

“Bye Bye Cascada:” Replacing Turnover Taxes with Subnational VAT in Argentina. An Interregional Input-Output Analysis.

Gabriel Michelena

MESi IIEP FCE CONICET University of Buenos Aires

Pedro Elosegui

`pedro.elosegui@economicas.uba.ar`

IIEP FCE CONICET University of Buenos Aires

Marcos Herrera-Gómez

CONICET-CIANECO, National University of Río Cuarto

Research Article

Keywords: cascading taxes, Ingresos Brutos, value-added tax, input-output analysis, Argentina, tax reform, regional fiscal policy.

Posted Date: October 28th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-10921806/v1>

License:   This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Additional Declarations: No competing interests reported.

“Bye Bye Cascada:” Replacing Turnover Taxes with Subnational VAT in Argentina.

An Interregional Input-Output Analysis

Gabriel Michelena ^{*} Pedro Elosegui [†] Marcos Herrera-Gómez [‡]

Abstract

Argentina’s *Ingresos Brutos* (IIBB) is a cascading turnover tax levied at every production stage under the origin principle, and constitutes the primary tax revenue source for provincial governments. Using a five-region, twenty-sector multi-regional input-output (MRIO) model built on Argentina’s 2019 national accounts and updated with 2025 statutory IIBB rates, we compute the vertically integrated IIBB rate for each sector-region pair, defined as the full tax burden per unit of final demand, including all upstream cascade. The national effective rate is 5.4% compared to a statutory average of 2.9%; cascade multipliers range from 1.3× to 6.0× across sectors. The Pampeana region accounts for approximately 78% of total estimated IIBB revenue (875.7 bn ARS out of 1,124.1 bn ARS nationwide). We derive two equivalent VAT rates per region: a revenue-equivalent rate $\tau^{IVA,R}$, matching total IIBB collection divided by the household consumption base, and a welfare-equivalent rate $\tau^{IVA,W}$, which calculates the cascade burden actually borne by local consumption. Nationally, $\tau^{IVA,R} = 8.7\%$ and $\tau^{IVA,W} = 6.2\%$; the 2.5 percentage-point wedge equals the IIBB embedded in chains feeding exports, investment, and government purchases, which a reform could offset. At the regional level, $\tau^{IVA,R}$ ranges from 6.9% (Cuyo) to 9.2% (Sur), with $\tau^{IVA,W}$ from 5.7% to 6.8%. Under the origin principle, all five regions collect more than their own consumption base would generate under destination-based taxation, so a switch to the destination principle requires compensating transfers. The $\tau^{IVA,W}$ estimates are a lower bound on the revenue-neutral replacement rate: they assume full compliance and a household-only base. Broadening the base to investment and exports (the policy gap), or accounting for informality and evasion (the compliance gap), would each raise the required rate.

Keywords: cascading taxes, Ingresos Brutos, value-added tax, input-output analysis, Argentina, tax reform, regional fiscal policy.

JEL Codes: H20, H71, H77, R13.

^{*}MESi, Universidad de Buenos Aires. Email: pmiguelena@gmail.com. Orcid 0000-0001-6967-4829.

[†]IIEP, Universidad de Buenos Aires. Email: pedro.elosegui@economicas.uba.ar (Corresponding author). Orcid 0000-0003-0020-7880.

[‡]CONICET-CIANECO, Depto. de Economía, Universidad Nacional de Río Cuarto. Email: mher-reragomez@conicet.gov.ar. Orcid 0000-0002-5385-2675.

1 Introduction

Provincial governments in Argentina rely heavily on *Ingresos Brutos* (IIBB), a turnover tax applied at each stage of production and sale. Unlike a value-added tax (VAT), IIBB is levied on gross revenue without crediting taxes paid on intermediate inputs, generating a *cascade effect*: the effective tax burden embedded in the final price of a good exceeds the statutory rate by a factor that grows with supply-chain length and intermediate input intensity. This structure produces three well-defined distortions. The first is a vertical-integration bias: since every domestic transaction is taxed on its full value, longer supply chains accumulate more tax and vertical integration is artificially rewarded relative to arm's-length contracting. The second is an anti-domestic-input bias: imported inputs enter Argentina IIBB-exempt, so domestically sourced inputs carry an embedded cascade that identical imported inputs avoid, penalizing local sourcing. The third is an anti-export bias: exporters sell at internationally determined prices and therefore cannot pass the accumulated tax cascade on to foreign buyers. As a result, the embedded turnover tax acts as an implicit tax on exports, reducing the international competitiveness of domestic production.

A destination-based VAT with full input tax crediting removes all three distortions automatically: firms receive credits for the tax paid on intermediate purchases, eliminating the cascade, while zero-rating with refund removes the implicit export tax. Reform has recently moved from a long-standing debate in Argentine public finance to the active policy agenda: the ongoing reconsideration of fiscal federalism includes proposals to replace these highly distortionary provincial turnover taxes with destination-based consumption taxes while preserving provincial fiscal autonomy. Any transition away from IIBB therefore requires answering a quantitative question that existing fiscal statistics cannot resolve: what regional VAT rate would preserve each region's revenues once cascading taxation is eliminated? This paper provides that missing benchmark by exploiting the production-network structure of the Argentine economy rather than relying exclusively on observed tax collections.

This paper quantifies the cascade distortion embedded in Argentina's IIBB using an MRIO framework. The cascade combines two conceptually different effects: (i) *Accumulation* (the cascade effect proper) arises because IIBB grants no credit for tax paid on inputs: at each stage the tax is levied on a base that already embeds the tax collected upstream, so the same value is taxed repeatedly and the effective rate rises with the number of taxed stages, tax is charged on tax (Ebrill et al., 2001); (ii) *Pyramiding* is a different effect: as firms set prices by applying a percentage margin to a tax-inclusive cost, the margin is also earned on the embedded tax, so the final consumer price rises by more than the tax revenue actually collected. Accumulation occurs even in the absence of any markup; a positive markup adds pyramiding on top of it. The vertically integrated rate computed in this paper measures accumulation, the component that determines tax revenue, so that, to the extent firms pyramid, τ^{VI} provides a conservative lower bound on the total price distortion borne by consumers.

The core object of interest is the *vertically integrated IIBB rate* $\tau^{\text{VI}^r}_i$, the total IIBB accumulated per unit of final demand for good i produced in region r , cumulated over all upstream stages of the supply chain. We decompose $\tau^{\text{VI}^r}_i$ into an own-region cascade component, a cross-region cascade component, and the direct statutory rate, and compute the cascade ratio $\tau^{\text{VI}^r}_i / \tau^{d^r}_i$, which gives the factor by which the effective burden exceeds the statutory rate. This measure also provides a natural definition of the implicit export tax. Since exporters cannot shift the embedded cascade to foreign buyers, the implicit tax on exports is simply the vertically integrated tax burden embodied in the producer price,

$$T_i^{\text{exp},r} = \tau^{\text{VI}^r}_i p_i^{\text{IB},r}, \quad (1)$$

where $T_i^{\text{exp},r}$ denotes the implicit export tax on sector i in region r , and $p_i^{\text{IB},r}$ is the producer price net of VAT but inclusive of IIBB.

The analysis then turns to the reform question: what single-rate regional VAT, applied at the destination (final consumption) stage, would generate the same revenue per unit of regional household consumption as IIBB? Two distinct equivalent rates are then derived per region. The revenue-equivalent rate $\tau^{\text{IVA},R}$ matches total IIBB collections on local production to the household consumption base. The welfare-equivalent rate $\tau^{\text{IVA},W}$ measures the cascade burden actually borne by local consumers, including the cascade embedded in goods produced elsewhere and consumed locally. The wedge between them equals the IIBB raised on chains feeding exports, investment, and government purchases; its export component is the implicit export tax that reform would eliminate. This paper is primarily inspired by the Brazilian reform experience documented in [Cebreiro et al. \(2025\)](#), and is complementary to, rather than an extension of [Delalibera et al. \(2023\)](#), whose general-equilibrium model answers what Brazil would gain from eliminating cascade taxation; the present paper answers the prior accounting question of how large the cascade is and what rates would replace it.

The recent construction of an Argentine MRIO table ([Elosegui et al., 2026](#)) makes this exercise feasible for the first time. Previous provincial fiscal statistics report tax collections but contain no information on the interregional production linkages through which cascading taxes propagate, whereas national input-output tables abstract from the federal structure that determines the spatial incidence of IIBB. The MRIO therefore contributes more than additional regional detail: it provides the minimum information required to recover vertically integrated tax burdens, distinguish origin-based revenue generation from destination-based tax incidence, and trace the channels through which cascading taxation is transmitted across regional economies.

Related literature. Cascading turnover taxes have long been recognized as a source of production inefficiency and anti-export bias ([Ebrill et al., 2001](#); [Keen and Lockwood, 2010](#)). For Argentina specifically, IIBB has been studied in the context of domestic tax harmonization and the *Convenio Multilateral* ([Corti, 2010](#); [Elosegui, 2024](#)). The MRIO methodology follows [Miller and Blair \(2009\)](#) and [Timmer et al. \(2015\)](#); the analysis of tax distortions in production networks builds on [Acemoglu et al. \(2012\)](#) and [Baqaee and Farhi \(2020\)](#). For revenue gap decomposition, the paper follows the RA-GAP taxonomy of [Cebreiro et al. \(2025\)](#) and [Kanbur and Keen \(2014\)](#). The alternative IVN reform is discussed in [Zocaro \(2020\)](#) following [Bird \(2014\)](#).

Our contribution also differs from previous Argentine policy studies estimating replacement VAT rates. Existing exercises derive aggregate replacement rates primarily from observed fiscal revenues and macroeconomic aggregates. By contrast, our estimates are obtained from the interregional production network itself. This framework allows us not only to recover equivalent regional VAT rates, but also to identify the supply-chain origin of cascading taxation, distinguish between revenue-equivalent and welfare-equivalent replacement rates, decompose cascading effects into intra- and interregional components, and quantify the fiscal redistribution implied by replacing the origin principle with destination-based taxation.

Unlike previous studies focused on aggregate tax replacement, our objective is not to recommend a particular reform design. Rather, we develop a measurement framework capable of quantifying the production-network distortions generated by cascading turnover taxation and providing internally consistent benchmarks for evaluating alternative regional VAT schemes.

