × |

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The pre-treatment period from 1995 to 1998 represents the baseline in all models. *Transition* corresponds to the years 1999-2003 during which CB worker employment restrictions were partially lifted. The *Post-reform* period starts in 2004 when CB worker employment was completely liberalized in the BR. Results correspond to Equation 2 but are based on a cruder categorization into distance groups. Standard errors clustered by municipality.

Figure A3: Tax policy response by tax base and treatment phase – continuous driving time specification



Notes: Coefficient estimates and 95% confidence intervals for the interaction of the *transition* phase (1999-2003) and *free movement* phase ($t \geq 2004$) with the driving time variable. For an easier interpretation of the graph, driving time has been multiplied by (-1). Coefficients (δ_1 and δ_2) estimated based on the following main specification:

$$\ln(mult_{i,t}) = \beta_1 Transition + \delta_1(Transition \times driving_time) + \beta_2 Free_move + \delta_2(Free_move \times driving_time) + \theta' \mathbf{X}_{i,t} + \alpha_i + \alpha_c \times \alpha_t + \varepsilon_{i,t}.$$

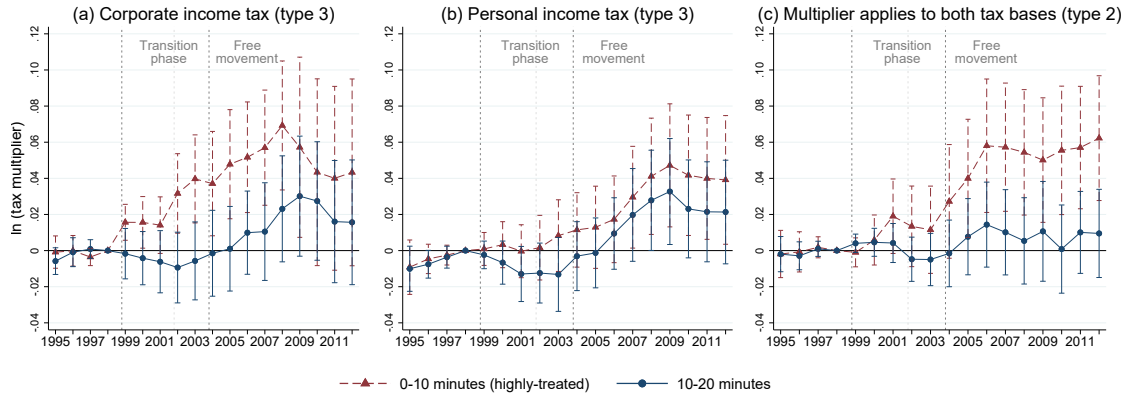
The pre-treatment period from 1995 to 1998 represents the baseline in all models. Standard errors clustered by municipality.

Table A6: Tax policy response by tax base and treatment phase – exclusion of observations that are constrained in their tax policy

| | Corporate income tax (type 3) | | | | Personal income tax (type 3) | | | |
|--|----------------------------------|---------------------|---------------------|---------------------|---------------------------------|--------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| $1\{0 \leq d_i \leq 10\}$ *Transition | 0.024*** (0.007) | 0.023*** (0.007) | | | 0.006 (0.007) | 0.005 (0.007) | | |
| $1\{0 \leq d_i \leq 10\}$ *Post-reform | 0.051*** (0.015) | 0.050*** (0.015) | | | 0.030** (0.013) | 0.032** (0.013) | | |
| $1\{10 < d_i \leq 20\}$ *Transition | -0.005 (0.008) | -0.005 (0.008) | | | -0.004 (0.007) | -0.003 (0.007) | | |
| $1\{10 < d_i \leq 20\}$ *Post-reform | 0.011 (0.012) | 0.012 (0.012) | | | 0.017* (0.010) | 0.019* (0.010) | | |
| $1\{0 \leq d_i \leq 15\}$ *Transition | | | 0.022* (0.013) | 0.022 (0.014) | | | 0.006 (0.011) | 0.006 (0.011) |
| $1\{0 \leq d_i \leq 15\}$ *Post-reform | | | 0.068*** (0.020) | 0.066*** (0.022) | | | 0.034** (0.015) | 0.034** (0.016) |
| $1\{15 < d_i \leq 30\}$ *Transition | | | 0.021** (0.010) | 0.021** (0.010) | | | 0.014 (0.009) | 0.014 (0.009) |
| $1\{15 < d_i \leq 30\}$ *Post-reform | | | 0.051*** (0.016) | 0.049*** (0.017) | | | 0.041*** (0.012) | 0.040*** (0.013) |
| No. of observations | 1,750 | 1,718 | 2,688 | 2,627 | 1,750 | 1,718 | 2,688 | 2,627 |
| Constrained obs. excluded | | × | | × | | × | | × |
| Municipality controls | × | × | × | × | × | × | × | × |
| Municipality fixed effects | × | × | × | × | × | × | × | × |
| Canton*year fixed effects | × | × | × | × | × | × | × | × |

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The pre-treatment period from 1995 to 1998 represents the baseline in all models. *Transition* corresponds to the years 1999-2003 during which CB worker employment restrictions were partially lifted. The *Post-reform* period starts in 2004 when CB worker employment was completely liberalized in the BR. Results correspond to Equation 2. Standard errors clustered by municipality.

