

Structure of employment associated with international trade in Brazil from a gender perspective

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Abstract

This article analyses the volume and structure of female employment linked to Brazil's foreign trade with its different partners in 2019, on the basis of estimations made from the Brazilian input-output table and on trade and employment statistics. Jobs linked to exports account for a small share of total employment in Brazil, especially in the case of women. Comparing the number of jobs generated by exports with those threatened by imports, the balance is smaller for women than for men. In addition, the quality of export-related employment is below the economy-wide average, for both women and men alike. Nonetheless, trade-related jobs in Brazil vary across trading partners, reflecting the country's heterogeneous pattern of trade specialization.

Keywords

Foreign trade, employment, labour market, gender, women's employment, gender equality, working conditions, input-output analysis, Brazil

JEL classification

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I. Introduction

A key issue in the field of international trade is the relationship between foreign trade and the labour market or social inequalities (Çağatay, 2005). The debate on the distributive effects of international trade is an old and recurrent one; and it often concerns the labour market,¹ since some of the jobs in an economy are directly or indirectly linked to its exports or imports of goods and services.

Fluctuations in trade flows affect job creation and destruction. The volume and profile of these two effects depends, firstly, on the sectoral composition of trade and, secondly, on the pattern of employment in the different sectors of the country in question. A recurring theme in the related literature is how trade liberalization affects existing employment opportunities, in terms of both the quantity of jobs affected by trade and their composition and quality.

Employment conditions differ between social groups, and the labour market effects of trade reproduce, mitigate or accentuate these differences. In the case of gender, how international trade affects women's employment is an open debate, and there is no consensus on how trade reproduces, mitigates or aggravates gender inequalities. The growing importance of this debate is reflected, for example, in the proliferation of provisions and chapters dealing with gender and trade in trade agreements. Between 1957 and 2022, 110 agreements including gender-related provisions were signed, which may encompass gender equality, women's rights and other issues. In the same period there were also seven trade agreements that contained a chapter on the recognition of gender inequalities present in the economy and the development of policies to ensure that international trade does not accentuate them (Ferreira and Castilho, 2024). Even more significant, however, is the fact that gender equality is the subject of United Nations Sustainable Development Goal 5; and it also contributes to the achievement of two others: Goal 8 —Decent work and economic growth and Goal 9— Industry, innovation and infrastructure.

Women engage in society differently than men, owing to the sexual division of the paid and unpaid labour market, and other spheres of social and economic life;² and also because trade flows, with their sectoral and geographical characteristics, affect the two groups differently. Several authors, such as Fontana (2009), Staritz (2013) and Urmeneta (2021), postulate that export-related jobs are more egalitarian in terms of formality, pay and participation, among other characteristics, than those linked to production that is targeted exclusively to the domestic market. Other studies, such as those of Azar, Espino and Salvador (2009) and Barrientos (2001), claim that international trade can accentuate existing discrimination in the labour market, either because the impact of changes in international trade varies across the different sectors of the economy, or else through indirect mechanisms. These include the fact that unpaid work tends to be a female responsibility, which restricts women's participation in the paid labour market (Ferreira, 2022). It should be noted that the relationship between trade and employment is bidirectional from a gender perspective: trade movements affect gender disparities in employment and can also create spurious conditions for export competitiveness (Fajnzylber, 1983).

In addition to different perceptions of the effects of international trade on women's employment, some female authors argue that the effects may also vary according to country-specific normative, institutional and cultural factors. For this reason, it seems impossible to generalize the effects of changes in international trade on gender inequalities; and studies would need to be performed on specific countries or sectors (Barafani and Barral Verna, 2020; Çağatay, 2005).

¹ This is not the only transmission channel linking international trade with the distribution of income or employment. Others include entrepreneurial activity, consumption and unpaid work. For further discussion, see Çağatay (2005) and Ferreira and Castilho (2024).

² These differences are accentuated by the different social markers that affect men and women, such as colour and race, sexual orientation or gender identity, and social class (Fontana, 2003).

This article aims to analyse how trade flows contribute to gender inequalities in the Brazilian labour market. It starts by considering the structure of the country's trade, which has displayed a regressive specialization trend since the decade of 2000, in which the share of mineral and agricultural goods with little or no processing has increased. In contrast Brazil's import structure is concentrated in products with a higher degree of processing (Nassif and Castilho, 2020). Nonetheless the structure of the country's trade varies significantly across its different trading partners. For example, exports to China — currently Brazil's main trading partner — are concentrated in agricultural and mineral products, whereas its exports to the rest of South America are largely manufactures of higher technological content. These individual partner specializations give rise to specific trade-related employment structures, as discussed below.

The volume and structure of trade-related employment is analysed by estimating the female and male employment content of exports and imports, and by evaluating the job characteristics that are used to gauge its quality. Employment content is estimated using a methodology that is well established in the literature, whereby the labour input coefficient used in domestic production is applied to the values of exports and imports, both direct and indirect (in other words, employment associated with the manufacture of inputs used in the production of goods and services). The characteristics of the labour market, including the gender division of employment, are obtained from statistical surveys on the Brazilian labour market. The objective is to examine the extent to which jobs linked to foreign trade are of equal, worse or better quality than employment in the economy at large, which would indicate whether trade reproduces, mitigates or accentuates gender inequalities in the Brazilian labour market. This analysis has been performed in both aggregate and disaggregated form, with respect to Brazil's main trading partners,³ since its trade specialization varies in each case.

The article is divided into four sections, including this introduction and final remarks. Section II describes the content of employment (volume and sectoral composition) related to Brazilian exports and imports, both total and by trading partner. It then presents the methodology adopted. Section III uses the employment quality indicator to analyse the profile of jobs linked to international trade, both as a whole and according to each selected partner.

II. Female and male employment associated with Brazil's international trade

The paid labour market is a specially fertile area for analysing how changes in international trade flows affect society and the well-being of its population. This is because, in any country, some of the jobs — both those generated by exports and those threatened by imports — are linked to trade flows. While the production of exported goods and services creates jobs both directly and indirectly, the sectors that are most sensitive to competition from imports may contract, thereby putting the associated jobs at risk (ECLAC, 2021a; Fontana, 2020). Not surprisingly therefore, a key issue in the field of international trade is the relationship between foreign trade and the labour market (Çağatay, 2005).

As is the case in other large economies, Brazil's goods trade in 2019 represented only a small share (16.8%) of its GDP.⁴ However, the country has several trading partners — which have varied over recent decades — with which it maintains more or less intense relations and a pattern of trade specialization that varies according to each partner. Trade structures can be more or less sophisticated and may be associated with a larger or smaller number of jobs, of higher or lower quality. This is demonstrated in

³ These are China, the United States, the European Union, South America, Argentina, Japan, Mexico and the United Kingdom.

⁴ Authors' calculations based on the Computerized Integrated System of Foreign Trade (SISCOMEX), the Integrated System of Foreign Trade in Services, Intangibles and other Operations that Produce Variations in Equity (SISCOSERV) and the input-output table estimated by Alves-Passoni and Freitas (2020).

Castilho (2010), which notes that Brazil mainly exports manufactures with a low or medium degree of processing but imports manufactures of greater value added. Nonetheless, while Brazil's trade with its more developed partners, such as Japan and the European Union, reflects the north-south archetype, it exports more sophisticated products to its developing-country partners.

This section analyses the content of paid labour associated with Brazil's international trade, both as a whole and with each of its main trading partners in 2019, the shares of which are reported below. The methodology used for the calculation is described briefly in subsection II.1, and the results are presented in subsection II.2. In 2019, the six trading partners with the largest shares in Brazil's exports and imports were China, the European Union, the United States, Latin America, Japan and the United Kingdom, which jointly absorbed 75.4% of its exports and supplied 74.9% of its imports. Within Latin America, the largest trading partners are Mexico and South America, especially Argentina. Accordingly, the analysis in this article focuses on bilateral trade with China, the European Union, the United States, South America, Argentina, Japan, Mexico and the United Kingdom, in addition to total trade. In 2019, these trading partners together accounted for 75.6% of Brazil's exports and 76.5% of its imports (see table 1).

Table 1
Brazil: international trade, by main trading partners, 2019
(Millions of dollars and percentages)

Trading partners	Exports (Millions of dollars)	Imports (Millions of dollars)	Exports (Percentages)	Imports (Percentages)
China	64 021	36 891	25.44	15.87
European Union	42 936	53 762	17.06	23.13
Netherlands (Kingdom of the)	15 762	12 810	6.26	5.51
Germany	6 071	12 929	2.41	5.56
France	3 192	5 820	1.27	2.50
Others	17 911	22 203	7.12	9.55
United States	37 395	47 950	14.86	20.63
Latin America	39 644	29 705	15.75	12.78
South America	30 172	23 349	11.99	10.05
Argentina	10 178	10 930	4.04	4.70
Chile	5 456	3 366	2.17	1.45
Uruguay	2 816	1 448	1.12	0.62
Other	11 721	7 606	4.66	3.27
Central America	4 193	978	1.67	0.42
Mexico	5 280	5 378	2.10	2.31
Japan	5 856	5 684	2.33	2.45
United Kingdom	4 547	6 136	1.81	2.64
Republic of Korea	3 535	5 484	1.40	2.36
India	2 935	4 671	1.17	2.01
Rest of the world	50 791	42 149	20.18	18.13
Grand total	251 661	232 432	100.00	100.00

Source: Prepared by the authors, on the basis of Computerized Integrated System of Foreign Trade (SISCOMEX) and Integrated System of Foreign Trade in Services, Intangibles and other Operations that Produce Variations in Equity (SISCOSERV).