2 Institutional background

2.1 IIBB: scope, rates, and fiscal weight

IIBB taxes the gross turnover of economic activity regardless of profit and constitutes the single largest own-source revenue of Argentina’s 24 jurisdictions. Each of the 23 provinces and the Autonomous City of Buenos Aires (CABA) legislates its own rate schedule annually through the provincial tax code and the annual tax law, yielding statutory rates that range from 0.45%

on primary goods to 8.4% on services and finance. The tax accounts for approximately 78% of provinces' own-tax revenue and represented roughly 3.5–4% of GDP over 2017–2025, depending on the year (DNI AF 2026, provincial tax-pressure series, applying an estimated IIBB share of 72–75% of provincial own-source revenue reported independently for individual years in that period; Legislatura de Córdoba 2020), covering on average 25% of total provincial resources; the dispersion is wide, from roughly 6% of total resources in Formosa to 73% in CABA. Figure 1 shows the full statutory schedule: the dot marks each sector's simple average rate across the five regions and the bar spans the range between the lowest- and highest-rate region. IIBB is levied under the origin principle (the seller's province retains the revenue), and since imported inputs are IIBB-exempt while domestic inputs are not, the cascade is embedded in export costs and functions as a hidden export retention. Single-province firms file locally; multi-province firms apportion revenue under the *Convenio Multilateral* (COMARB).¹

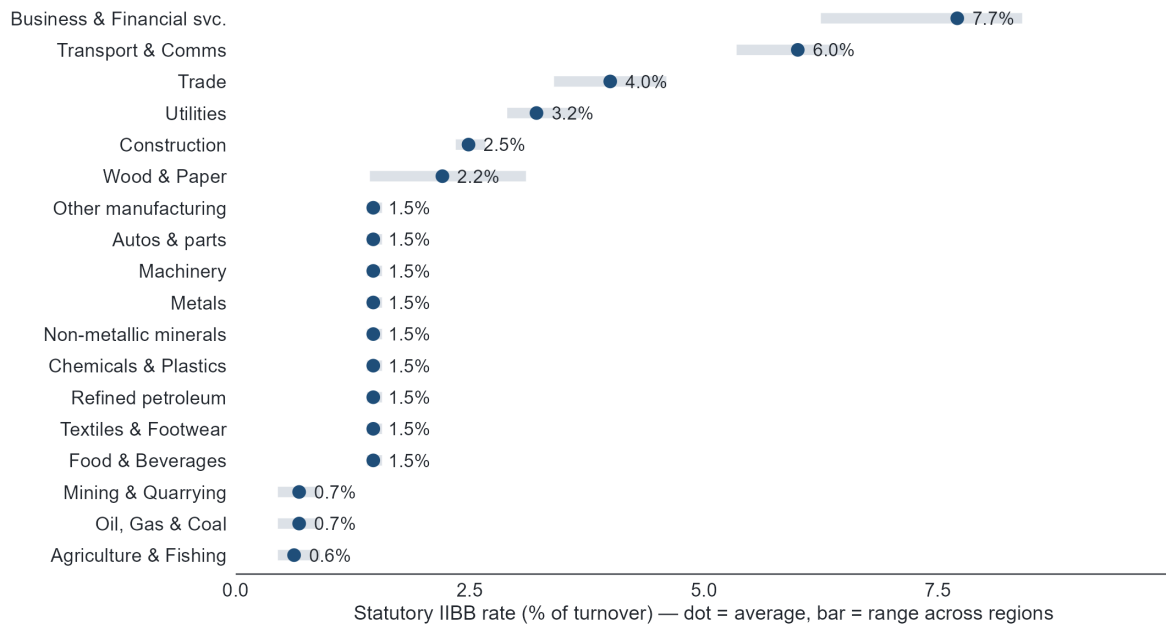


Figure 1: Statutory IIBB rate by sector (% of turnover): dot is the simple average across the five regions, bar spans the lowest- to highest-rate region.

Successive federal-provincial fiscal pacts (1993, the 2017 *Consenso Fiscal*, and its 2021 renegotiation) committed to phasing down or capping IIBB rates. None of them delivered sustained reductions: adherence to the 2017 *Consenso Fiscal* was uneven from the outset (OPC, 2018), and fiscal crises repeatedly reversed commitments in the pacts that followed. By 2024–2026, the Supreme Court had declared origin-principle IIBB on inter-provincial transactions unconstitutional in several rulings, framing the cascade as a de facto internal trade barrier (*aduanas interior*).

The statutory schedule is heterogeneous by design: primary and tradeable goods carry rates below 1.6% to protect export competitiveness, manufacturing is typically around 1.5%, while commerce, transport, and financial services carry rates of 4–8%. Public administration, health, and education are set to zero by convention, since the boundary between public and private activity cannot be cleanly separated at the statutory level.

¹The inter-provincial body that administers and apportions the IIBB tax base of taxpayers operating in more than one province, under the 1977 *Convenio Multilateral*.

2.2 International precedents: replacing cascade subnational taxes

Three federal systems provide directly relevant precedents. Brazil’s Constitutional Amendment 132/2023 and its implementing legislation (Supplementary Law 214/2025) replace origin-based ICMS and ISS with a dual destination VAT: a federal CBS and a state-and-municipal IBS, with an independent IBS Steering Committee centralizing collection and distributing revenues to destination states over a 50-year transition (2029–2078), cushioned by a compensation fund of BRL 8–60 bn per year (Cebreiro et al., 2025). Canada’s Harmonized Sales Tax (HST) demonstrates a simpler path: the federal government collects a unified consumption tax and remits the provincial share by administrative agreement, requiring no constitutional amendment and allowing base uniformity to coexist with provincial rate autonomy. India’s dual GST (2017) replaced cascading state sales taxes with a central IGST on inter-state transactions that allocates revenue to the destination state, making it the closest institutional parallel to the challenge posed by Argentina’s *Convenio Multilateral*.

The present paper takes the Brazilian reform as its primary reference, given the structural parallels with Argentina’s federal fiscal architecture and the availability of detailed implementation data. Although Brazil provides the closest institutional benchmark, the Brazilian reference VAT rate of 28% (Cebreiro et al., 2025) and the 6–9% replacement rates reported here answer different policy questions and are derived under different institutional and methodological assumptions. Four dimensions are particularly relevant and are examined throughout the paper. First, tax scope: the Brazilian reform consolidates five taxes (PIS, Cofins, IPI, ICMS, and ISS), whereas this paper considers the replacement of a single subnational tax, IIBB. Second, institutional coverage: Brazil’s reference rate applies to a combined federal–subnational VAT (CBS and IBS), while $\tau^{\text{IVA},R}$ and $\tau^{\text{IVA},W}$ refer exclusively to the provincial level. Third, calibration base: Brazil’s reference rate is derived for a comprehensive destination-based consumption tax, whereas this paper reports replacement rates based on a household private-consumption base. Fourth, compliance assumptions: the Brazilian estimate incorporates an assumed compliance gap of 12.5%, while the benchmark rates reported here assume full compliance; the implications of tax evasion are analyzed separately in Section 5.6. Together, these differences provide the appropriate context for interpreting the Brazilian reference rate alongside the 6–9% replacement rates reported here.

An alternative considered in the Argentine policy debate is the *Impuesto sobre las Ventas Netas* (IVN) proposed by Zocaro (2020) following Bird (2014), a provincial net sales tax levied under the origin principle that would deduct intermediate input purchases from the base. Since it remains origin-based, it does not resolve the anti-export bias or the inter-provincial fiscal redistribution that the origin principle creates; it is also administratively more demanding than IIBB’s simple gross-turnover filing, requiring robust invoicing infrastructure and cross-firm audit capacity to verify net-revenue declarations. For these reasons, the destination-based regional VAT remains the reform benchmark of this analysis.

3 Theoretical framework

3.1 The IIBB price system

Let A^d be the matrix of domestic intermediate input coefficients in the MRIO, of dimensions $(nR) \times (nR)$ with $n = 20$ sectors and $R = 5$ regions. Let $\tau^d = \text{diag}(\tau_1^{d,1}, \dots, \tau_n^{d,R})$ be the diagonal matrix of statutory IIBB rates and v the vector of value-added coefficients.

Lemma 1 (IIBB Price System). *Under origin-principle IIBB, equilibrium producer prices satisfy:*

$$p^{\text{IB}} = [I - (A^d)' - \text{diag}(\tau^d)]^{-1} v, \quad (2)$$

where $(\cdot)'$ denotes transposition.

Equation (2) captures the feedback loop: a higher price for good i raises the IIBB base for downstream purchasers, which further raises their prices, and so on.

3.2 Vertically integrated rate

Definition 1 (Vertically Integrated IIBB Rate). The vertically integrated IIBB rate for sector i in region r is:

$$\tau_i^{\text{VI}^r} = \frac{p_i^{\text{IB}^r} - 1}{p_i^{\text{IB}^r}}, \quad (3)$$

i.e., the share of the final price representing accumulated IIBB across all production stages.

Using the matrix identity $(I - (A^d)' - \text{diag}(\tau^d))^{-1} \text{diag}(\tau^d) (I - (A^d)')^{-1} = (I - A^d)^{-1} - (I - (A^d)' - \text{diag}(\tau^d))^{-1}$, one can show the key identity:

$$\tau_i^{\text{VI}^r} \cdot p_i^{\text{IB}^r} = p_i^{\text{IB}^r} - 1. \quad (4)$$

3.3 Cascade decomposition

The vertically integrated rate decomposes by the location and identity of the supplier that paid the tax:

$$\tau_i^{\text{VI}^r} = \underbrace{\tau_i^{\text{VI}^r, \text{self}}}_{\text{own sector}} + \underbrace{\tau_i^{\text{VI}^r, \text{same}}}_{\text{same region, other sectors}} + \underbrace{\tau_i^{\text{VI}^r, \text{cross}}}_{\text{other regions}}. \quad (5)$$

The first component contains the statutory rate itself along with the tax paid on own-sector inputs, so $\tau_i^{\text{VI}^r, \text{self}} \geq \tau_i^{d^r}$, and the three components sum to $\tau_i^{\text{VI}^r}$ by construction. Section 5.3 reports this decomposition; the cross-region component is the part of the burden that a province cannot remove by legislating on its own rate schedule.

The *cascade ratio* is defined as:

$$\kappa_i^r = \frac{\tau_i^{\text{VI}^r}}{\tau_i^{d^r}} \geq 1. \quad (6)$$

A ratio of $\kappa_i^r = 1$ means no cascade; values above 1 indicate that consumers bear κ_i^r times the statutory rate through the production chain.