Figure A4: Tax policy response by tax base – extension of the post-reform period until 2012



Notes: Coefficient estimates and 95% confidence intervals for municipalities in the distance groups with 0-10min and 10-20min driving time to the nearest border crossing, relative to the group 20-30min. Results correspond to Equation (1) with an extended sample period until 2012. Municipality controls as well as municipality and canton*year fixed effects are included. Standard errors clustered by municipality.

References

- Abberger, K., Y. Abrahamsen, T. Bolli, A. Dibiasi, P. Egger, A. Frick, M. Graff, F. Hälg, D. Iselin, S. Sarferaz, J. Schläpfer, M. Siegenthaler, B. Simmons-Süer, J.-E. Sturm, and F. Tarlea (2015). Der bilaterale Weg – Eine ökonomische Bestandsaufnahme. ETH Zürich, KOF Studien No. 2.
- Aeppli, R., M. Altenburg, S. Arvanitis, E. Atukeren, T. Bolli, M. Gassebner, M. Graff, H. Hollenstein, A. Lassmann, D. Liechi, V. Nitsch, B. Siliverstovs, and J.-E. Sturm (2008). Auswirkungen der bilateralen Abkommen auf die Schweizer Wirtschaft. ETH Zürich, KOF Studien No. 2.
- Andersson, F. and R. Forslid (2003). Tax Competition and Economic Geography. *Journal of Public Economic Theory* 5(2), 279–303.
- Bacher, H. U. and M. Brülhart (2013). Progressive Taxes and Firm Births. *International Tax and Public Finance* 20(1), 129–168.
- Baldwin, R. E. and P. Krugman (2004). Agglomeration, Integration and Tax Harmonisation. *European Economic Review* 48(1), 1–23.
- Beerli, A., J. Ruffner, M. Siegenthaler, and G. Peri (2021). The Abolition of Immigration Restrictions and the Performance of Firms and Workers: Evidence from Switzerland. *American Economic Review* 111(3), 976–1012.
- BFS (2023). Grenzgängerinnen und Grenzgänger. Grenzgängerstatistik (GGS). <https://www.bfs.admin.ch/bfs/de/home/statistiken/arbeits-erwerb/erwerbsstaetigkeit-arbeitszeit/erwerbsbevoelkerung/grenzgaenger.html> [Accessed: 21/03/2023].
- Borck, R. and M. Pflüger (2006). Agglomeration and Tax Competition. *European Economic Review* 50(3), 647–668.
- Borjas, G. J. (2003). The Labor Demand Curve is Downward Sloping: Reexamining the Impact of Immigration on the Labor Market. *The Quarterly Journal of Economics* 118(4), 1335–1374.
- Brülhart, M., S. Bucovetsky, and K. Schmidheiny (2015). Taxes in Cities. In *Handbook of Regional and Urban Economics*, Volume 5, pp. 1123–1196.
- Brülhart, M. and M. Jametti (2006). Vertical Versus Horizontal Tax Externalities: An Empirical Test. *Journal of Public Economics* 90(10-11), 2027–2062.
- Brülhart, M. and M. Jametti (2019). Does Tax Competition Tame the Leviathan? *Journal of Public Economics* 177, 104037.
- Brülhart, M., M. Jametti, and K. Schmidheiny (2012). Do Agglomeration Economies Reduce the Sensitivity of Firm Location to Tax Differentials? *The Economic Journal* 122(563), 1069–1093.