Note: The European Union comprises 27 European countries.

In 2019, 36.5% of Brazil's exports were specialized in agriculture, livestock, forestry, fishing and aquaculture, and in agricultural commodities. The next largest export category was industrial commodities, with a 32.8% share. On the import side the highest concentrations were in innovative industry (36.3%), traditional industry (20.0%) and industrial commodities (18.7%).^{5 6}

As noted above, this profile varies between trading partners. While bilateral trade with China, the European Union and Japan displays a trend similar to that of trade as a whole, the United States, South America, Argentina and Mexico, for example, are the only trading partners in which innovative industry has a significant presence in Brazil's exports. In the case of exports destined for Argentina and elsewhere in South America, all industrial groups are represented strongly.⁷

1. Methodology

The methodology used to calculate the employment content associated with Brazil's total and bilateral exports and imports is based on studies by Castilho (2007), ECLAC (2021a, 2021b and 2022) and Ferreira (2022).

The data sources used were the input-output table estimated by Alves-Passoni and Freitas (2020); data on employment, exports and the gross value of Brazilian production were taken from the System of National Accounts of the Brazilian Institute of Geography and Statistics; labour market data were obtained from the Continuous National Household Sample Survey (*PNAD Contínua*); and statistics on trade in goods and services were sourced from the SISCOMEX and SISCOSERV portals, respectively. The year chosen to calculate the employment content was 2019, because it is the latest for which all the necessary data are available.

It should be noted that trade has been measured in gross terms because there is little difference between gross exports and their domestic value added. This is because Brazilian exports are heavily concentrated in natural resource-intensive products of low import content (Ferreira, 2022; Marcato, 2018). This reflects Brazil's scant participation in global value chains, especially when measured in terms of the foreign content of its exports (Costa, 2018; Ferraz, Gutierre and Cabral, 2015; Ferreira, 2022). Lastly, use of the Brazilian input-output table affords greater compatibility with national gender-specific labour market statistics, and with foreign trade statistics, with a more detailed sectoral breakdown than those contained in international input-output matrices.

The employment content of exports is calculated for jobs that are linked to exports directly and also for indirect jobs related to the production of inputs incorporated in those exports. To calculate export-related employment, it is first necessary to calculate the direct employment coefficient:

$$n_{67 \times 1} = E_{67 \times 1} \odot V_{67 \times 1} \quad (1)$$

⁵ Agricultural commodities involve activities that make greater use of natural resources and energy, and consist mainly of homogeneous products with lower technological content. Industrial commodities also comprise activities that make heavy use of natural resources, but are associated with mineral extraction, metallurgy and basic chemistry. Traditional industry, meanwhile, focuses on the production of goods of lower technological content with few requirements in terms of scale of production, and the production of wage goods and industrial complements, for example. Lastly, innovative industry produces goods of higher technological content, including more sophisticated activities. Its component sectors are said to be responsible for inducing technical progress in the economy (Alves-Passoni and Freitas, 2017; Torracca and Kupfer, 2014).

⁶ Authors' calculations based on SISCOMEX and SISCOSERV.

⁷ Authors' calculations based on SISCOMEX and SISCOSERV.

where:

$n_{67 \times 1}$ = direct employment coefficient, by activity,

$E_{67 \times 1}$ = total employment, by activity,

$V_{67 \times 1}$ = gross value of production at current prices, by activity, and

\odot = elementwise division.

To calculate the direct employment associated with exports, the direct employment coefficient is multiplied by the exports column vector:

$$ED_{67 \times 1} = n_{67 \times 1} \odot X_{67 \times 1} \quad (2)$$

where:

$ED_{67 \times 1}$ = direct employment linked to exports, by activity,

$X_{67 \times 1}$ = total exports of goods and services, by activity, and

\odot = elementwise multiplication.

Indirect export-related employment consists of jobs associated with the production of inputs used to produce the exported goods and services. This is calculated by firstly estimating the total production associated with exports:

$$Q_{67 \times 1}^x = \left\{ (I - A^d)^{-1} \right\}_{67 \times 67} \cdot X_{67 \times 1} \quad (3)$$

where:

$Q_{67 \times 1}^x$ = direct and indirect domestic production associated with exports, and

$\left\{ (I - A^d)^{-1} \right\}_{67 \times 67}$ = Leontief inverse matrix.

Total employment (both direct and indirect) is then calculated by applying the employment coefficient to the domestic production associated with exports:

$$ET_{67 \times 1} = N_{67 \times 67} \cdot Q_{67 \times 1}^x \quad (4)$$

$N_{67 \times 67}$ = matrix in which the values in the main diagonal correspond to the direct employment coefficient, by activity;

where total employment (TE) corresponds to the sum of direct employment (DE) and indirect employment (IE) linked to exports. In other words, EI can be obtained as follows:

$$EI_{67 \times 1} = ET_{67 \times 1} - ED_{67 \times 1} \quad (5)$$

This methodology is used to calculate the direct and indirect jobs associated with the total exports of the economy in question, by activity. The male and female employment shares are distinguished by harmonizing the System of National Accounts (level 67) with the Continuous National Household Sample Survey classification (National Classification of Economic Activities (CNAE) domicile 2.0). The data are then grouped into 56 activities.

Subsequently, the male and female shares are applied to the employment content associated with each activity in the column vectors:

$$ED_{56 \times 1}^f = e_{56 \times 1}^f \odot ED_{56 \times 1} \quad (6)$$

$$EI_{56 \times 1}^f = e_{56 \times 1}^f \odot EI_{56 \times 1} \quad (7)$$

$$E_{56 \times 1}^f = e_{56 \times 1}^f \odot E_{56 \times 1} \quad (8)$$

where:

$e_{56 \times 1}^f$ = female participation in total employment, by activity,

$ED_{56 \times 1}^f$ = female employment directly linked to exports, by activity,

$EI_{56 \times 1}^f$ = female employment indirectly linked to exports, by activity, and

$E_{56 \times 1}^f$ = total female employment linked to exports, by activity.

The same exercise is performed for men.

To estimate the employment content by trading partner, the vector $X_{67 \times 1}$ is disaggregated by trading partners.

To estimate the employment content that is threatened by imports, the export vectors are replaced by total and bilateral import vectors.

2. Employment content associated with Brazilian foreign trade

In 2019, 14.2 million domestic jobs were linked to Brazilian exports, representing 14.9% of all jobs in the Brazilian economy.⁸ Of these 14.2 million, 25% were held by women. This means that women are even more underrepresented in export-related employment than in the labour market generally, where they held 42.8% of all jobs in the same year. Nonetheless, export-related jobs contribute significantly to women's total employment: in 2019 there were 3.5 million women employed in activities linked to Brazilian exports, representing approximately 8.7% of all women employed in the entire labour market (see table 2).

Meanwhile, an estimated 11.5 million jobs were threatened by imports in 2019. Of these, 30.6% were held by women, which is more than their share of the jobs generated by exports. This percentage also represents approximately 3.5 million women, or 8.7% of female employment in the entire economy. Thus, female employment linked to international trade in 2019 generated a net balance of just 31,202 jobs, representing merely 0.1% of women employed in the Brazilian economy (see table 2).

The situation is different for men: in 2019 there were 10.6 million jobs linked to exports and 8.0 million threatened by imports, equivalent to 19.6% and 14.7% of total male employment respectively. The net balance of male employment associated with international trade in that year was considerably larger than in the case of women, at 2.7 million jobs, representing 4.9% of total male employment (see table 2).

In 2019, the employment content of bilateral trade with China, the United States, the European Union, South America, Argentina, Japan, Mexico and the United Kingdom accounted jointly for more than 70% of the jobs associated with Brazil's total exports and imports. Of these partners, only China, South America, Japan and the United Kingdom generated a positive net employment balance both for women and for men. Mexico displayed a positive employment balance for men only, which exceeds the negative balance for women. The United States, the European Union and Argentina display negative employment balances for both women and men (see table 2).

⁸ According to the Continuous National Household Sample Survey (2022), there were 40.6 million women and 54.3 million men in the paid labour market in 2019.

Table 2
Brazil: content of employment directly and indirectly linked to international trade, by trading partner and sex, 2019
(Number of employed people)

Trading partners	Exports				Imports				Balance (exports – imports)	
	Women		Men		Women		Men		Women	Men
	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect		
China	331 553	466 079	1 256 626	1 473 005	266 144	341 676	342 881	844 869	189 812	1 541 881
United States	218 006	311 100	519 364	899 536	325 706	386 292	573 354	1 024 286	-182 892	-178 740
European Union	216 774	312 091	602 360	945 506	244 232	391 236	510 990	1 041 715	-106 602	-4 839
South America	157 711	297 889	347 345	844 490	142 446	231 993	333 496	677 212	81 161	181 126
Argentina	37 259	96 865	94 712	268 539	57 317	117 056	164 994	335 371	-40 249	-137 115
Japan	40 036	56 026	128 073	179 001	22 055	44 770	53 693	115 966	29 237	137 416
Mexico	27 141	47 066	84 245	133 942	26 240	52 927	50 852	141 678	-4 960	25 658
United Kingdom	26 554	36 653	63 496	106 302	11 278	34 833	26 759	96 239	17 096	46 800
Rest of the world	326 669	541 510	923 740	1 769 367	420 523	399 058	636 939	1 002 572	48 598	1 053 597
Total	1 381 704	2 165 280	4 019 962	6 619 689	1 515 942	1 999 841	2 693 959	5 279 907	31 202	2 665 785
National total	40 609 501 14		54 346 658		40 609 501		54 346 658		40 609 501	54 346 658

Source: Prepared by the authors, on the basis of P. Alves-Passoni and F. Freitas, "Estimação de matrizes insumo-produto anuais para o Brasil no Sistema de Contas Nacionais: referência 2010", *Texto para Discussão*, No. 25, Institute of Economics, Federal University of Rio de Janeiro (UFRJ), 2020; Continuous National Household Survey 2022; Computerized Integrated System of Foreign Trade (SISCOMEX), and Integrated System of Foreign Trade in Services, Intangibles and other Operations that Produce Variations in Equity (SISCOSERV).