3.4 Revenue-equivalent regional VAT

Under destination-principle VAT, a consumer in region r pays a flat rate τ^{IVA^r} on all final purchases, regardless of origin. The revenue-equivalence condition requires that the VAT raised on the household consumption base equal the IIBB currently collected on local production. Two assumptions underlie this condition as stated below: (a) the consumption base is restricted to household final demand c_i^r , excluding investment, government expenditure, and exports; and (b) every unit in that base is subject to the full statutory VAT rate, that is, the compliance rate is one, equivalently $\gamma = 0$ in Corollary 1. Both are stated explicitly in the proposition because they determine the sense in which the resulting rate is a lower bound.

Proposition 1 (Revenue-Equivalent VAT Rate under Full Compliance). *Under assumptions (a) and (b) above, the rate $\tau^{\text{IVA}^R, r}$ that equates destination-basis VAT revenue on household consumption to origin-basis IIBB collections in region r is:*

$$\tau^{\text{IVA}^R, r} = \frac{\sum_i \tau_i^{d^r} p_i^{\text{IB}^r} x_i^r}{\sum_i c_i^r} = \frac{R_r^{\text{IIBB}}}{C^r}, \quad (7)$$

where x_i^r is gross output of sector i in region r , so the numerator $R_r^{\text{IIBB}} = \sum_i \tau_i^{d^r} p_i^{\text{IB}^r} x_i^r$ is the IIBB actually collected on production located in r , an origin (turnover) base that includes

business-to-business, government, and export sales, while the denominator $C^r = \sum_i c_i^r$ is household final consumption in r (destination base). By identity (4) and the Leontief quantity relation $x = (I - A^d)^{-1}f$, this origin collection aggregates nationally to $\sum_{i,r} (p_i^{IB^r} - 1) f_i^r$ over full final demand f . The rate $\tau^{IVAR,r}$ constitutes a lower bound on the operationally feasible replacement rate: relaxing assumption (a) by expanding the base raises the required rate if the additional base components currently bear IIBB; relaxing assumption (b) by incorporating a positive compliance gap $\gamma > 0$ raises the required rate in proportion to $(1 - \gamma)^{-1}$, as Corollary 1 makes precise.

Corollary 1 (Compliance-Gap Adjustment). *Let $\gamma \in [0, 1]$ denote the compliance gap on the VAT base: the fraction of taxable household consumption that falls outside the registered VAT chain due to evasion or informality. Under assumption (a) and compliance rate $(1 - \gamma)$, the required statutory rate to achieve the same expected revenue as $\tau^{IVAR,r}$ is:*

$$\tau^{IVAR,r}(\gamma) = \frac{\tau^{IVAR,r}}{1 - \gamma}. \quad (8)$$

The rate band $[\tau^{IVAR,r}, \tau^{IVAR,r}(\bar{\gamma})]$, indexed to a maximum compliance gap estimate $\bar{\gamma}$, brackets the set of operationally feasible replacement rates under assumption (a). For a given $\bar{\gamma}$, the width of the band is $\tau^{IVAR,r} \bar{\gamma} (1 - \bar{\gamma})^{-1}$, increasing in both the base rate and the compliance gap.

Equation (8) follows directly from the condition that expected VAT revenue $(1 - \gamma) \tau^{IVAR,r}(\gamma) \sum_i c_i^r$ equal the target $\tau^{IVAR,r} \sum_i c_i^r$. No structural assumption beyond the proportionality of the compliance gap is required; in particular, the corollary does not assume that γ is uniform across sectors. If sector-level compliance data were available, γ_i^r could replace γ in equation (8), yielding a weighted compliance adjustment. That exercise is left for further work.

3.5 Welfare-equivalent regional VAT and the revenue-welfare wedge

The revenue-equivalent rate $\tau^{IVAR,r}$ matches IIBB collected on local production to the household consumption base. A conceptually distinct rate measures the cascade burden actually *borne* by local consumers, including the cascade embedded in goods produced in other regions and purchased locally.

Proposition 2 (Welfare-Equivalent VAT Rate). *The welfare-equivalent rate $\tau^{IVAW,r}$ is:*

$$\tau^{IVAW,r} = \frac{\sum_i \sum_s (p_i^{IB^s} - 1) c_i^{s \rightarrow r}}{\sum_i c_i^{\text{cons},r}}, \quad (9)$$

where $c_i^{s \rightarrow r}$ denotes goods of type i produced in region s and consumed in region r ; the numerator sums the embedded cascade from all origin regions over locally purchased goods.

By construction, $\tau^{IVAR,r} \geq \tau^{IVAW,r}$ for net production regions. The national wedge is always positive:

$$\tau_{\text{nat}}^{IVAR} - \tau_{\text{nat}}^{IVAW} = \frac{\sum_{(i,r)} (p_i^{IB^r} - 1)(f_i^r - c_i^r)}{\sum_{(i,r)} c_i^r} > 0, \quad (10)$$

since aggregate final demand f_i^r exceeds household consumption c_i^r by investment, government expenditure, and exports. The wedge therefore equals the IIBB raised on chains feeding those components, outside the household consumption base. At the regional level, the sign depends on each region's net fiscal trade position; all five macro-regions in the present model are net fiscal exporters (see Table 4).

4 Data and calibration

4.1 MRIO model

We use the Argentine Multi-Regional Input-Output table version 5.1 (Elosegui et al., 2026), covering $n = 20$ ISIC sectors and $R = 5$ macro-regions: Cuyo, Noreste, Noroeste, Pampeana, and Sur. The table’s structural coefficients and all monetary values (gross output, value added, final demand) are anchored to Argentina’s 2019 national accounts and are expressed in 2019 pesos; version 5.1 refers to the release of the regionalization methodology, not to the price or reference year of the underlying data. Every peso-denominated figure reported in this paper (IIBB revenue, the net fiscal position, the wedge, and the bilateral consumption matrix) is therefore stated in 2019 pesos and is not directly comparable to current-price fiscal aggregates without an explicit deflator; the rate-based results (τ^{VI} , $\tau^{\text{IVA},R}$, $\tau^{\text{IVA},W}$, and the cascade ratios) are unaffected, since they are ratios of quantities measured in the same price vintage. Table 1 lists the provinces in each region.

Table 1: Regional aggregation

Region	Provinces
Pampeana	CABA, Buenos Aires, Córdoba, Entre Ríos, La Pampa, Santa Fe
Noroeste	Catamarca, Jujuy, La Rioja, Salta, Sgo. del Estero, Tucumán
Sur	Chubut, Neuquén, Río Negro, Santa Cruz, Tierra del Fuego
Cuyo	Mendoza, San Juan, San Luis
Noreste	Corrientes, Chaco, Formosa, Misiones

Statutory IIBB rates τ_i^{dr} for 2025 were compiled from each provincial tax code. The intermediate input coefficient matrix A^d was constructed from the MRIO usage matrix, retaining only domestic flows.

4.2 Household consumption data

Destination-based consumption weights c_i^r are drawn from the *Encuesta Nacional de Gastos de los Hogares* (ENGHo) 2018 (INDEC), covering 24 provinces in 9 ISIC-compatible sectors, aggregated to the five MRIO regions via the COICOP–ISIC crosswalk in Table 2.

Table 2: ENGHo–MRIO sector crosswalk

ENGHo category	ISIC / MRIO sector
Alimentos y bebidas	10T12 (Food & beverages)
Textil y calzado	13T15 (Textiles)
Otros manufactureros	30T33 (Other manufacturing)
Electricidad, gas y agua	35T39 (Utilities)
Comercio	45T56 (Trade & tourism)
Transporte y comunicaciones	49T61 (Transport)
Serv. empresariales y financieros	64T82 (Finance & business services)
Adm. pública, salud y educación	84T88 (Public admin. & education)
Otros servicios	90T98 (Arts & other services)

4.3 Revenue estimates

IIBB revenue by region is estimated as $\text{Rev}^r = \sum_i \tau^{\text{VI}^r}_i \cdot p^{\text{IB}^r}_i \cdot F^r_i$, where F^r_i is final demand (origin basis) from the MRIO.²

Table 3: Estimated IIBB revenue by region (model, 2025 rates)

Region	Revenue (bn ARS)	Share (%)
Pampeana	875.7	77.9
Noroeste	77.8	6.9
Sur	72.8	6.5
Cuyo	53.1	4.7
Noreste	44.7	4.0
Total	1,124.1	100.0

Note: Model-derived estimates, not official DNIAF collections. Discrepancies reflect MRIO calibration, informal-sector omission, and compliance gaps.

Table 4: Revenue-equivalent ($\tau^{\text{IVA},R}$) and welfare-equivalent ($\tau^{\text{IVA},W}$) rates, regional wedge, and net fiscal position by region

Region	Origin IIBB (bn ARS)	$\tau^{\text{IVA},R}$ (%)	$\tau^{\text{IVA},W}$ (%)	Wedge (pp)	Net fiscal pos. ^a (bn ARS)
Cuyo	53.1	6.9	5.7	+1.2	+9.0
Noreste	44.7	8.5	5.7	+2.8	+14.8
Noroeste	77.8	8.5	5.9	+2.7	+24.5
Pampeana	875.7	8.8	6.3	+2.5	+252.0
Sur	72.8	9.2	6.8	+2.3	+18.5
National	1,124.1	8.7	6.2	+2.5	+318.8

^a Net fiscal position = origin-basis IIBB revenue-cascade burden borne by local consumption; positive means origin collection exceeds what the region's own household consumption base would generate under a destination VAT. All five regions are positive, so this is not a transfer among Argentine regions: it reflects IIBB embedded in production destined for exports, investment, and government purchases, none of which is captured by local household consumption. Replacing this revenue, on the order of 318.8 bn ARS nationally, is a distinct problem from interregional redistribution; see Table 8 for the (smaller) component that is genuinely interregional.

5 Results

5.1 Cascade ratios by sector and region

The cascade ratio $\kappa^r_i = \tau^{\text{VI}^r}_i / \tau^{d^r}_i$ can be computed for each of the 100 sector-region cells. Figure 2 reports its national counterpart $\bar{\kappa}_i = \bar{\tau}^{\text{VI}}_i / \bar{\tau}^d_i$, where $\bar{\tau}_i$ denotes the gross-output-weighted average of τ^r_i across the five regions, for the 18 sectors with a non-zero statutory rate.

²These are *model-derived* estimates, not official fiscal statistics. Observed IIBB collections are published by DNIAF (Ministry of Economy); discrepancies reflect MRIO calibration, informal-sector omission, and compliance gaps.