- Brühlhart, M. and H. Simpson (2018). Agglomeration Economies, Taxable Rents and Government Capture: Evidence from a Place-Based Policy. *Journal of Economic Geography* 18(2), 319–353.
- Brutschin, C. (2014). Fachkräfterekrutierung – Eine Herausforderung für die Region Basel. In: MetroBasel Report 2014. Fachkräftebedarf und Fachkräftemangel.
- Burchardi, K. B., T. Chaney, T. A. Hassan, L. Tarquinio, and S. J. Terry (2020). Immigration, Innovation, and Growth. NBER Working Paper No. 27075.
- Charlot, S. and S. Paty (2007). Market Access Effect and Local Tax Setting: Evidence from French Panel Data. *Journal of Economic Geography* 7(3), 247–263.
- Chevalier, A., B. Elsner, A. Lichter, and N. Pestel (2018). Immigrant Voters, Taxation and the Size of the Welfare State. IZA Discussion Paper No. 18/14.
- Combes, P.-P. and L. Gobillon (2015). The Empirics of Agglomeration Economies. In *Handbook of Regional and Urban Economics*, Volume 5, pp. 247–348.
- Crook, T. R., S. Y. Todd, J. G. Combs, D. J. Woehr, and D. J. Ketchen Jr (2011). Does Human Capital Matter? A Meta-Analysis of the Relationship Between Human Capital and Firm Performance. *Journal of Applied Psychology* 96(3), 443.
- Cueni, D. and G. Sheldon (2011). Arbeitsmarktintegration von EU/EFTA-Bürgerinnen und Bürgern in der Schweiz. Studie im Auftrag des Bundesamtes für Migration. Forschungsstelle für Arbeitsmarkt- und Industrieökonomik, University of Basel.
- Devereux, M. P., R. Griffith, and H. Simpson (2007). Firm Location Decisions, Regional Grants and Agglomeration Externalities. *Journal of Public Economics* 91(3-4), 413–435.
- Doms, M., E. Lewis, and A. Robb (2010). Local Labor Force Education, New Business Characteristics, and Firm Performance. *Journal of Urban Economics* 67(1), 61–77.
- Duranton, G. and D. Puga (2004). Micro-Foundations of Urban Agglomeration Economies. In *Handbook of Regional and Urban Economics*, Volume 4, pp. 2063–2117.
- Dustmann, C., T. Frattini, and I. P. Preston (2013). The Effect of Immigration Along the Distribution of Wages. *Review of Economic Studies* 80(1), 145–173.
- Dustmann, C. and A. Glitz (2015). How do Industries and Firms Respond to Changes in Local Labor Supply? *Journal of Labor Economics* 33(3), 711–750.

- Dustmann, C., U. Schönberg, and J. Stuhler (2017). Labor Supply Shocks, Native Wages, and the Adjustment of Local Employment. *The Quarterly Journal of Economics* 132(1), 435–483.
- FEW-HSG (2008). KMU-Landschaft im Wandel. Eine Studie anhand der Betriebszählungen 1998, 2001 und 2005. FEW-HSG, Forschungsinstitut für Empirische Ökonomie und Wirtschaftspolitik. BFS, Statistik der Schweiz.
- Fisher-Vanden, K., E. T. Mansur, and Q. J. Wang (2015). Electricity Shortages and Firm Productivity: Evidence from China’s Industrial Firms. *Journal of Development Economics* 114, 172–188.
- Haaland, I. and C. Roth (2020). Labor Market Concerns and Support for Immigration. *Journal of Public Economics* 191, 104256.
- Hainmueller, J. and M. J. Hiscox (2010). Attitudes Toward Highly Skilled and Low-Skilled Immigration: Evidence from a Survey Experiment. *American Political Science Review* 104(1), 61–84.
- Henneberger, F. and A. Ziegler (2011). Evaluation der Wirksamkeit der flankierenden Massnahmen zur Personenfreizügigkeit: Teil 2: Empirische Überprüfung des Auftretens von Lohndruck aufgrund des Immigrationsdrucks aus den EU17/EFTA-Mitgliedstaaten.
- Hindriks, J., S. Peralta, and S. Weber (2008). Competing in Taxes and Investment Under Fiscal Equalization. *Journal of Public Economics* 92(12), 2392–2402.
- Hofmann, U. (2014). Paradigmenwechsel auf dem Arbeitsmarkt. In: MetroBasel Report 2014. Fachkräftebedarf und Fachkräftemangel.
- Hornung, E. (2014). Immigration and the Diffusion of Technology: The Huguenot Diaspora in Prussia. *American Economic Review* 104(1), 84–122.
- Jofre-Monseny, J. (2013). Is Agglomeration Taxable? *Journal of Economic Geography* 13(1), 177–201.
- Kägi, W., G. Sheldon, and N. Braun (2009). Indikatorensystem Fachkräftemangel. Studie des B,B,S. Volkswirtschaftliche Beratung und der Forschungsstelle für Arbeitsmarkt- und Industrieökonomik (University of Basel) im Auftrag des Bundesamts für Berufsbildung und Technologie (BBT).
- Koethenbuerger, M. (2014). Competition for Migrants in a Federation: Tax or Transfer Competition? *Journal of Urban Economics* 80, 110–118.
- Koh, H.-J., N. Riedel, and T. Böhm (2013). Do Governments Tax Agglomeration Rents? *Journal of Urban Economics* 75, 92–106.
- Krapf, M. and D. Staubli (2020). The Corporate Elasticity of Taxable Income: Event Study Evidence from Switzerland. CESifo Working Paper, No. 8715.