The share of these countries in the net jobs balance is heterogeneous. Considering the sum of the female and male balances, China accounted for 64.2% of the total balance of national jobs linked to international trade. The partner with the second largest positive balance was South America, but this only represented 9.7% of the total. However, while the number of net jobs generated, in the case of China, is positive for both women and men and accounts for a large share of the number of jobs created, women represented just 11.0% of the total balance. In the case of South America, the balance was more evenly distributed, although there is still a gender gap, with women accounting for 30.9% of the balance generated (see table 2).

Japan and the United Kingdom —the two remaining partners with a positive total employment balance— presented a similar picture of female underrepresentation: women accounted for 17.5% of the balance of employment linked to bilateral trade with Japan and 26.8% of the balance with the United Kingdom. In Mexico, as noted above, despite a positive net employment balance overall, the female balance was negative (see table 2).

In contrast, an analysis of partners with a negative employment balance for both men and women reveals the opposite. In bilateral trade with the United States and the European Union, women are overrepresented, accounting for 50.6% and 95.7% respectively of the negative employment balance. In the case of bilateral trade with Argentina, contrary to the pattern observed thus far, men account for the vast majority (77.3%) of the negative employment balance (see table 2).

However, having analysed the volume of employment linked to, or threatened by, international trade, the following subsections consider its sectoral composition and characteristics.

3. Sector composition of the employment content

The sector composition of male and female employment linked to international trade has a direct impact on the quality of the jobs both created and threatened. The sectors and activities that generate these jobs are not homogeneous: they may be more or less capital-intensive and more or less (female and male) labour-intensive; they may also have greater or lesser potential to stimulate the economy,⁹ with more or less desirable characteristics for workers; and they may create or threaten a larger or smaller number of jobs linked to international trade.

(a) Characterization of the sectors

Various authors, such as Clark (1940), Hirschman (1958) and Kaldor (1978),¹⁰ generally identify manufacturing, among the three large macro-sectors, as the sector that is capable of driving economic development. The observation that the manufacturing sector is the core of economic growth was enshrined in Kaldor's three laws, which postulate a positive relationship between: (i) the growth of manufacturing and the growth rate of total production; (ii) the rate of manufacturing productivity growth and the growth rate of industrial production (which became known as the Kaldor-Verdoorn law) owing to economies of scale; and (iii) the growth of manufacturing production and employment and the growth of aggregate productivity in the national economy as a whole. Rocha (2016) notes that since manufacturing has a higher capital-labour ratio than other sectors of the economy, it also has a higher initial level of labour productivity than the other sectors. Manufacturing industry would therefore serve as the engine of the economy as it has the capacity to promote productivity growth, innovation and skill accumulation.

⁹ The sectors that drive the economy are those that require greater knowledge and have greater potential to generate quality jobs, as well as a greater capacity for innovation and the incorporation of technological advances. The sectors in question are: the renewable energy transition, the digital revolution, urban electromobility, the bioeconomy, the care economy, the circular economy, the health-care manufacturing industry and sustainable tourism (ECLAC, 2020).

¹⁰ Other authors, such as Weiss and Jalilian (2016), emphasize other factors that explain why manufacturing is the engine of economic growth, such as its greater potential for expansion through exports than other sectors.

In addition to being the main source of capital accumulation and technological progress, manufacturing has great capacity to propagate technical progress and growth to the rest of the economy. Nonetheless, Brazilian manufacturing industry displays structural heterogeneity across several dimensions.¹¹ The more sophisticated sectors play a greater role in generating and propagating of technical progress and promoting economic growth, by purchasing goods and services from other sectors (Nassif, 2008).

Nassif (2008) also emphasizes that the capital goods industry is one of the drivers of a country's economic development, since it creates productive capacity and induces technical progress, thus playing a strategic role in the economic development process.

The Sustainable Development Goals recognize the importance of the industrial sector for socioeconomic development, beyond the academic debate. Goal 9 deals specifically with industry, innovation and infrastructure; and its various targets include the need to increase industry's share of to GDP and employment, and promote inclusive and sustainable industrialization (target 9.2).

There are other important ways to add value and foster technological development in specific value chains. These include promoting the innovative industrialization of agriculture, which can boost productivity, give access to new global markets and foster productive diversification. However, this entails transforming agricultural activities into highly productive industrial processes. This, in turn, requires flexible and dynamic industrial policies that respond to the specific characteristics of each country and are not confined to the manufacturing sector, but pursue innovation and technological upgrading (Andreoni and Tregenna, 2020).

Several authors, such as Bresser-Pereira, Nassif and Feijó (2016), argue that specific service subsectors — the technologically sophisticated tradable ones — along with sectors of high technological content, play a strategic role in economic development, because they contain high levels of value added per capita and pay their workers high wages.¹² Following recent transformations in the organization of production — as a result of the proliferation of global and regional value chains, which has led to the outsourcing of various activities that were previously performed within the organization or firm — the distinction between manufacturing and commerce has become more blurred, and the service content of manufacturing production has increased significantly. This process is known as the servitization of manufacturing (ILO, 2019). Servitization generates both under- and overestimations in international production and trade statistics, because the services content in manufactured products, and vice versa, is increasing but hard to distinguish. At the same time, the services sector comprises a large number of subsectors that vary widely in terms of productivity, the knowledge required to perform them and the jobs created.

(b) Analysis of employment content by sector

The sectoral composition of jobs linked to Brazil's international trade varies according to its trading partners. In trade with China, Japan and the European Union, the sectoral composition of female and male export-related jobs is far less diversified than in trade with Argentina or South America as a whole, or with Mexico, the United Kingdom or the United States, (see tables A1.1, A1.2, A1.3 and A1.4 in

¹¹ The firms that make up the industry differ in size and in ownership and corporate structures, shares in industry value added or in the rate of productivity growth, or different strategies for increasing their technological and export potential (Nassif, 2008). In developing countries, this structural heterogeneity is expressed in wide differences in labour productivity, both between sectors of the economy and within each sector — much larger than in developed countries. These differences are sufficiently marked to segment the productive system and the labour market clearly into different strata, in which technological and remuneration conditions are pronouncedly asymmetric (ECLAC, 2010; Cimoli and Porcile, 2013).

¹² For a discussion of the importance of the service sector for economic development and its relationship with manufacturing industry, see Cassini and Robert (2020), for example. According to these authors, in the current context it is difficult to predict whether a productive profile specialized in services will produce the desired growth and development effects, if it has not previously reached a higher level of industrialization.

the annex). This is an important detail, since export diversification can serve as a way to promote economic growth. Developing countries should seek to diversify their exports both geographically and between sectors, since this would help mitigate the instability caused by the volatility of commodity prices and would increase the income elasticity of exports and thus boost economic growth (Hesse, 2008; Sarin, Mahapatra and Sood, 2022).

In addition to sectoral diversification, the types of goods in which each country's production specializes also affect its economic performance. As Hausmann, Hwang and Rodrik (2007) note, developing economies would be better off producing the same types of goods as rich countries, rather than commodities. This section will focus on the latter point.

In bilateral trade with most of the selected partners, export-related female employment content is concentrated largely in three activities: agriculture; commerce; and scientific, professional and technical activities. In bilateral trade with China, the European Union and Japan, the export-related female employment content pertains mostly to the agriculture sector. This sector also accounts for a considerable share (more than 17%) in bilateral trade with Mexico and the United Kingdom, but it is not the largest job creator. In the case of Mexico, most of the employment content is associated with commerce, while in trade with the United Kingdom it is linked to scientific, professional and technical activities (see tables A1.1 and A1.2 in the annex).

Argentina, South America and the United States are Brazil's only trading partners for which the employment content associated with agriculture is not among the top three sectors. In trade with the United States, the accommodation and food services sector ranks third in terms of female employment content. In bilateral trade with Argentina and South America as a whole, this place is taken by traditional industry (see tables A1.1 and A1.2 in the annex).

In terms of imports, the three sectors that most threaten female employment content include commerce, and scientific, professional and technical activities — in the case of all selected trading partners. In trade with China, the threatened female employment content is mostly concentrated in traditional industry; and in trade with Japan, the third sector posing the greatest threat to female employment content is innovative industry. In contrast, in trade with the United States, the European Union and Mexico, much of the threatened employment content pertains to the accommodation and food sector. Argentina and South America, meanwhile, are the only trading partners in which the female employment content associated with agriculture is among the most threatened (see tables A1.1 and A1.2 in the annex).

As noted above, only four trading partners display a positive net female employment content: China, Japan, South America and the United Kingdom. Of these, only trade with South America generates a positive balance of jobs associated with all industrial sectors. In fact, trade with this partner generates a negative female jobs balance in just two sectors: agriculture, and accommodation and food services. In the case of Argentina, although the total balance of trade-related female jobs is negative, it displays positive balances in innovative industry, traditional industry and industrial commodities. These are offset by clearly negative balances in sectors such as agriculture, commerce, accommodation and food services, and agricultural commodities (see tables A1.1 and A1.2 in the annex).