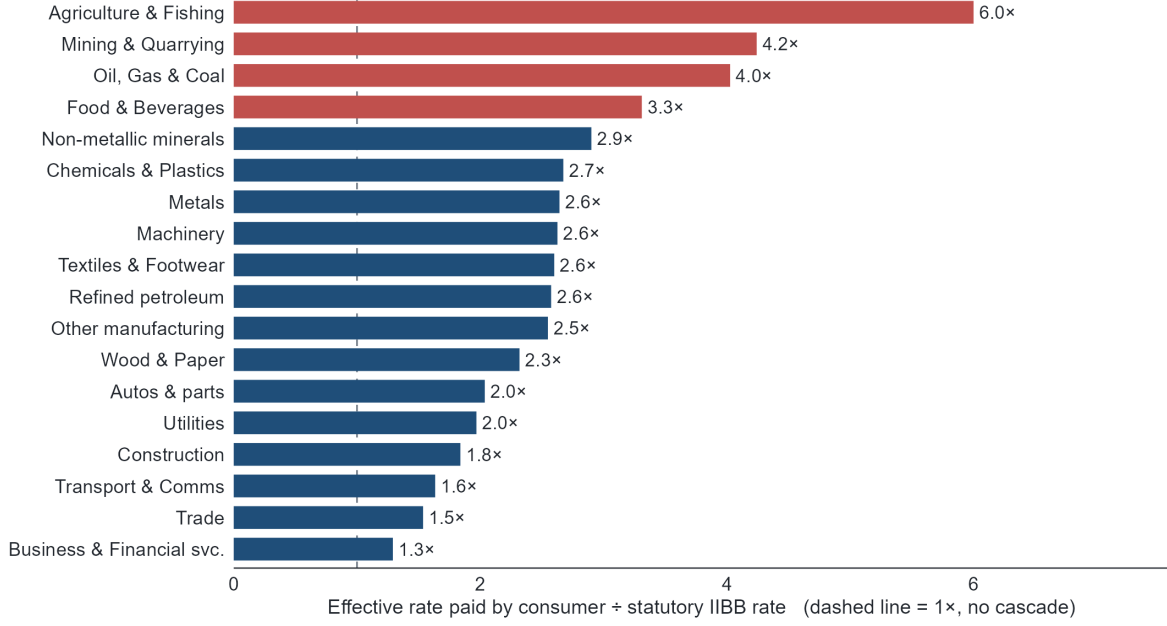


Figure 2: National cascade ratio $\bar{\kappa}_i$ (gross-output-weighted average across regions) by sector. The dashed line at 1 indicates no cascade. Sectors 84T88 (Public adm., health, education) and 90T98 (Other services) are excluded because their statutory rate $\tau^d = 0$, making the ratio undefined.

Cascade ratios are substantial across all sectors and vary further by region. The national gross-output-weighted ranking (Figure 2) runs from 1.3× in Business & Financial Services to 6.0× in Agriculture & Fishing; primary sectors dominate the top of the ranking, with 4.2× for Mining & Quarrying and 4.0× for Oil, Gas & Coal close behind, reflecting long input chains at low statutory rates. Manufacturing sectors range from 2.3× to 3.3×, and services sectors from 1.3× to 2.0×. Within Agriculture & Fishing the region-specific multiplier is even wider, from 4.0× in Cuyo to 7.6× in Sur, with Pampeana at 6.2×. Consumers therefore pay several times the statutory rate in embedded tax, with the multiple depending on both sector and region.

5.2 Cascade convergence: build-up by upstream stage

The matrix inversion in equation (2) expands as a Neumann series, $[I - (A^d)' - \text{diag}(\tau^d)]^{-1} = \sum_{k=0}^{\infty} [(A^d)' + \text{diag}(\tau^d)]^k$, where each term k corresponds to one additional round of upstream input purchases (stage L_k). This decomposition allows tracing how the cascade accumulates before converging to the vertically integrated rate. For the Pampeana region, approximately 90% of the total cascade accrues within three upstream rounds (L_0 through L_3), as Figure 3 shows for the five sectors with the largest Pampeana-specific cascade multipliers.

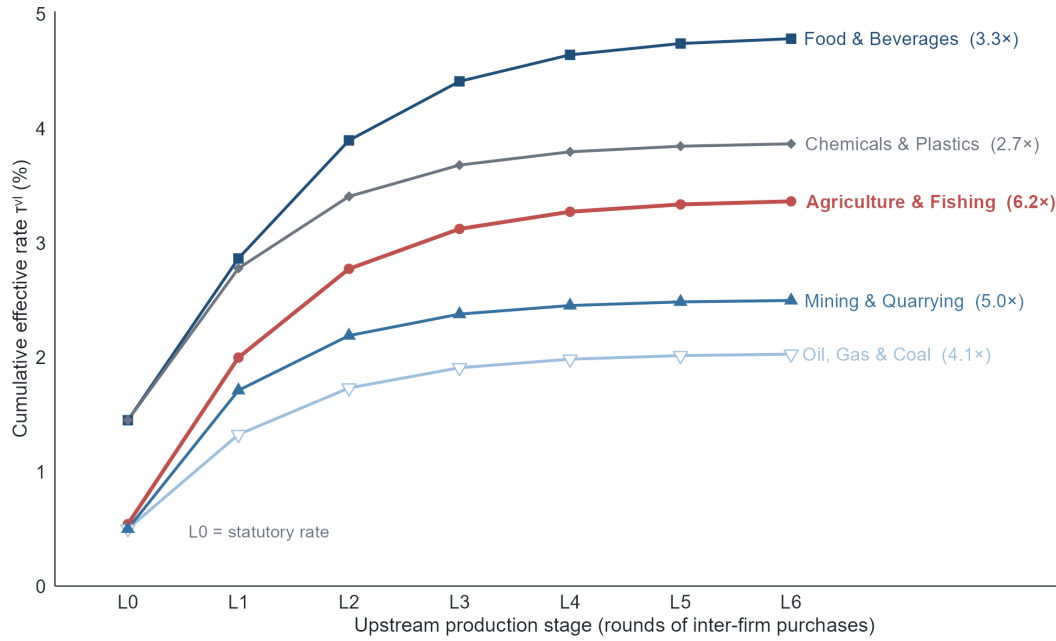


Figure 3: Cumulative effective rate τ^{VI} by upstream production stage (L_0 = statutory rate), Pampeana. Multipliers in parentheses are the Pampeana-specific cascade ratio for that sector, distinct from the national ranking in Figure 2.

Sectors that converge most slowly, and where the cascade multiplier is largest, are those with low statutory own-rates but intensive use of taxed inputs: Agriculture & Fishing (0.5% statutory rate, 3.4% effective in Pampeana, multiplier 6.2 $\times$) inherits most of its cascade from Transport & Communications (27% of τ^{VI}), Commerce & Hotels (20%), and Business Services (20%); own-sector activity accounts for only 19%, as Figure 4 details. The implication is that taxing services heavily generates cascade externalities that fall disproportionately on primary and tradeable sectors.

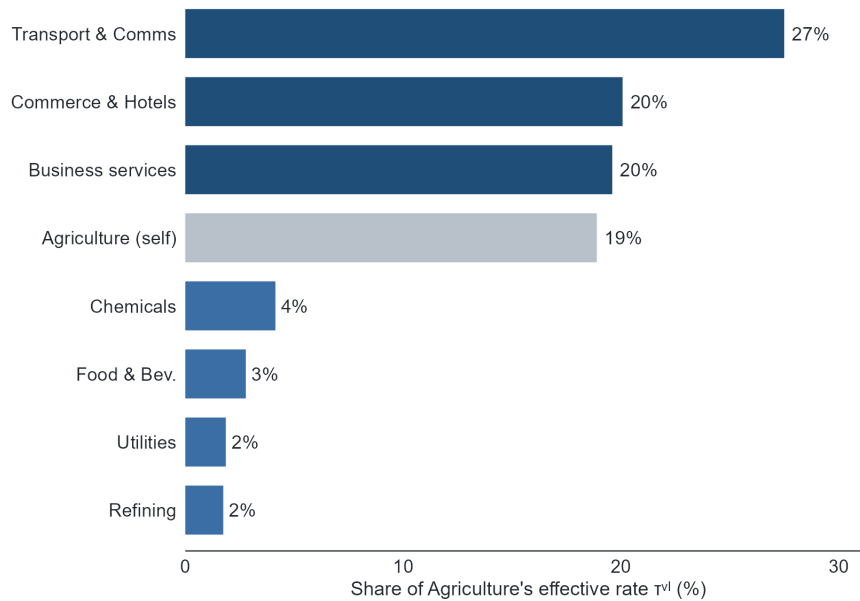


Figure 4: Supplier attribution for Agriculture & Fishing's vertically integrated rate, Pampeana: share of τ^{VI} contributed by each of the eight largest sources.

5.3 Cascade source decomposition: same-region versus cross-region

The decomposition of equation (5) can be computed by restricting the Neumann expansion to own-sector, within-region, and cross-region input blocks separately. For the five Pampeana sectors with the largest cascade multipliers, the same-region component dominates: it accounts for 75% of the effective rate in Agriculture & Fishing and Mining & Quarrying, 66% in Oil, Gas & Coal, 59% in Food & Beverages, and 43% in Chemicals & Plastics, as Figure 5 shows; the three components sum to exactly 100% of τ^{VI} for each sector by construction. The cross-region component grows as Chemicals draws inputs more intensively from other macro-regions. The direct own-sector contribution is only 19–44% of the total effective burden in these sectors.