- Kreis, G. (2007). Grenzgänger. In: Historisches Lexikon der Schweiz (HLS). <https://hls-dhs-dss.ch/de/articles/007843/2007-01-23/> [Accessed: 20/12/2021].
- Ludema, R. D. and I. Wooton (2000). Economic Geography and the Fiscal Effects of Regional Integration. *Journal of International Economics* 52(2), 331–357.
- Luthi, E. and K. Schmidheiny (2014). The Effect of Agglomeration Size on Local Taxes. *Journal of Economic Geography* 14(2), 265–287.
- Mitaritonna, C., G. Orefice, and G. Peri (2017). Immigrants and Firms’ Outcomes: Evidence from France. *European Economic Review* 96, 62–82.
- Nakamura, R. and C. J. M. Paul (2019). Measuring Agglomeration. In *Handbook of Regional Growth and Development Theories*, pp. 386–412.
- Niebuhr, A. and S. Stiller (2004). Integration and Labour Markets in European Border Regions. *Zeitschrift für ArbeitsmarktForschung – Journal for Labour MarketResearch* 39(1), 57–76.
- Niskanen, W. A. (1975). Bureaucrats and Politicians. *The Journal of Law and Economics* 18(3), 617–643.
- OECD (2019). OECD Skills Strategy 2019: Skills to Shape a Better Future. OECD Publishing, Paris.
- Orefice, G. and G. Peri (2020). Immigration and Worker-Firm Matching. NBER Working Paper No. 26860.
- Ottaviano, G. I. and T. Van Ypersele (2005). Market Size and Tax Competition. *Journal of International Economics* 67(1), 25–46.
- Parchet, R. (2019). Are Local Tax Rates Strategic Complements or Strategic Substitutes? *American Economic Journal: Economic Policy* 11(2), 189–224.
- Peri, G. (2012). The Effect of Immigration on Productivity: Evidence from US States. *Review of Economics and Statistics* 94(1), 348–358.
- Pieretti, P. and S. Zana (2011). On Tax Competition, Public Goods Provision and Jurisdictions’ Size. *Journal of International Economics* 84(1), 124–130.
- Pittet, F. (2014). Faktenblatt 3: Verteilungsfragen. Unternehmenssteuern seit 1990 immer wichtiger. Factsheet of the economiesuisse Verband der Schweizer Unternehmen.
- Ramel, N. and G. Sheldon (2012). Fiskalbilanz der Neuen Immigration in die Schweiz. Studie erstellt mit Unterstützung des Bundesamtes für Migration, Forschungsstelle für Arbeitsmarkt- und Industrieökonomik, University of Basel.

- Redding, S. J. and D. M. Sturm (2008). The Costs of Remoteness: Evidence from German Division and Reunification. *American Economic Review* 98(5), 1766–97.
- Rosenthal, S. S. and W. C. Strange (2004). Evidence on the Nature and Sources of Agglomeration Economies. In *Handbook of Regional and Urban Economics*, Volume 4, pp. 2119–2171.
- Schmidheiny, K. and M. Slotwinski (2018). Tax-Induced Mobility: Evidence from a Foreigners’ Tax Scheme in Switzerland. *Journal of Public Economics* 167, 293–324.
- Schumpeter, J. A. (1918). *Die Krise des Steuerstaats*. Graz, Leipzig: Leuschner & Lubensky.
- Siegenthaler, M., M. Graff, and M. Mannino (2016). Characteristics and Drivers of the Swiss “Job Miracle”. *Review of Economics* 67(1), 53–89.
- Spengel, C., F. Schmidt, J. H. Heckemeyer, and K. Nicolay (2020). Effective Tax Levels Using the Devereux/Griffith Methodology. Project for the EU Commission TAXUD/2020/DE/308.
- Von Stokar, T., M. Peter, R. Zandonella, and S. S. Cammarano (2015). Nutzen der Zuwanderung für die Schweizer Städte und die Schweiz. Studie im Auftrag der Interessengemeinschaft Große Kernstädte (IGGK) des Schweizerischen Städteverband (SSV).
- Zissimos, B. and M. Wooders (2008). Public Good Differentiation and the Intensity of Tax Competition. *Journal of Public Economics* 92(5-6), 1105–1121.



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ZEW – Leibniz Centre for European
Economic Research

L 7,1 · 68161 Mannheim · Germany

Phone +49 621 1235-01

info@zew.de · zew.de

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