In the case of men, most of the employment content linked to exports is concentrated in agriculture; transportation, storage, support activities for transportation and postal services; and also in commerce. The agriculture sector is clearly much more predominant in trade with China, the European Union and Japan, than with other partners. In trade with Argentina, innovative industry is one of the three sectors that generate the most employment linked to exports, while in the case of the United Kingdom and the United States it is the scientific, professional and technical activities sector (see tables A1.3 and A1.4 in the annex).

In terms of male jobs threatened by imports, the commerce sector and the transportation, storage, support activities for transportation and postal services sector are among the three that most threaten employment content in trade with all selected trading partners (except commerce in the case of Japan). A large proportion of the male jobs threatened by trade with China is concentrated in traditional industry and, in the case of Japan and Mexico, in innovative industry. Conversely, in trade with Argentina and South America as a whole, most of the threatened male employment content pertains to the agriculture sector (see tables A1.3 and A1.4 in the annex).

Regarding the balance of male jobs, as noted above, trade with China, Japan, Mexico, South America and the United Kingdom generates more jobs than it threatens. Here again, South America is the only trading partner for which the jobs balance is positive in all industrial sectors. In fact, with the exception of Argentina —where industrial commodities and innovative industry generate a positive balance— and the United States —where traditional industry has a positive balance— the only industrial sector in which the other partners generate a positive balance in male jobs is agricultural commodities (see tables A1.3 and A1.4 in the annex).

III. Quality of female and male employment linked to Brazil's international trade

This section estimates an “indicator of job quality” (both domestic and trade-related) to gauge the extent to which differences in the sectoral composition of female and male employment influence the different quality of both total employment and that specifically linked to exports or threatened by imports. The employment quality indicator is calculated using the methodology proposed by Saboia and Kubrusly (2014), which makes it possible to combine employment characteristics into a synthetic indicator similar to the United Nations Human Development Index. The following variables were combined for this purpose: pay per hour worked, participation in leadership or managerial positions, share of formal employment, and time spent in jobs (or turnover). The higher the values of these variables, the better the employment characteristics for workers.

The employment content (both generated and threatened) in the 10 activities with the highest total employment quality indicators in 2019, among the selected partners, is discussed below. For simplicity, hereinafter these activities are referred to as the drivers of the Brazilian economy.¹³

1. Employment content of the drivers of the Brazilian economy

According to the calculation of the job quality indicator, in 2019 the following 10 activities considered drivers of the Brazilian economy were distinguished as offering higher quality to their workers, namely the extraction of oil and gas, including supporting activities; financial intermediation, insurance and supplementary pension plans; public administration, defence and social security; manufacturing of pharmaceutical products and chemicals; electricity, gas and other utilities; publishing and printing; manufacturing of chemicals; air transportation; manufacture of coke, petroleum products and biofuels; and manufacture of motor vehicles, trailers and coachwork (see tables A1.1 and A1.2 of the annex).

The first noteworthy feature is the fact that few of the driving activities have a significant share¹⁴ in the female employment content of exports. Bilateral trade with Argentina and South America as a whole, and with Mexico, includes the manufacture of motor vehicles, trailers and coachwork, while trade

¹³ Criteria such as environmental sustainability, for example, have not been considered here, despite the importance of this debate.

¹⁴ Defined as those of the 10 activities that have the largest share of female employment content linked to Brazilian exports.

with China and the United Kingdom includes financial activities, insurance and related services. The manufacture of motor vehicles, trailers and coachwork is also among the 10 activities with the largest share in the content of female jobs that are threatened by imports from Argentina, Japan and Mexico; and it only displays a positive balance in bilateral trade with South America. Financial activities, insurance and related services, meanwhile, are among the 10 activities with the largest share of the content of jobs threatened by imports from the European Union, the United Kingdom and the United States; and the sector displays a positive balance in trade with China, South America and the United Kingdom (see tables A1.1 and A1.2 in the annex).

In the case of men, the manufacture of motor vehicles, trailers and coachwork was the only one of the 10 driving activities that was among those with the largest shares in export-related employment, including in bilateral trade with Argentina, South America and Mexico. However, this sector is also one of those with the largest employment content threatened by imports from Argentina and South America, and from Japan and Mexico; and it only displays a positive balance in trade with South America (see tables A1.3 and A1.4 in the annex).

Several of these economic drivers are among the ten activities that generate the smallest shares of export-related employment for both women and men. These are: (i) the extraction of oil and gas, including supporting activities — in trade with Argentina, the European Union, Japan, the United Kingdom and the United States, in terms of female job creation; and with Argentina, Japan, Mexico and the United Kingdom in terms of male jobs; (ii) the manufacture of coke, petroleum products and biofuels, in trade with Argentina, China, the European Union, the United Kingdom and the United States, in job creation for women; and with Argentina and South America, the European Union and Mexico in the case of men; (iii) the manufacture of pharma-chemical and pharmaceutical products, in trade with China, Japan, the United Kingdom and the United States, in terms of job creation for women, and with all partners except Mexico in the case of male employment; (iv) electricity, gas and other utilities in trade with the European Union and the United States, in terms of job creation for women; (v) air transportation, in trade with Argentina and South America as a whole, for both female and male job creation; and lastly, (vi) publishing and printing, in trade with China in the case of female employment, and with China, the European Union, the United Kingdom and the United States in the case of men (see tables A1.1, A1.2, A1.3 and A1.4 in the annex).

Analysis of the importance of the aforementioned activities in terms of employment generated by bilateral trade with each of the partners analysed thus far, has revealed that export-related employment in these activities, whether for women or for men, is relatively minor in most of the countries analysed. In other words, given the structure of Brazilian international trade, these activities generate relatively few female and male export-related jobs.

Argentina is the partner that generates proportionally most female and male export-related employment associated with these activities: 8.9% and 10%, respectively, of the employment content related to exports to this partner. It is followed by Mexico and South America, which account for 8.1% and 6.8%, respectively, of the female and male employment content of exports associated with these activities. In Brazil's trade with other partners, the total female and male employment content linked to these activities is less than 5%, and no more than 3.1% in the cases of China and Japan (see tables A1.1, A1.2, A1.3 and A1.4 in the annex).

The aggregate balance of female jobs associated with these activities is positive solely in bilateral trade with South America, where the only negative balance is in the manufacture of coke, petroleum products and biofuels. In the case of men, the aggregate balance is positive in trade with China and South America — owing mainly to the extraction of oil and gas, including supporting activities, in the case of China; and to the manufacture of motor vehicles, trailers and coachwork, in the case of South America. In contrast, the European Union is the partner that generates the largest negative balance of female and male jobs associated with these activities — minus 43,752 in the case of women and minus 73,917 in the case of men (see tables A1.1, A1.2, A1.3 and A1.4 in the annex).

The activities classified as drivers of the Brazilian economy include the following three in particular: the manufacture of pharma-chemical and pharmaceutical products (an indirect indicator of the health-care industry and considered a driving sector of the economy by the Economic Commission for Latin America and the Caribbean (ECLAC)), the manufacture of chemical products, and the manufacture of coke, petroleum derivatives and biofuels, all of which were key activities for the Brazilian economy in 2019 (Ferreira, 2022).

The trading partners with the largest share of the export-related employment content associated with these activities are Argentina and South America –2.3% and 1.8%, respectively in the case of women and 1.9% and 1.6% in the case of men. Moreover, South America is the only partner with a positive aggregate job balance in these activities for both women and men, thanks mainly to the manufacture of chemical products (see tables A1.1, A1.2, A1.3 and A1.4 in the annex).

The next section considers the quality indicator of employment associated with total and bilateral Brazilian exports and imports in aggregate terms, with a view to comparing the quality of jobs generated and threatened among the selected trading partners.

2. Quality of aggregate employment content

In aggregate terms, Brazil's export specialization is such that the structure of employment in the economy as a whole is of higher quality (based on the definition established in this paper) than that linked to total exports, both for women and for men (see table 3).

Table 3
Brazil: employment quality indicator, by category, trading partner and sex, 2019

Trading partners	Women		Men	
	Exports	Imports	Exports	Imports
Total Brazil	0.545	0.545	0.562	0.562
Total trade	0.516	0.538	0.497	0.564
China	0.507	0.515	0.460	0.568
United States	0.527	0.534	0.542	0.575
European Union	0.515	0.566	0.502	0.579
South America	0.528	0.507	0.546	0.513
Argentina	0.536	0.511	0.566	0.519
Japan	0.502	0.563	0.467	0.612
Mexico	0.527	0.517	0.532	0.576
United Kingdom	0.532	0.576	0.531	0.593

Source: Prepared by the authors, on the basis of P. Alves-Passoni and F. Freitas, "Estimação de matrizes insumo-produto anuais para o Brasil no Sistema de Contas Nacionais: referência 2010", *Texto para Discussão*, No. 25, Institute of Economics, Federal University of Rio de Janeiro (UFRJ), 2020; Continuous National Household Survey 2022; Computerized Integrated System of Foreign Trade (SISCOMEX), and Integrated System of Foreign Trade in Services, Intangibles and other Operations that Produce Variations in Equity (SISCOSERV).