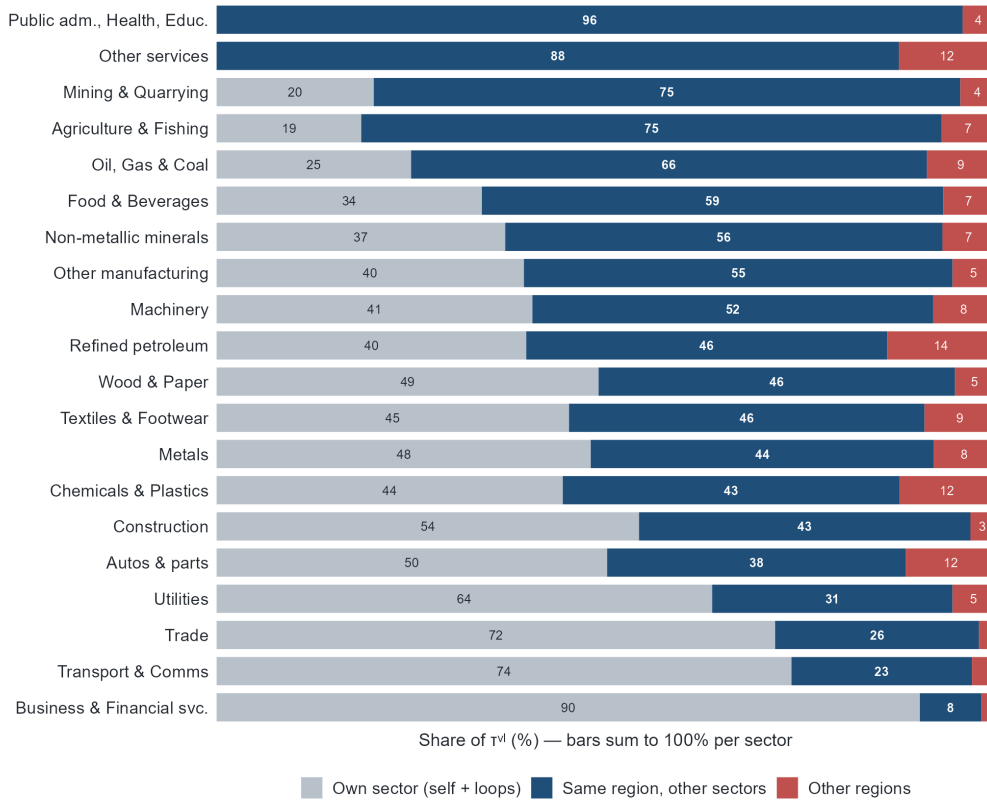


Figure 5: Source of the vertically integrated rate τ^{VI} , Pampeana: own sector (self-loops), same region (other sectors), and other regions. Bars sum to 100% of τ^{VI} for each sector.

Figure 6 generalizes the cross-region component from the five Pampeana sectors of Figure 5 to all five macro-regions, weighting each region's sector-level τ^{VI} by gross output. Nationally, 6.0% of the effective rate is imported from suppliers located in other regions, but that average conceals a sharp divide between Pampeana and the rest of the country. Pampeana imports only 4.1% of its effective burden, equivalent to 0.23 pp of τ^{VI} , whereas the four peripheral regions import close to three times as much: 12.7% in Cuyo (0.59 pp), 12.3% in Noreste (0.62 pp), 11.7% in Sur (0.51 pp), and 11.5% in Noroeste (0.59 pp). The asymmetry follows from the structure of the interregional table rather than from the rate schedules. Pampeana produces most of the intermediate inputs it consumes, so its supply chains close within the region; the peripheral regions source a substantial share of their intermediate consumption from Pampeana and therefore inherit Pampeana's statutory rates through the cascade.

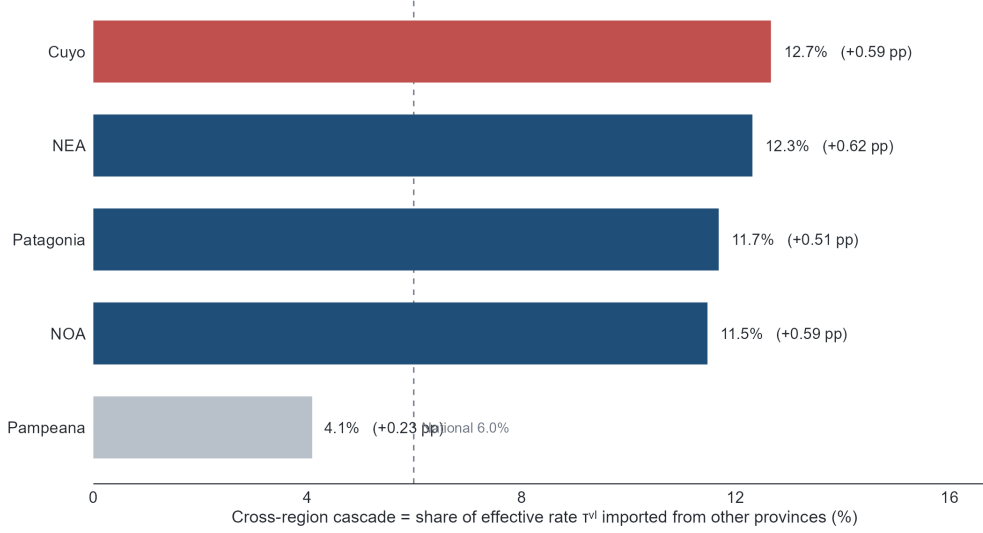


Figure 6: Cross-region cascade by region: share of the effective rate τ^{VI} originating in suppliers located in other macro-regions (gross-output-weighted, %). Figures in parentheses are the same component in percentage points of τ^{VI} . The dashed line is the national average of 6.0%. NEA, NOA, and Patagonia denote Noreste, Noroeste, and Sur.

In absolute terms the magnitudes are modest. Even in the most exposed region the imported cascade adds less than two thirds of a percentage point to the effective rate, so the cross-region channel is a second-order contributor to the level of τ^{VI} and cannot account for the multipliers reported in Section 5.1. The incidence, however, is asymmetric in a way that bears on reform sequencing: a peripheral province acting alone leaves roughly an eighth of the effective burden on its own producers untouched, since that portion originates in tax paid on output from other regions, against about one twenty-fifth for Pampeana. This is also the channel through which the origin principle operates as an internal trade barrier in the sense of the rulings discussed in Section 2, since the imported cascade is the tax that crosses a provincial border embedded in the price of an input.

Either way, a region cannot substantially reduce its effective burden on upstream sectors by lowering its own statutory rate in isolation. The cascade is driven by the rates of supplier sectors, principally transport, trade, and financial services operating within the same region, so rate reform requires coordinated action across sectors within a region, and, for the peripheral regions, across regions as well.

5.4 Statutory versus vertically integrated rate: national average

Figure 7 compares the statutory rate τ^d_i against the vertically integrated rate τ^{VI}_i for each sector, both as gross-output-weighted national averages across the five regions. The gap is the pure cascade: tax paid not because consumers are directly taxed, but because their suppliers were.

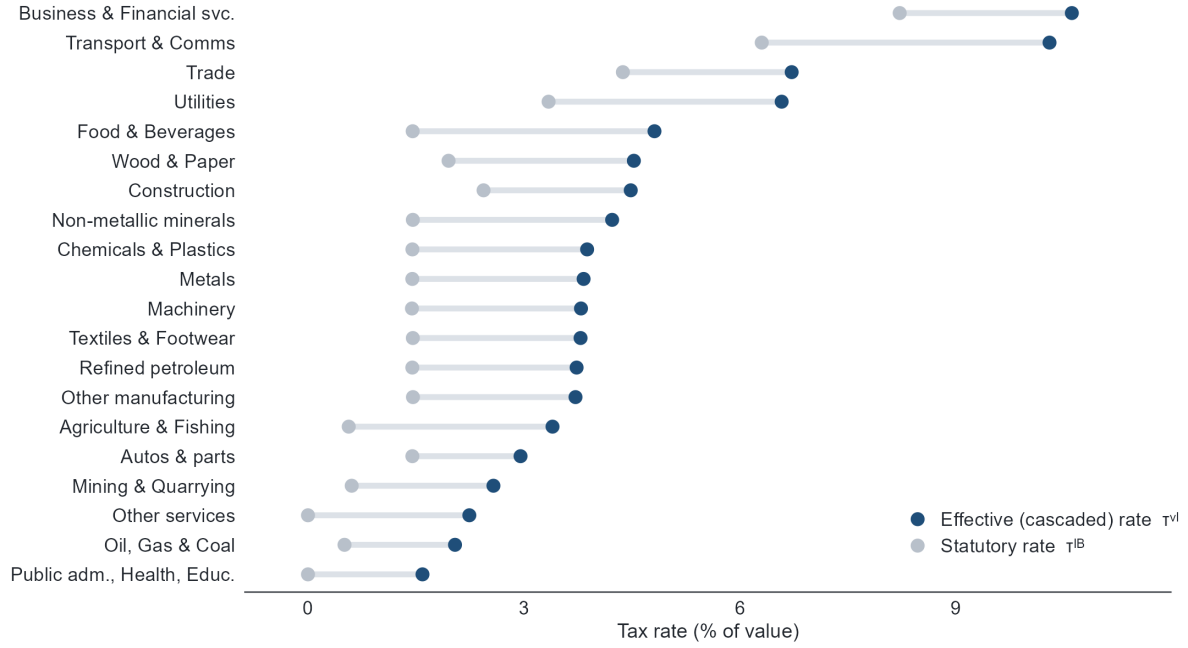


Figure 7: Statutory IIBB rate (τ^d , light) vs. vertically integrated rate (τ^{VI} , shaded) by sector, national average. The national effective rate is 5.4% vs. 2.9% statutory; cascade multiplier $\approx 1.8\times$ on average.

5.5 Revenue-equivalent and welfare-equivalent regional VAT rates

Figure 8 previews the national result before turning to the regional breakdown: the welfare-equivalent rate of 6.22% (rounded to 6.2% elsewhere in this paper) rises by a wedge of 2.46 percentage points, the IIBB embedded in exports, investment, and government purchases, to the revenue-equivalent rate of 8.68% (6.2% and 8.7% respectively when rounded to one decimal).

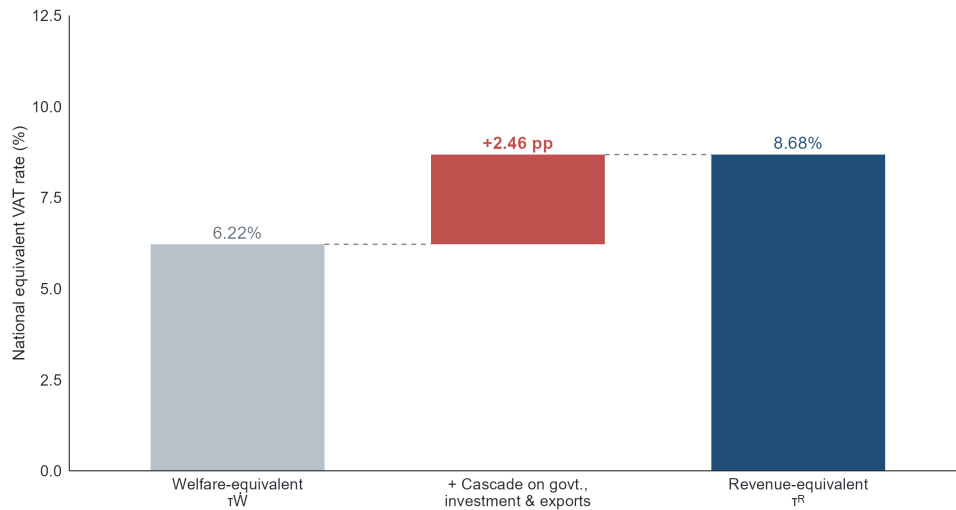


Figure 8: From the welfare-equivalent to the revenue-equivalent national VAT rate: the wedge is the IIBB embedded in non-household final demand (exports, investment, government purchases).

Applying Propositions 1 and 2 with ENGHo 2018 consumption weights yields two distinct equivalent rates per region, reported in Table 4 and Figure 9.

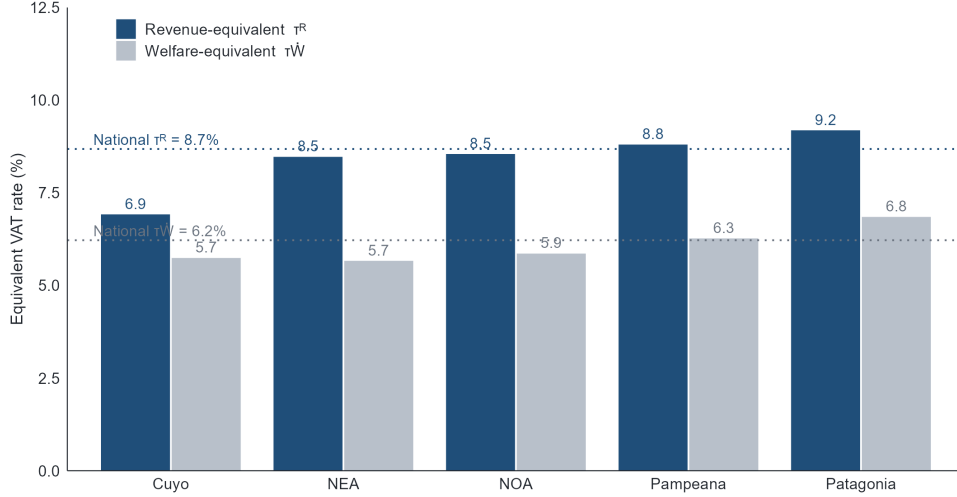


Figure 9: Revenue-equivalent ($\tau^{\text{IVA},R}$, dark) and welfare-equivalent ($\tau^{\text{IVA},W}$, light) regional VAT rates. National $\tau^{\text{IVA},R} = 8.7\%$ shown as dashed reference line.

Nationally, $\tau^{\text{IVA},R} = 8.7\%$ and $\tau^{\text{IVA},W} = 6.2\%$, yielding a 2.5 pp wedge that equals the IIBB hidden in chains feeding exports, investment, and government purchases, and whose export component is the implicit export tax that reform would eliminate. At the regional level, $\tau^{\text{IVA},R}$ ranges from 6.9% (Cuyo) to 9.2% (Sur) and $\tau^{\text{IVA},W}$ from 5.7% to 6.8%. The ordering by $\tau^{\text{IVA},R}$ reflects each region's statutory rate schedule, output-chain length, and net trade position: Sur and Noroeste, as net primary producers with long taxed input chains, require the highest revenue-neutral rates; Cuyo the lowest. A reform on a consumption-only base that sets the VAT at $\tau^{\text{IVA},W}$ would generate a fiscal shortfall equal to the wedge unless it extends the base to investment and government or accepts the revenue loss as the cost of eliminating the implicit export tax.

This 2.3 pp regional spread is considerably narrower than the province-level replacement-rate estimates reported elsewhere in the Argentine literature, which range from roughly 11% in CABA to 49% in Formosa (FIEL, 2015; IARAF, 2025). Two features of this paper's design account for most of the difference, not a disagreement about the underlying tax burden. First, aggregation: averaging 24 provinces into five macro-regions mechanically compresses extremes, since a province with an unusually high or low ratio of IIBB revenue to consumption base is pooled with several neighbors before the regional rate is computed; Formosa's rate, for instance, is averaged together with Chaco, Corrientes, and Misiones within Noreste. Second, and probably more consequential, the equivalence base differs: this paper's $\tau^{\text{IVA},R}$ is origin-basis IIBB revenue divided by a household private-consumption base (Proposition 1), whereas province-level replacement-rate estimates in the literature typically divide provincial IIBB collection by a narrower or differently defined provincial tax base, which by construction produces more extreme ratios for provinces with small or atypical bases such as Formosa. Reconciling the two approaches at the provincial level, ideally for CABA and Formosa as the extremes, is a natural extension once a province-level MRIO or a documented regionalization method becomes available; it is beyond the scope of the five-region model used here.

5.6 Informality and the compliance gap

Proposition 1 and its welfare counterpart assume full compliance ($\gamma = 0$): every peso of the base is reached by the replacement VAT. Corollary 1 relaxes this through the gross-up $\tau^{\text{IVA}}(\gamma) = \tau^{\text{IVA}}/(1 - \gamma)$, but left γ unparameterized for Argentina. We bound it with two independent estimates: an *employment-based* measure of labor informality and a *revenue-based* measure recovered from the model itself.

The employment measure is the regional rate of labor informality, unregistered employment

(*empleo no registrado*) as a share of total employment, from INDEC’s provincial employment matrix.³ It ranges from 16.0% in Sur to 28.0% in Noroeste, with an employment-weighted national average of 23.5%.

These regional rates are not taken off the shelf but are the unregistered-employment share of a purpose-built provincial employment matrix, estimated in four steps. National sectoral employment (20 activities) comes from the 2018 INDEC national input-output matrix (MIP); provincial participation, unemployment, and registered private and public employment are 2017–2019 averages from the Indicadores Económicos Provinciales (IEP) database; the population denominator is the 2022 Census rolled back to 2018 at 1.1% per year; and formality and self-employment shares by province and sector are estimated from pooled microdata of the *Encuesta Permanente de Hogares* (EPH, third quarter, 2016–2019), mapped to the MIP sectors through a CAES crosswalk, with a private-sector wage-earner counted as unregistered when the job makes no pension contributions.⁴ Provincial employment is $E_p = \text{Pop}_{p,2018} \alpha_p (1 - u_p)$, with α_p the participation rate and u_p unemployment, and formal employment is registered private plus provincial public employment. The EPH seed counts by province, sector, and status (registered, unregistered, self-employed) are then reconciled through a three-way iterative proportional fitting that matches two marginals simultaneously: national sector-by-status totals and provincial employment totals, converging to a maximum absolute change below 10^{-6} and reproducing both margins to numerical precision while preserving the EPH cross-product structure, the Kullback-Leibler-minimizing solution of [Deming and Stephan \(1940\)](#). Aggregating the fitted unregistered stock to the five macro-regions gives γ_r^{emp} .

Both equivalent rates are grossed up by the *same* factor because informal activity escapes both sides of the accounting. On the production side, IIBB is not collected on unregistered turnover, so the origin revenue R_r^{IIBB} to be replaced is raised only on the formal share $(1 - \gamma_r)$; on the consumption side, the replacement VAT reaches only the formal share of the base. Holding target revenue fixed, the required statutory rate on the formal base is the full-compliance rate divided by $(1 - \gamma_r)$. Because it is implausible that the *entire* informal sector escapes taxation (some informal consumption is transacted through formal retailers, and some informal producers bear IIBB on formal inputs), we report the adjustment as a sensitivity over the effective escaping share $\phi \in \{0.25, 0.50, 0.75, 1.00\}$; the $\phi = 0$ column reproduces the unadjusted full-compliance rates of Figure 9.

The employment measure captures only labor informality. A second, independent estimate follows from the model itself: because the MRIO revenue of Section 4 assumes full compliance, comparing it to *observed* 2019 IIBB collections yields a revenue-based gap

$$\gamma_r^{\text{gap}} = 1 - R_r^{\text{eff}} / R_r^{\text{model}},$$

which folds informality together with evasion and any rate- or base-mismeasurement, and is therefore naturally larger than pure labor informality where collection is high relative to the model. Table 5 places the two side by side.⁵

³Computed as $\gamma_r^{\text{emp}} = L_r^{\text{no reg}} / L_r^{\text{total}}$ and aggregated to the five MRIO macro-regions. Labor informality proxies the VAT compliance gap (the best regionally disaggregated), officially measured indicator of activity outside the registered chain. It is a proxy, not a direct compliance-gap estimate: the two coincide only if informal firms neither remit tax on their sales nor bear it on their inputs.

⁴Operationally, from the EPH an employed individual (ESTADO= 1) is classified as *unregistered* when PP07H= 2 (no pension/social-security discount), CAT_OCUP= 3 (wage-earner), and PP04A= 2 (private sector); otherwise the worker inherits the CAT_OCUP category (registered or self-employed). Employers, unpaid family workers, and non-response codes are excluded, and observations are pooled across 2016–2019 using the PONDERA weights divided by the number of years.

⁵The MIP is denominated in thousand ARS (gross output sums to 35.1, i.e. ≈ 35 trillion ARS, consistent with 2019 GDP); model revenue is scaled to millions before the ratio. Nationally the model implies IIBB of $\approx 5.2\%$ of GDP under full compliance against $\approx 3.6\%$ actually collected: a $\approx 30\%$ gap.

Table 5: Two informality-gap estimates compared (2019)

Region	R^{model} (mill. ARS)	R^{eff} 2019 (mill. ARS)	γ^{gap} (rev.)	γ^{emp} (empl.)
Cuyo	53,061	43,318	0.184	0.244
Noreste	44,701	36,292	0.188	0.259
Noroeste	77,805	53,716	0.310	0.280
Pampeana	875,722	578,089	0.340	0.229
Sur	72,759	73,803	−0.014	0.160
National	1,124,049	785,218	0.301	0.235

$\gamma_r^{\text{gap}} = 1 - R_r^{\text{eff}}/R_r^{\text{model}}$. R^{model} is the full-compliance MRIO estimate (Section 4); R^{eff} is observed 2019 IIBB collection. Sur’s negative value (collection exceeds the model) is retained, not clipped: plausibly the 20-sector aggregate understates the Patagonian hydrocarbon base (Neuquén alone ≈ 33.1 bn ARS).

The two measures agree in order of magnitude, with national estimates of 30.1% for the revenue gap and 23.5% for the employment-based measure. They are closely aligned in Noroeste, where the revenue gap slightly exceeds the labor measure, as expected given its broader scope; in Noreste the ordering reverses, with the revenue gap (18.8%) below labor informality (25.9%). The two measures diverge where observed collection is low relative to the model. In the Pampeana region, the revenue gap reaches 34.0%, compared with labor informality of 22.9%, consistent with metropolitan evasion and tax base erosion beyond pure informality. Sur is the exception: its estimated revenue gap is slightly negative (−1.4%), indicating that observed Patagonian collection marginally exceeds the model prediction, so the corresponding gross-up leaves the region’s replacement rates essentially unchanged (Panel B below).