Whereas in the labour market as a whole, the employment quality indicator is higher for men than for women, the opposite is true for jobs associated with total exports (see table 3). However, if the agriculture sector is excluded from the calculation, the quality indicator for export-related employment is again higher for men than for women. As Brumer (2004) notes, this sector is ignored because of the overwhelming invisibility of women's work in agriculture, which is usually considered an extension of unpaid domestic work and, therefore, results in women's participation in the sector being underestimated. Thus, given the characteristics of the agriculture sector and its share of total employment, its inclusion in the employment quality indicator could mask this reality. Meanwhile, in the case of employment content threatened by imports, the resulting job quality indicator is higher than for jobs linked to exports, for both women and men alike (see table 3).

Accordingly, the analysis of total trade shows clearly that growth in international trade that reinforces these characteristics will do little to reduce gender inequalities in the labour market, or to promote the country's socioeconomic development and improve employment opportunities for workers. Nonetheless, as noted above, it is also necessary to understand how this dynamic varies with each trading partner.

Trade with Argentina, for example, has the highest quality indicator in export-related employment for both women and men. In the case of men, it even exceeds the quality indicator for male employment in the Brazilian economy as a whole. Meanwhile, the quality of jobs threatened by imports from Argentina, for both women and men, is among the lowest, being surpassed only by South America. In short, bilateral trade with Argentina, with respect to the other selected trading partners and taking into account the aforementioned employment characteristics, not only generates the best jobs but also only threatens those with the least desirable characteristics for workers (see table 3).

In bilateral trade with South America, the pattern is similar. Female jobs linked to exports have the third best job quality indicator, and male jobs have the second best. However, as mentioned above, in terms of jobs threatened by imports, trade with South America has the worst aggregate job quality indicators both for women and for men. Thus, as with Argentina, the jobs generated in trade with South America have a better job quality indicator than those that are threatened, for both sexes. In the case of men, Argentina and South America are the only partners where this is the case. For women, this also applies to bilateral trade with Mexico (see table 3).

In the case of Mexico, for both women and men, trade as a whole generates and threatens jobs of intermediate skill level. However, as just noted, the quality indicator for female employment linked to exports is higher than that of employment threatened by imports. The same is not true for men.

The United States displays a pattern similar to that of Mexico in the case of women, in terms of the ranking of the employment quality indicator among the countries analysed. However, the quality indicator for female employment linked to exports is lower than that related to imports. As for men, jobs linked to bilateral trade with the United States have the third highest male job quality indicator, while those under threat have the fifth highest. In either case, the quality indicator for jobs threatened by imports exceeds that of jobs supported by exports (see table 3).

Bilateral trade with Japan, the European Union, the United Kingdom and China, meanwhile, has a very detrimental impact on the Brazilian labour market. In the case of both female and male employment, Japan and the European Union are among partners that generate jobs with a lower employment quality indicator but threaten higher-quality jobs. In trade with the United Kingdom, female export-related jobs have the second highest job quality indicator, but those threatened by imports have the highest. The situation is worse for men: jobs linked to exports have the fourth lowest job quality indicator, while those threatened by imports have the second highest. Lastly, in the case of trade with China, the jobs both generated and threatened have some of the worst quality indicators, both for women and for men. In bilateral trade with all of these partners, the job quality indicator for employment linked to imports is higher than that linked to exports, for women and men alike (see table 3).

In the case of exports to Argentina and South America, and to Mexico and the United States, the employment quality indicator is higher for men than for women, as in the Brazilian labour market as a whole. However, the female jobs associated with exports to China, the European Union, Japan and the United Kingdom are of higher quality than the corresponding male jobs. In the case of the European Union and the United Kingdom, however, and as noted above, if the agriculture sector is excluded from the calculation, male export-related jobs are of higher quality than their female counterparts. Moreover, for both women and men, the employment content in bilateral trade with China and Japan reports the two worst job quality indicators analysed (see table 3).

IV. Concluding remarks

Brazil's foreign trade, like that of other large economies, represents a relatively small share of GDP (16.8%). This, together with the sectoral composition of its trade, explains the small proportion of net employment that is linked to trade flows (2.8% of total employment in 2019). However, the contribution of trade is weak not only quantitatively but also in terms of quality. The quality indicator for export-linked employment suggests that the characteristics of trade-related jobs are less desirable than those of jobs linked to the domestic market. At the same time, according to the job quality indicator calculated in this article, the quality of jobs linked to, or threatened by, imports is higher. Naturally, the characteristics in question vary across Brazil's different States; but these quantitative and qualitative observations on jobs linked to foreign trade flows are valid for the country as a whole.

Premised on the belief that economic phenomena — including international trade in goods and services — are not gender-neutral, this article has attempted to analyse the qualitative and quantitative differences between male and female employment associated with Brazilian imports and exports. These differences stem basically from the sectoral composition of trade and the extent of female employment in each sector.

In 2019, there were 3.5 million female and 10.6 million male jobs supported by exports, and there were 3.5 million female and 8.0 million male jobs threatened by imports. Trade is therefore not a significant net source of jobs for women, but it is for men. In fact, women were even more underrepresented in trade-related employment (25%) than in the wage-earning labour market generally, where they accounted for 42.8% of total Brazilian employment.

Trade-related employment is highly heterogeneous across Brazil's different partners, reflecting its equally diverse trade specialization in each case. Bilateral trade with Argentina and South America as a whole, Mexico, the United Kingdom and the United States is more diversified, in terms of both female and male employment, than trade with China, the European Union and Japan. This reflects the degree of diversification of exports with these partners.

Trade with Argentina and South America supports a more highly skilled job content and more desirable job characteristics for workers; it also has the best job quality indicators in export-related employment and the lowest quality of jobs threatened by imports. In contrast, bilateral trade with the other partners analysed is generally less favourable for the Brazilian labour market: the quality of jobs threatened by imports tends to be higher than that of jobs generated by exports.

Although international trade can have adverse effects by reinforcing and creating gender inequalities, it can also be a way for countries to promote socioeconomic development and for women to gain greater equality and economic autonomy. Promoting socioeconomic development entails encouraging a progressive (as opposed to a regressive) shift in the country's productive and trade specialization towards more highly processed sectors, which are generally associated with better jobs. Meanwhile, gender discrimination must be combated with targeted policies, to prevent trade and other economic phenomena from exploiting or widening the gaps that exist.

The first of these aims requires adopting a productive development strategy that harnesses industrial, innovation, trade and foreign policy, so as to stimulate development of a more sophisticated production mix. This would redirect Brazil's productive specialization to enable the country to move up the value chain in international production networks. The second depends on mainstreaming gender in Brazil's various economic policies.

Given the structure of Brazil's bilateral trade with Argentina and with South America as a whole, this strategy should encourage regional integration. This is important from the standpoint of economic momentum associated with the strengthening of relatively more sophisticated sectors, which, as noted

above, are the main creators of “good” jobs, particularly for women. Greater regional integration can stimulate intersectoral productive complementarity, help achieve more efficient scales of production, and foster a productive and trade diversification process that generates international engagement with benefits including better-quality jobs for all workers, both women and men alike.

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Annex A1

Table A1.1

Brazil: job quality indicator and female employment content linked to Brazilian exports by activity, sectoral group and trading partner, 2019
(Number of employed people)

Group of sectors – Classification based on Alves-Passoni and Freitas (2017)	Activities—Harmonized classification between the National Classification of Economic Activities (CNAE) domicile 2.0, CNAE 2.0 and the System of National Accounts level 67	Total employment quality indicator	Employment content – exports								
			Total	China	United States	European Union	South America	Argentina	Japan	Mexico	United Kingdom
Agriculture	Agriculture, livestock and related services	0.275	896 304	343 517	41 113	113 073	38 643	7 451	35 304	12 022	10 710
	Forestry, fishing and aquaculture	0.279	35 782	7 700	7 587	7 512	2 393	713	1 445	560	450
Industrial commodities	Mining of coal and non-metallic minerals	0.336	3 164	679	595	636	377	123	54	76	38
	Extraction of oil and gas, including supporting activities	0.734	3 572	1 922	507	315	295	25	17	12	11
	Mining of metallic minerals	0.440	7 331	2 815	345	1 770	256	108	202	154	63
Agricultural commodities	Manufacture of food products	0.296	182 575	27 059	10 872	34 499	13 670	2 454	6 232	1 286	2 747
Traditional industry	Manufacture of beverages	0.381	1 849	52	196	120	1 273	44	19	10	14
Agricultural commodities	Manufacture of tobacco products	0.344	3 107	568	281	1 108	179	52	0	12	14
Traditional industry	Manufacture of textiles	0.268	46 956	9 204	5 036	4 689	9 062	3 068	481	1 135	403
	Manufacture of clothing and accessories	0.269	60 828	3 390	12 271	7 428	26 311	3 348	708	779	890
	Preparation of leather and manufacture of leather products, travel accessories, footwear	0.328	55 523	7 414	9 860	13 410	10 060	3 117	159	1 325	710
Agricultural commodities	Manufacture of wood products	0.263	34 665	2 481	13 514	5 981	2 508	477	1 035	2 291	1 062
	Manufacture of pulp, paper and paper products	0.379	31 203	9 852	4 678	6 435	3 896	1 415	630	460	601
Traditional industry	Printing and reproduction of recorded media	0.499	6 625	1 056	1 242	1 009	1 043	298	153	155	428
Industrial commodities	Manufacture of coke, petroleum products and biofuels	0.538	2 958	443	872	357	226	72	67	34	29
Traditional industry	Manufacture of chemicals	0.560	29 193	6 706	3 124	3 953	6 920	2 618	794	966	374
Innovative industry	Manufacture of pharma-chemical and pharmaceutical products	0.614	4 314	414	591	823	1 018	348	60	262	46
Industrial commodities	Manufacture of rubber and plastics products	0.408	27 343	2 770	5 240	3 252	8 802	3 691	418	1 311	286
Traditional industry	Manufacture of non-metallic mineral products	0.337	15 949	1 621	5 531	1 523	3 437	1 077	189	517	225
Industrial commodities	Metallurgy	0.530	9 706	872	1 996	1 087	1 268	529	207	230	444
	Manufacture of metal products, except machinery and equipment	0.351	15 601	2 067	3 528	1 983	3 810	1 290	247	536	174
Innovative industry	Manufacture of computer hardware, electronic and optical products	0.459	3 960	285	1 329	591	833	355	25	147	77
	Manufacture of electrical machinery, apparatus and equipment	0.402	10 481	614	2 968	1 427	3 305	1 004	74	327	144
	Manufacture of machinery and equipment	0.516	14 906	1 323	4 153	1 775	3 915	1 212	190	683	133
	Manufacture of motor vehicles, trailers and coachwork	0.536	20 763	688	2 305	2 061	10 297	5 621	141	2 707	259
	Manufacture of other transport equipment, except motor vehicles	0.449	12 563	43	7 343	1 967	663	191	230	77	212
Traditional industry	Manufacture of furniture and miscellaneous industrial products	0.365	15 281	695	4 967	2 760	3 182	702	78	317	668
Maintenance, repair and installation of machinery and equipment	Maintenance, repair and installation of machinery and equipment	0.333	11 056	2 239	2 107	1 606	1 406	475	221	244	176
Production and distribution of electricity, gas and water, for example	Electricity, gas and other utilities	0.569	5 194	1 243	755	762	652	230	144	122	103
	Water, sewerage and waste management	0.289	9 660	1 521	1 950	1 337	1 417	514	222	250	255