Tables 6 and 7 apply both gaps through the common $1/(1 - \phi\gamma_r)$ gross-up.

Table 6: Informality-adjusted *revenue-equivalent* VAT rate $\tau^{\text{IVA},R}/(1 - \phi\gamma_r)$ (%)

		Effective escaping share ϕ				
Region	γ_r	$\phi = 0$	0.25	0.50	0.75	1.00
<i>Panel A. Employment-based gap γ^{emp}</i>						
Cuyo	0.244	6.9	7.4	7.9	8.5	9.2
Noreste	0.259	8.5	9.1	9.7	10.5	11.4
Noroeste	0.280	8.5	9.2	9.9	10.8	11.9
Pampeana	0.229	8.8	9.3	9.9	10.6	11.4
Sur	0.160	9.2	9.6	10.0	10.4	10.9
National	0.235	8.7	9.2	9.8	10.5	11.3
<i>Panel B. Revenue-based gap γ^{gap}</i>						
Cuyo	0.184	6.9	7.3	7.6	8.0	8.5
Noreste	0.188	8.5	8.9	9.3	9.9	10.4
Noroeste	0.310	8.5	9.3	10.1	11.1	12.4
Pampeana	0.340	8.8	9.6	10.6	11.8	13.3
Sur	−0.014	9.2	9.2	9.1	9.1	9.1
National	0.301	8.7	9.4	10.2	11.2	12.4

Full-compliance revenue-equivalent rates ($\phi = 0$) grossed up by $1/(1 - \phi\gamma_r)$ per equation (8), under each gap measure of Table 5.

Table 7: Informality-adjusted *welfare-equivalent* VAT rate $\tau^{\text{IVA},W}/(1 - \phi\gamma_r)$ (%)

Region	γ_r	Effective escaping share ϕ				
		$\phi = 0$	0.25	0.50	0.75	1.00
<i>Panel A. Employment-based gap γ^{emp}</i>						
Cuyo	0.244	5.7	6.1	6.5	7.0	7.6
Noreste	0.259	5.7	6.1	6.5	7.0	7.6
Noroeste	0.280	5.9	6.3	6.8	7.4	8.1
Pampeana	0.229	6.3	6.7	7.1	7.6	8.1
Sur	0.160	6.9	7.1	7.5	7.8	8.2
National	0.235	6.2	6.6	7.1	7.6	8.1
<i>Panel B. Revenue-based gap γ^{gap}</i>						
Cuyo	0.184	5.7	6.0	6.3	6.7	7.0
Noreste	0.188	5.7	5.9	6.2	6.6	7.0
Noroeste	0.310	5.9	6.4	6.9	7.6	8.5
Pampeana	0.340	6.3	6.9	7.6	8.4	9.5
Sur	−0.014	6.9	6.8	6.8	6.8	6.8
National	0.301	6.2	6.7	7.3	8.0	8.9

Welfare-equivalent counterpart of Table 6; same $1/(1 - \phi\gamma_r)$ gross-up.

The two gaps bracket a common conclusion. At full pass-through the national revenue-equivalent rate reaches 11.3% under the labor gap and 12.4% under the broader revenue gap (welfare-equivalent: 8.1% and 8.9%); both bracket or exceed the aggregate FIEL/IARAF benchmark of ≈ 11 –12%, which therefore embeds an informality/compliance gap of the measured order rather than resting on a broader base alone. The two measures also re-rank the regions differently: under the labor gap the high-informality northern regions (Noroeste, Noreste) require the steepest rates, whereas under the revenue gap Pampeana, with the largest revenue shortfall, leads, requiring up to 13.3% at $\phi = 1$. Either way, the distance between the full-compliance baseline and the policy benchmark decomposes into a *policy gap* (household-only versus broader base, ≈ 2.5 pp, the wedge of equation (10)) and an *informality/compliance gap* (the $1/(1 - \gamma)$ gross-up), the latter now bounded from two independent directions. A full structural separation of informality, evasion, and calibration is left to further work.

5.7 Regional revenue structure

Pampeana accounts for 77.9% of total estimated IIBB revenue (875.7 bn ARS out of 1,124.1 bn ARS nationally), reflecting its larger economic size and higher sectoral rates, as Table 3 shows. Any reform design must therefore be anchored on Pampeana’s fiscal requirements; the political economy of transition will be dominated by the interests of the provinces in that region. The Brazilian precedent is instructive: the Constitutional Amendment of December 2023 and its implementing legislation (Supplementary Law 214/2025) established a 50-year transition mechanism (2029–2078) to redistribute IBS revenues gradually from origin to destination shares, complemented by a National Regional Development Fund (Cebreiro et al., 2025). The magnitude and duration of a comparable Argentine arrangement cannot be derived from the present model, but the existence of a citable institutional precedent anchors the discussion of transition feasibility.

6 Sensitivity and robustness

This section reports three checks for which the model’s existing outputs provide all the necessary information. Two additional checks require re-estimating the model under alternative assumptions rather than re-processing existing output: the treatment of imports and customs perceptions, and an assessment of network endogeneity based on perturbations of A^d toward lower vertical integration. These extensions are left for a subsequent round.

6.1 Regional aggregation: intra-regional rate dispersion

The five-region partition used throughout this paper necessarily discards within-region heterogeneity in statutory rates. Using the province-level rate schedule (24 jurisdictions) that underlies the regional averages in Figure 1, the intra-regional range averages 0.85 percentage points across all sector-region cells, but reaches as much as 5.0 pp for particular sectors: Wood & Paper varies from 1.0% to 6.0% within Sur alone (Chubut vs. Tierra del Fuego), and Transport & Communications from 2.0% to 6.5% within Cuyo. The five-region partition is therefore a simplification with real consequences for within-region results, not a presentational choice; a province-level extension (beyond the scope of this paper) would show more heterogeneity than the regional figures suggest.

6.2 Is the cascade ratio just a small denominator?

Because the cascade ratio is defined as $\kappa = \tau^{\text{VI}}/\tau^d$, a natural concern is that sectors with the highest ratios, Agriculture and Mining chief among them, appear extreme only because their statutory rate τ^d is small, not because their effective burden τ^{VI} is unusually large in absolute terms. Figures 7 and 3 address this directly by reporting absolute levels rather than only the ratio: Agriculture’s effective rate of 3.4% in Pampeana is of the same order of magnitude as most manufacturing sectors’ effective rates (3.7–4.8%), even though its statutory rate (0.5–1.5% depending on region) is far lower. Were the large ratio purely a small-denominator artifact, τ^{VI} itself would also be close to zero for these sectors; the figures show it is not. The cascade ratio for primary sectors reflects a large absolute effective burden divided by a small statutory base, not a division artifact.

6.3 Numerical convergence: truncating the Neumann expansion

Because τ^{VI} is computed via a matrix inverse, a natural robustness check is whether the result is sensitive to truncating the underlying Neumann series rather than summing it in full. Truncating at stage L_3 , three rounds of upstream purchases, instead of continuing to L_6 , recovers between 91.97% and 99.04% of the L_6 value across the 98 sector-region cells with a positive statutory rate (mean 95.3%, median 95.1%); the worst-converging cells in every region are Food & Beverages, consistent with Figure 3, which already flags that sector as converging more gradually than Agriculture, Mining, or Oil, Gas & Coal. A three-round truncation reproduces the fully-converged value to within about 8% in relative terms in the worst case, and typically within 5%, which rules out numerical instability near the limit of invertibility as an explanation for the reported cascade ratios.

7 Discussion and policy implications

The cascade is large and its source is local services. Cascade ratios substantially above 1 are found in all sectors with non-zero statutory rates. A 0.5% statutory IIBB rate on Agriculture imposes an effective burden of 3.4% in Pampeana (6.2× multiplier) once supply-chain effects are internalized, invisible in official tax statistics but real in equilibrium prices. This cascade

is overwhelmingly same-region (75% of τ^{VI} for Agriculture & Fishing) and driven by a small set of service sectors: Transport & Communications, Commerce, and Business Services together account for two thirds of the embedded burden in primary goods. This result is consistent with the mechanism documented by [Delalibera et al. \(2023\)](#) for Brazil, where cumulative taxation induces firms to shorten supply chains and integrate vertically; that behavioral response is not captured by the fixed-coefficient structure of the present model, so the cascade ratios here should be read as accounting measures of the statutory burden, not equilibrium predictions of effective incidence.

The revenue-welfare wedge and its policy interpretation. The 2.5 pp national wedge between $\tau^{\text{IVA},R} = 8.7\%$ and $\tau^{\text{IVA},W} = 6.2\%$ is the IIBB hidden in chains feeding exports, investment, and government purchases, as equation (10) makes precise. A revenue-neutral subnational VAT on household consumption alone requires 8.7%, not 6.2%; the difference must be recovered from consumers because a destination VAT cannot tax exports (zero-rated) or, in most designs, government purchases. The export component of the wedge is simultaneously the implicit export tax that reform would eliminate, so there is a direct trade-off: accepting the higher $\tau^{\text{IVA},R}$ on household consumption recovers the revenue lost from zero-rating exports, while removing the implicit export tax would plausibly generate a competitiveness gain that offsets part of the household burden through lower domestic prices, though this is a general-equilibrium mechanism that the present model, being a fixed-price accounting framework, does not capture and cannot quantify. The scenario logic of [Cebreiro et al. \(2025\)](#), whose range for Brazil runs from a fiscal surplus to a shortfall of 1.9% of GDP depending on assumed compliance, suggests that the band between $\tau^{\text{IVA},W}$ and $\tau^{\text{IVA},R}$ will widen once a compliance gap is incorporated. That exercise requires region-level compliance data at the sector-region granularity of this model, which are not currently available for Argentina.

Distributional implications: what the model can and cannot say. Food & beverages (10T12), the largest expenditure category and disproportionately important for lower-income households, carries a τ^{VI} exceeding the 10.5% reduced IVA rate currently applied to food. Whether replacing IIBB with a uniform regional VAT below 10.5% would improve the distributional profile of indirect taxation depends on behavioral responses, the pass-through of the tax change to consumer prices, and the design of any accompanying exemptions or zero-ratings, none of which is addressed by the present model. The claim that distributional outcomes would improve is plausible under standard incidence assumptions but is not established by the present results.