Group of sectors – Classification based on Alves-Passoni and Freitas (2017)	Activities—Harmonized classification between the National Classification of Economic Activities (CNAE) domicile 2.0, CNAE 2.0 and the System of National Accounts level 67	Total employment quality indicator	Employment content – exports								
			Total	China	United States	European Union	South America	Argentina	Japan	Mexico	United Kingdom
Construction	Construction	0.199	6 767	1 459	1 810	1 251	491	209	124	190	109
Commerce	Trade and repair of automobiles, motorcycles	0.285	707 960	146 256	113 384	104 981	107 992	38 469	18 861	18 061	12 496
Transportation, storage, support activities for transportation and postal services	Land transportation	0.258	241 643	57 558	35 706	36 125	33 279	11 010	5 887	5 056	3 560
	Water transportation	0.381	352	34	34	118	84	40	4	12	3
	Air transportation	0.556	4 178	519	953	1 083	471	113	100	195	103
	Warehousing, support activities for transportation and postal activities	0.408	30 083	5 348	3 967	5 877	3 740	1 036	641	524	641
Accommodation and food services	Accommodation	0.352	73 519	3 754	23 619	13 645	13 628	7 014	996	2 360	2 486
	Food services	0.167	78 938	4 730	33 117	16 299	8 184	3 091	2 036	1 544	2 060
Information and communication	Publishing and printing	0.569	7 850	461	1 747	910	2 535	392	252	368	125
	Television, radio, cinema, sound and image recording and publishing activities	0.488	9 657	1 090	2 493	1 653	1 639	430	221	191	279
	Telecommunications	0.319	6 106	858	1 301	1 021	923	347	105	156	243
	Development of information systems and other information services	0.526	17 551	1 664	5 454	3 471	1 905	578	226	398	526
Financial activities, insurance and related services	Financial intermediation, insurance and supplementary pension plans	0.711	52 242	10 182	9 822	7 347	6 729	1 996	1 108	1 121	1 828
Real estate activities	Real estate activities	0.377	3 642	452	1 407	466	414	122	58	63	54
Scientific, professional and technical activities	Legal, accounting, consulting and head office activities	0.430	224 478	40 784	33 282	28 852	23 234	7 083	4 107	3 558	4 625
	Architectural, engineering, technical analysis and R&D services,	0.485	66 714	4 364	23 503	18 319	4 156	1 323	990	681	2 491
	Other professional, scientific and technical activities	0.393	40 667	5 111	9 509	7 042	6 545	1 994	1 081	922	939
	Non-real estate rental and management of intangible non-financial assets	0.368	35 357	6 873	5 970	4 269	7 191	1 783	567	1 029	813
	Other administrative activities and complementary services	0.279	183 066	34 636	38 031	28 200	26 195	7 976	4 744	4 790	4 082
	Surveillance, security and investigation activities	0.300	10 661	2 003	1 775	1 683	1 676	578	231	270	208
Administration and social security	Public administration, defence and social security	0.685	10 806	2 318	1 764	1 650	1 632	544	247	250	195
Public and private health and education	Education	0.499	43 464	8 856	7 431	6 756	5 562	1 877	975	958	917
	Public and private health	0.454	4 522	74	2 497	755	499	53	10	17	83
Art, culture, sports and leisure	Creative, arts and entertainment activities	0.295	44 526	1 388	2 891	2 597	27 037	569	1 367	1 077	1 469
Other service activities	Associative organizations and other personal services	0.215	63 825	15 606	10 785	9 247	8 740	2 876	1 378	1 409	1 125
	Domestic services	0.066	-	-	-	-	-	-	-	-	-
Total		0.400	3 546 984	797 632	529 107	528 865	455 600	134 124	96 062	74 208	63 207

Source: Prepared by the authors, on the basis of P. Alves-Passoni and F. Freitas, “Estrutura produtiva e indicadores de encadeamento na economia brasileira entre 2010 e 2014: uma análise multisectorial baseada no modelo insumo-produto”, Second National Meeting on Industrial Economy and Innovation, *Blucher Engineering Proceedings*, vol. 4, No. 2, Rio de Janeiro, Editora Blucher, 2017; P. Alves-Passoni and F. Freitas, “Estimação de matrizes insumo-produto anuais para o Brasil no Sistema de Contas Nacionais: referência 2010”, *Texto para Discussão*, No. 25, Institute of Economics, Federal University of Rio de Janeiro (UFRJ), 2020; Continuous National Household Survey 2022; Computerized Integrated System of Foreign Trade (SISCOMEX), and Integrated System of Foreign Trade in Services, Intangibles and other Operations that Produce Variations in Equity (SISCOSERV).

Note: A beige border is used to denote the 10 activities with the highest job quality indicator.

Table A1.2
Brazil: employment quality indicator and import-related female employment content by activity, sectoral group and trading partner, 2019
(Number of employed people)

Group of sectors – Classification based on Alves-Passoni and Freitas (2017)	Activities—Harmonized classification between the National Classification of Economic Activities (CNAE) domicile 2.0, CNAE 2,0 and the System of National Accounts level 67	Total employment quality indicator	Employment content – Imports								
			Total	China	United States	European Union	South America	Argentina	Japan	Mexico	United Kingdom
Agriculture	Agriculture, livestock and related services	0.275	152 403	12 299	24 830	24 470	59 291	35 009	697	3 246	865
	Forestry, fishing and aquaculture	0.279	22 419	1 490	1 185	1 706	10 118	566	177	183	160
Industrial commodities	Mining of coal and non-metallic minerals	0.336	9 885	443	3 093	532	1 434	164	46	93	48
	Extraction of oil and gas, including supporting activities	0.734	1 867	75	626	177	250	40	10	11	14
	Mining of metallic minerals	0.440	2 026	173	154	188	1 127	42	29	28	33
Agricultural commodities	Manufacture of food products	0.296	44 744	3 399	7 618	10 461	13 464	6 946	240	635	439
Traditional industry	Manufacture of beverages	0.381	4 785	39	506	1 237	2 224	986	10	139	288
Agricultural commodities	Manufacture of tobacco products	0.344	3 459	1	38	818	1 284	24	1	449	5
Traditional industry	Manufacture of textiles	0.268	149 370	81 106	6 850	11 800	12 434	3 287	1 069	1 716	591
	Manufacture of clothing and accessories	0.269	235 660	125 609	4 941	10 606	17 717	1 861	353	1 306	428
	Preparation of leather and manufacture of leather products, travel accessories, footwear	0.328	24 251	10 704	372	2 601	630	156	27	110	60
Agricultural commodities	Manufacture of wood products	0.263	8 009	2 292	1 440	1 689	597	310	174	239	117
	Manufacture of pulp, paper and paper products	0.379	9 663	1 802	1 549	2 522	1 201	617	184	240	135
Traditional industry	Printing and reproduction of recorded media	0.499	9 152	1 195	1 988	1 567	686	358	174	191	1 195
Industrial commodities	Manufacture of coke, petroleum products and biofuels	0.538	3 404	199	1 689	492	314	110	27	32	29
Traditional industry	Manufacture of chemicals	0.560	54 021	7 716	11 202	12 061	5 239	2 760	740	1 495	874
Innovative industry	Manufacture of pharma-chemical and pharmaceutical products	0.614	26 956	2 185	3 805	12 975	493	351	316	258	791
Industrial commodities	Manufacture of rubber and plastics products	0.408	43 056	9 016	6 832	8 514	5 466	3 138	1 464	1 454	736
Traditional industry	Manufacture of non-metallic mineral products	0.337	14 540	3 466	1 741	3 760	1 630	1 005	333	615	274
Industrial commodities	Metallurgy	0.530	7 049	1 292	783	1 339	1 127	323	213	219	239
	Manufacture of metal products, except machinery and equipment	0.351	23 793	5 610	3 820	5 629	1 776	980	927	607	483
Innovative industry	Manufacture of computer hardware, electronic and optical products	0.459	51 317	21 800	4 720	4 503	160	113	1 416	1 552	338
	Manufacture of electrical machinery, apparatus and equipment	0.402	27 924	12 305	3 228	5 197	467	285	870	857	384
	Manufacture of machinery and equipment	0.516	28 164	5 811	6 343	9 259	673	475	1 307	402	689
	Manufacture of motor vehicles, trailers and coachwork	0.536	31 616	2 951	2 385	7 389	7 536	6 675	2 343	3 695	496
	Manufacture of other transport equipment, except motor vehicles	0.449	18 191	4 097	6 148	3 388	27	17	683	206	231
Traditional industry	Manufacture of furniture and miscellaneous industrial products	0.365	39 107	13 060	6 806	7 810	1 018	383	921	1 696	351
Maintenance, repair and installation of machinery and equipment	Maintenance, repair and installation of machinery and equipment	0.333	16 087	1 414	5 437	3 348	1 012	384	293	223	224
Production and distribution of electricity, gas and water, for example	Electricity, gas and other utilities	0.569	5 710	725	809	879	562	255	100	118	1 234
	Water, sewerage and waste management	0.289	9 473	1 432	1 675	1 939	1 067	450	237	245	222

Group of sectors – Classification based on Alves-Passoni and Freitas (2017)	Activities—Harmonized classification between the National Classification of Economic Activities (CNAE) domicile 2.0, CNAE 2.0 and the System of National Accounts level 67	Total employment quality indicator	Employment content – Imports								
			Total	China	United States	European Union	South America	Argentina	Japan	Mexico	United Kingdom
Construction	Construction	0.199	4 484	688	846	956	371	120	65	68	45
Commerce	Trade and repair of automobiles, motorcycles	0.285	712 898	132 774	129 223	138 930	81 631	44 367	18 089	20 896	12 349
Transportation, storage, support activities for transportation and postal services	Land transportation	0.258	216 323	33 051	40 056	43 819	25 044	12 444	4 585	5 147	4 042
	Water transportation	0.381	284	34	38	73	21	7	4	3	2
	Air transportation	0.556	4 871	870	1 238	1 184	239	72	108	76	27
	Warehousing, support activities for transportation and postal activities	0.408	17 768	2 686	3 412	3 795	2 249	1 193	366	443	298
Accommodation and food services	Accommodation	0.352	185 074	2 971	32 214	55 291	11 507	2 623	2 161	1 569	1 954
	Food services	0.167	204 572	6 681	112 625	24 646	32 040	12 949	643	10 828	553
Information and communication	Publishing and printing	0.569	14 762	2 002	4 280	3 390	552	285	145	271	862
	Television, radio, cinema, sound and image recording and publishing activities	0.488	12 397	1 183	4 446	2 142	1 035	583	243	294	188
	Telecommunications	0.319	8 110	1 040	2 033	1 791	664	380	180	204	108
	Development of information systems and other information services	0.526	32 558	2 273	15 694	6 351	1 314	689	345	379	222
Financial activities, insurance and related services	Financial intermediation, insurance and supplementary pension plans	0.711	85 649	6 888	21 733	22 109	4 993	2 364	1 302	1 449	909
Real estate activities	Real estate activities	0.377	4 714	415	2 104	725	290	133	72	70	51
Scientific, professional and technical activities	Legal, accounting, consulting and head office activities	0.430	210 947	25 693	53 679	42 774	17 995	8 213	8 817	4 188	4 807
	Architectural, engineering, technical analysis and R&D services	0.485	44 859	2 830	21 383	8 989	2 175	1 081	1 113	595	391
	Other professional, scientific and technical activities	0.393	56 306	5 818	18 914	10 174	5 146	2 907	1 202	1 392	942
	Non-real estate rental and management of intangible non-financial assets	0.368	181 978	2 068	18 274	21 161	5 102	946	4 595	467	342
	Other administrative activities and complementary services	0.279	219 265	23 919	40 961	42 377	16 374	7 638	3 814	4 866	3 280
	Surveillance, security and investigation activities	0.300	11 759	1 646	2 397	2 494	1 214	646	276	328	199
Administration and social security	Public administration, defence and social security	0.685	11 642	1 694	2 341	2 357	1 256	634	257	294	233
Public and private health and education	Education	0.499	58 417	5 045	17 789	11 659	4 228	2 017	1 202	977	830
	Public and private health	0.454	5 905	75	1 685	1 442	221	38	40	176	8
Art, culture, sports and leisure	Creative, arts and entertainment activities	0.295	62 284	1 408	26 917	14 486	1 410	889	247	298	223
Other service activities	Associative organizations and other personal services	0.215	69 861	10 362	15 103	13 499	6 343	3 082	1 577	1 631	1 270
	Domestic services	0.066	-	-	-	-	-	-	-	-	-
Total		0.400	3 515 783	607 820	711 999	635 468	374 439	174 373	66 825	79 168	46 111

Source: Prepared by the authors, on the basis of P. Alves-Passoni and F. Freitas, “Estrutura produtiva e indicadores de encadeamento na economia brasileira entre 2010 e 2014: uma análise multisectorial baseada no modelo insumo-produto”, Second National Meeting on Industrial Economy and Innovation, *Blucher Engineering Proceedings*, vol. 4, No. 2, Rio de Janeiro, Editora Blucher, 2017; P. Alves-Passoni and F. Freitas, “Estimação de matrizes insumo-produto anuais para o Brasil no Sistema de Contas Nacionais: referência 2010”, *Texto para Discussão*, No. 25, Institute of Economics, Federal University of Rio de Janeiro (UFRJ), 2020; Continuous National Household Survey 2022; Computerized Integrated System of Foreign Trade (SISCOMEX), and Integrated System of Foreign Trade in Services, Intangibles and other Operations that Produce Variations in Equity (SISCOSERV).

Note: A beige border is used to denote the 10 activities with the highest job quality indicator.

Table A1.3
Brazil: employment quality indicator and export-related male employment content by activity, sectoral group and trading partner, 2019
(Number of employed people)

Group of sectors – Classification based on Alves-Passoni and Freitas (2017)	Activities—Harmonized classification between the National Classification of Economic Activities (CNAE) domicile 2.0, CNAE 2,0 and the System of National Accounts level 67	Total employment quality indicator	Employment content – Exports								
			Total	China	United States	European Union	South America	Argentina	Japan	Mexico	United Kingdom
Agriculture	Agriculture, livestock and related services	0.275	3 704 588	1 419 819	169 928	467 350	159 717	30 797	145 918	49 688	44 265
	Forestry, fishing and aquaculture	0.279	157 942	33 990	33 488	33 160	10 564	3 148	6 379	2 470	1 986
Industrial commodities	Mining of coal and non-metallic minerals	0.336	29 073	6 236	5 463	5 845	3 465	1 129	492	699	353
	Extraction of oil and gas, including supporting activities	0.734	25 761	13 860	3 658	2 268	2 130	184	121	89	82
	Mining of metallic minerals	0.440	43 353	16 648	2 038	10 470	1 512	636	1 193	913	373
Agricultural commodities	Manufacture of food products	0.296	374 443	55 495	22 298	70 754	28 036	5 034	12 781	2 637	5 633
Traditional industry	Manufacture of beverages	0.381	10 310	289	1 092	670	7 098	246	107	53	79
Agricultural commodities	Manufacture of tobacco products	0.344	5 507	1 007	498	1 965	317	92	1	22	26
Traditional industry	Manufacture of textiles	0.268	24 474	4 797	2 625	2 444	4 723	1 599	251	592	210
	Manufacture of clothing and accessories	0.269	17 289	964	3 488	2 111	7 478	952	201	221	253
	Preparation of leather and manufacture of leather products, travel accessories, footwear	0.328	60 537	8 084	10 751	14 621	10 968	3 399	174	1 444	774
Agricultural commodities	Manufacture of wood products	0.263	131 173	9 390	51 137	22 634	9 489	1 806	3 915	8 671	4 020
	Manufacture of pulp, paper and paper products	0.379	68 178	21 526	10 222	14 059	8 512	3 093	1 377	1 006	1 313
Traditional industry	Printing and reproduction of recorded media	0.499	14 521	2 314	2 721	2 211	2 287	654	335	339	939
Industrial commodities	Manufacture of coke, petroleum products and biofuels	0.538	14 960	2 240	4 409	1 804	1 145	362	341	171	146
Traditional industry	Manufacture of chemicals	0.560	69 262	15 910	7 413	9 379	16 419	6 212	1 884	2 292	886
Innovative industry	Manufacture of pharma-chemical and pharmaceutical products	0.614	4 257	408	583	812	1 004	343	59	259	45
Industrial commodities	Manufacture of rubber and plastics products	0.408	71 562	7 248	13 715	8 511	23 037	9 661	1 094	3 431	749
Traditional industry	Manufacture of non-metallic mineral products	0.337	81 625	8 297	28 306	7 795	17 587	5 513	966	2 647	1 149
Industrial commodities	Metallurgy	0.530	125 948	11 322	25 901	14 104	16 456	6 861	2 685	2 986	5 756
	Manufacture of metal products, except machinery and equipment	0.351	128 922	17 085	29 154	16 383	31 488	10 659	2 041	4 434	1 436
Innovative industry	Manufacture of computer hardware, electronic and optical products	0.459	5 380	388	1 805	803	1 132	483	34	200	105
	Manufacture of electrical machinery, apparatus and equipment	0.402	27 977	1 639	7 922	3 809	8 821	2 680	198	874	385
	Manufacture of machinery and equipment	0.516	99 244	8 810	27 650	11 819	26 070	8 071	1 262	4 545	887
	Manufacture of motor vehicles, trailers and coachwork	0.536	92 715	3 072	10 292	9 201	45 981	25 098	631	12 088	1 155
	Manufacture of other transport equipment, except motor vehicles	0.449	79 933	275	46 719	12 518	4 216	1 213	1 463	488	1 350
Traditional industry	Manufacture of furniture and miscellaneous industrial products	0.365	55 464	2 523	18 027	10 016	11 549	2 546	282	1 149	2 423
Maintenance, repair and installation of machinery and equipment	Maintenance, repair and installation of machinery and equipment	0.333	124 505	25 211	23 734	18 092	15 836	5 354	2 484	2 749	1 988
Production and distribution of electricity, gas and water, for example	Electricity, gas and other utilities	0.569	14 525	3 476	2 111	2 131	1 822	643	402	340	288
	Water, sewerage and waste management	0.289	33 888	5 338	6 841	4 692	4 970	1 801	779	878	895