Transition and origin-to-destination redistribution. A shift from origin to destination principle does not primarily redistribute revenue among Argentine regions. Table 4 shows all five regions as net fiscal exporters relative to their own consumption base, so there is no Argentine region positioned to receive the 318.8 bn ARS nationally at stake; that gap corresponds to IIBB embedded in exports, investment, and government purchases, which a destination VAT on household consumption does not recover in the same way. Table 8 isolates the interregional component alone, netting out self-consumption and the wedge just described: Cuyo, Noreste, Noroeste, and Sur are net exporters of IIBB embedded in private consumption to the other four regions, while Pampeana, whose consumption base outweighs even its outsized production, is a net importer of 40.5 bn ARS. The origin-basis revenue a destination reform would relocate away from Pampeana therefore does not travel mainly to other Argentine provinces; most of it corresponds to demand components this model cannot reallocate regionally at all. The Brazilian experience nonetheless establishes that a multi-decade transition with an explicit compensation fund is institutionally viable in a comparable federal system ([Cebreiro et al., 2025](#)). The appropriate duration and mechanism for Argentina depends on political economy considerations outside the scope of this paper, and on how the non-household component of the wedge is treated, which

this paper does not resolve.

Table 8: IIBB embedded in private consumption, by region of production (rows) and region of consumption (columns)

Origin	Cuyo	Noreste	Noroeste	Pampeana	Sur	Total ^a
(bn ARS)						
Cuyo	25.9	0.3	0.3	20.9	0.2	47.6
Noreste	1.1	20.6	2.0	15.8	0.1	39.6
Noroeste	1.2	0.9	40.7	22.7	0.4	65.8
Pampeana	14.1	7.9	8.8	532.3	20.1	583.2
Sur	1.8	0.3	1.6	31.9	33.4	69.0

^a Row total = IIBB embedded in all private consumption of goods produced in that region, wherever consumed; equals $(p^{IB} - 1)$ applied to the origin-by-destination private consumption matrix $c_i^{s \rightarrow r}$ (Proposition 2 base). Column totals reproduce, for each region, the numerator of $\tau^{IVA,W}$ in equation (9). Diagonal entries (same-region production and consumption) account for 48–91% of each region’s total, highest for Pampeana (91%) and lowest for Sur (48%), where roughly half of the IIBB embedded in local consumption originates in other regions. Net interregional position (off-diagonal exports minus off-diagonal imports): Cuyo +3.6, Noreste +9.7, Noroeste +12.5, Sur +14.8, Pampeana −40.5 bn ARS.

More broadly, the results should be interpreted as quantitative policy infrastructure rather than as a complete evaluation of tax reform. Modern production-network models emphasize that eliminating cascading taxation affects firms’ sourcing decisions, sectoral specialization, vertical integration, and productivity through general-equilibrium adjustments. Quantifying those behavioral responses requires a structural framework beyond the scope of the present paper. Nevertheless, any structural evaluation requires an internally consistent accounting benchmark before counterfactual simulations can be credibly calibrated. The equivalent VAT rates, vertically integrated tax measures, cascade decomposition, and regional fiscal balances reported here provide that benchmark for future quantitative analyses of Argentina’s ongoing reform of provincial taxation.

Limitations. Revenue estimates are model-derived and require cross-validation against DNIAF fiscal statistics; discrepancies reflect MRIO calibration, informal-sector omission, and compliance gaps. The MRIO’s structural coefficients and monetary base are anchored to 2019 national accounts, in 2019 pesos, combined with 2025 statutory rates and 2018 consumption weights, a three-way vintage mismatch that matters both for the input-output structure, following the fixed-coefficient caveat below, and, independently, for the price level of every peso-denominated result in this paper. Absolute revenue figures (Tables 3, 4, and 8) are stated in 2019 pesos by design and are not updated to current prices; validation against DNIAF fiscal statistics should accordingly use 2019 IIBB collections and provincial budget executions, not current-price series, to keep both sides of the comparison in the same price vintage. The rate-based results are not subject to this issue. The assumption of fixed input coefficients is particularly consequential: [Delalibera et al. \(2023\)](#) show that eliminating cumulative taxation lengthens production chains and raises upstreamness, so the observed matrix A^d under IIBB underrepresents the network fragmentation of the counterfactual, and the equivalent VAT rates inherit a bias whose direction is ambiguous without further simulation.

8 Conclusion

Using a five-region, twenty-sector MRIO model for Argentina, we document that *Ingresos Brutos* generates substantial cascade effects: the national effective rate is 5.4% compared to a statutory average of 2.9%, with cascade multipliers ranging from $1.3\times$ to $6.0\times$ across sectors. The welfare-equivalent regional VAT rate, the cascade burden actually borne by local consumers per unit of consumption, is approximately 6.2% nationally ($\tau^{\text{IVA},W}$ ranging from 5.7% to 6.8% by region). The revenue-equivalent rate, which must also recover IIBB on chains feeding exports, investment, and government, is 8.7% nationally ($\tau^{\text{IVA},R}$ ranging from 6.9% to 9.2%). The 2.5 pp wedge between them equals the IIBB embedded in exports, investment, and government purchases; its export component is the implicit export tax that reform would eliminate, and the wedge as a whole is the revenue shortfall a consumption-only destination VAT would face absent additional design choices. Under the origin principle, all five regions collect more IIBB than a destination VAT on their own household consumption would raise, about 318.8 bn ARS nationally, most of which is not interregional redistribution but IIBB embedded in exports, investment, and government purchases, so replacing it requires either broadening the base or compensation. What remains open is the behavioral response of the production network to the removal of cumulative taxation, the region-level compliance assumptions needed to construct a full rate band indexed to evasion, and the institutional design of the origin-to-destination transition. These are the questions that general-equilibrium and compliance-gap models are better positioned to answer.

Beyond the Argentine case, the methodology can be applied to other federal economies where subnational turnover taxes coexist with destination-based VAT systems. As new MRIO databases become available, the framework developed here offers a transparent approach for measuring cascading taxation and evaluating its replacement under alternative fiscal federal arrangements.

References

- Acemoglu, D., Carvalho, V. M., Ozdaglar, A., and Tahbaz-Salehi, A. (2012). The network origins of aggregate fluctuations. *Econometrica*, 80(5):1977–2016.
- Baqae, D. R. and Farhi, E. (2020). Productivity and misallocation in general equilibrium. *The Quarterly Journal of Economics*, 135(1):105–163.
- Bird, R. M. (2014). Subnational taxation in developing countries: A review of the literature. *Journal of International Commerce, Economics and Policy*, 2(1):139–161.
- Cebreiro, A., Dal Pizzol, L., Kolerus, C., Moreira, S., and Pecho, M. (2025). Brazil’s VAT reform: Ensuring revenue neutrality. IMF Working Paper WP/25/266, International Monetary Fund, Washington, D.C.
- Corti, A. H. M. (2010). *Ingresos Brutos y el Convenio Multilateral*. Editorial Errepar, Buenos Aires.
- Delalibera, B. R., Ferreira, P. C., Gomes, D., and Soares, J. (2023). Tax reforms and network effects. Ensaios Econômicos EPGE 832, Fundação Getulio Vargas, EPGE Brazilian School of Economics and Finance, Rio de Janeiro.
- Deming, W. E. and Stephan, F. F. (1940). On a least squares adjustment of a sampled frequency table when the expected marginal totals are known. *The Annals of Mathematical Statistics*, 11(4):427–444.
- DNIAF (2026). Recaudación tributaria anual: Nominal y en % del pib. Dirección Nacional de Investigaciones y Análisis Fiscal, Ministerio de Economía. <https://www.argentina.gob.ar/economia/ingresospublicos/dniaf/recaudaciontributaria>. Accessed July 2026.

- Ebrill, L., Keen, M., Bodin, J.-P., and Summers, V. (2001). *The Modern VAT*. International Monetary Fund, Washington, D.C.
- Elosegui, P. (2024). La instrumentación de la política monetaria y el impacto económico de los tributos subnacionales: El caso de Argentina. *Economic Research Working Papers* 115.
- Elosegui, P., Michelena, G., and Herrera Gómez, M. (2026). A multiregional and multisectoral analysis of trade flow and economic linkages in the argentinean economic regions. *Económica*, 72:e047.
- FIEL (2015). Hacia un sistema tributario moderno. Technical report, Fundación de Investigaciones Económicas Latinoamericanas, Buenos Aires.
- IARAF (2025). Reemplazo del impuesto sobre los ingresos brutos: estimaciones de alícuotas equivalentes. Technical report, Instituto Argentino de Análisis Fiscal, Córdoba.
- Kanbur, R. and Keen, M. (2014). Thresholds, informality, and partitions of compliance. *International Tax and Public Finance*, 21(4):536–559.
- Keen, M. and Lockwood, B. (2010). The value added tax: Its causes and consequences. *Journal of Development Economics*, 92(2):138–151.
- Legislatura de Córdoba (2020). La presión tributaria en las provincias argentinas. Technical report, Legislatura de la Provincia de Córdoba, Córdoba.
- Miller, R. E. and Blair, P. D. (2009). *Input-Output Analysis: Foundations and Extensions*. Cambridge University Press, Cambridge, 2 edition.
- OPC (2018). Incumplimiento de compromisos del consenso fiscal 2017. Technical report, Oficina de Presupuesto del Congreso, Buenos Aires.
- Timmer, M. P., Dietzenbacher, E., Los, B., Stehrer, R., and de Vries, G. J. (2015). An illustrated user guide to the world input-output database: the case of global automotive production. *Review of International Economics*, 23(3):575–605.
- Zocaro, A. (2020). Alternativas a Ingresos Brutos: el impuesto sobre las ventas netas provinciales. *Revista de Tributación, AAEF*.

A MRIO sector classification

Table 9: MRIO sector classification (ISIC Rev. 4)

ISIC code	Description
01T03	Agriculture, forestry and fishing
05T06	Coal and oil extraction
07T08	Other mining
10T12	Food, beverages and tobacco
13T15	Textiles, apparel and leather
16T18	Wood, paper and printing
19	Coke and refined petroleum
20T22	Chemicals, rubber and plastics
23	Non-metallic mineral products
24T25	Basic metals and metal products
26T28	Machinery and equipment
29	Motor vehicles
30T33	Other manufacturing
35T39	Utilities (electricity, gas, water)
41T43	Construction
45T56	Wholesale, retail trade and tourism
49T61	Transport and storage
64T82	Finance, insurance and business services
84T88	Public administration, education and health
90T98	Arts, entertainment and other services