Group of sectors – Classification based on Alves-Passoni and Freitas (2017)	Activities–Harmonized classification between the National Classification of Economic Activities (CNAE) domicile 2.0, CNAE 2.0 and the System of National Accounts level 67	Total employment quality indicator	Employment content – Exports								
			Total	China	United States	European Union	South America	Argentina	Japan	Mexico	United Kingdom
Construction	Construction	0.199	171 163	36 903	45 783	31 644	12 423	5 282	3 127	4 801	2 755
Commerce	Trade and repair of automobiles, motorcycles	0.285	958 164	197 945	153 455	142 083	146 158	52 064	25 527	24 444	16 913
Transportation, storage, support activities for transportation and postal services	Land transportation	0.258	2 460 891	586 177	363 632	367 896	338 916	112 123	59 949	51 489	36 256
	Water transportation	0.381	1 866	180	182	624	447	212	20	66	16
	Air transportation	0.556	9 437	1 172	2 153	2 447	1 064	255	226	440	233
	Warehousing, support activities for transportation and postal activities	0.408	170 199	30 255	22 444	33 252	21 162	5 863	3 627	2 962	3 625
Accommodation and food services	Accommodation	0.352	60 571	3 093	19 459	11 242	11 228	5 779	820	1 945	2 048
	Food services	0.167	63 349	3 796	26 577	13 080	6 567	2 480	1 634	1 239	1 653
Information and communication	Publishing and printing	0.569	7 773	457	1 729	901	2 510	388	249	365	124
	Television, radio, cinema, sound and image recording and publishing activities	0.488	17 365	1 960	4 482	2 972	2 948	773	397	344	502
	Telecommunications	0.319	9 552	1 342	2 035	1 597	1 444	542	165	244	381
	Development of information systems and other information services	0.526	60 023	5 691	18 653	11 870	6 516	1 976	773	1 360	1 799
Financial activities, insurance and related services	Financial intermediation, insurance and supplementary pension plans	0.711	53 364	10 400	10 032	7 505	6 873	2 039	1 131	1 145	1 867
Real estate activities	Real estate activities	0.377	5 237	650	2 023	670	596	176	83	91	77
Scientific, professional and technical activities	Legal, accounting, consulting and head office activities	0.430	212 260	38 564	31 471	27 281	21 969	6 697	3 884	3 365	4 374
	Architectural, engineering, technical analysis and R&D services,	0.485	111 691	7 307	39 348	30 668	6 958	2 215	1 658	1 140	4 171
	Other professional, scientific and technical activities	0.393	46 548	5 851	10 884	8 061	7 491	2 282	1 238	1 056	1 074
	Non-real estate rental and management of intangible non-financial assets	0.368	55 264	10 742	9 331	6 673	11 240	2 787	887	1 609	1 271
	Other administrative activities and complementary services	0.279	244 968	46 348	50 890	37 735	35 053	10 673	6 349	6 410	5 462
	Surveillance, security and investigation activities	0.300	75 475	14 179	12 569	11 914	11 864	4 089	1 632	1 908	1 474
Administration and social security	Public administration, defence and social security	0.685	17 061	3 660	2 786	2 606	2 577	859	390	394	308
Public and private health and education	Education	0.499	14 378	2 929	2 458	2 235	1 840	621	323	317	303
	Public and private health	0.454	1 510	25	834	252	167	18	4	6	28
Art, culture, sports and leisure	Creative, arts and entertainment activities	0.295	73 045	2 277	4 743	4 260	44 355	934	2 243	1 767	2 410
Other service activities	Associative organizations and other personal services	0.215	41 181	10 069	6 958	5 966	5 639	1 856	889	909	726
	Domestic services	0.066	-	-	-	-	-	-	-	-	-
Total		0.400	10 639 651	2 729 631	1 418 900	1 547 866	1 191 834	363 251	307 074	218 188	169 798

Source: Prepared by the authors, on the basis of P. Alves-Passoni and F. Freitas, “Estrutura produtiva e indicadores de encadeamento na economia brasileira entre 2010 e 2014: uma análise multisetorial baseada no modelo insumo-produto”, Second National Meeting on Industrial Economy and Innovation, *Blucher Engineering Proceedings*, vol. 4, No. 2, Rio de Janeiro, Editora Blucher, 2017; P. Alves-Passoni and F. Freitas, “Estimação de matrizes insumo-produto anuais para o Brasil no Sistema de Contas Nacionais: referência 2010”, *Texto para Discussão*, No. 25, Institute of Economics, Federal University of Rio de Janeiro (UFRJ), 2020; Continuous National Household Survey 2022; Computerized Integrated System of Foreign Trade (SISCOMEX), and Integrated System of Foreign Trade in Services, Intangibles and other Operations that Produce Variations in Equity (SISCOSERV).

Note: A beige border is used to denote the 10 activities with the highest job quality indicator.

Table A1.4
Brazil: employment quality indicator and import-related male employment content by activity, sectoral group and trading partner, 2019
(Number of employed people)

Group of sectors – Classification based on Alves-Passoni and Freitas (2017)	Activities—Harmonized classification between the National Classification of Economic Activities (CNAE) domicile 2.0, CNAE 2,0 and the System of National Accounts level 67	Total employment quality indicator	Employment content – Imports								
			Total	China	United States	European Union	South America	Argentina	Japan	Mexico	United Kingdom
Agriculture	Agriculture, livestock and related services	0.275	629 909	50 835	102 629	101 140	245 060	144 701	2 880	13 417	3 575
	Forestry, fishing and aquaculture	0.279	98 957	6 575	5 229	7 528	44 663	2 500	780	810	706
Industrial commodities	Mining of coal and non-metallic minerals	0.336	90 823	4 067	28 422	4 890	13 174	1 507	424	851	438
	Extraction of oil and gas, including supporting activities	0.734	13 466	539	4 514	1 278	1 805	292	73	76	99
	Mining of metallic minerals	0.440	11 980	1 023	911	1 113	6 663	246	173	163	196
Agricultural commodities	Manufacture of food products	0.296	91 766	6 971	15 624	21 454	27 613	14 246	493	1 302	901
Traditional industry	Manufacture of beverages	0.381	26 675	215	2 821	6 897	12 401	5 496	55	778	1 606
Agricultural commodities	Manufacture of tobacco products	0.344	6 131	3	67	1 451	2 276	43	1	795	9
Traditional industry	Manufacture of textiles	0.268	77 853	42 273	3 570	6 150	6 481	1 713	557	894	308
	Manufacture of clothing and accessories	0.269	66 980	35 701	1 404	3 014	5 036	529	100	371	122
	Preparation of leather and manufacture of leather products, travel accessories, footwear	0.328	26 441	11 671	406	2 836	687	170	29	120	65
Agricultural commodities	Manufacture of wood products	0.263	30 307	8 672	5 449	6 392	2 259	1 175	658	906	444
	Manufacture of pulp, paper and paper products	0.379	21 114	3 938	3 385	5 510	2 625	1 348	403	524	295
Traditional industry	Printing and reproduction of recorded media	0.499	20 060	2 620	4 358	3 434	1 503	784	381	419	2 619
Industrial commodities	Manufacture of coke, petroleum products and biofuels	0.538	17 214	1 004	8 541	2 488	1 586	556	138	162	148
Traditional industry	Manufacture of chemicals	0.560	128 169	18 307	26 578	28 615	12 430	6 549	1 756	3 547	2 074
Innovative industry	Manufacture of pharma-chemical and pharmaceutical products	0.614	26 598	2 155	3 754	12 802	487	346	312	254	780
Industrial commodities	Manufacture of rubber and plastics products	0.408	112 687	23 597	17 880	22 283	14 305	8 212	3 832	3 805	1 928
Traditional industry	Manufacture of non-metallic mineral products	0.337	74 414	17 736	8 911	19 242	8 340	5 145	1 706	3 149	1 403
Industrial commodities	Metallurgy	0.530	91 474	16 763	10 166	17 374	14 630	4 198	2 765	2 842	3 103
	Manufacture of metal products, except machinery and equipment	0.351	196 621	46 363	31 568	46 515	14 674	8 102	7 663	5 015	3 988
Innovative industry	Manufacture of computer hardware, electronic and optical products	0.459	69 713	29 615	6 412	6 118	217	154	1 924	2 108	459
	Manufacture of electrical machinery, apparatus and equipment	0.402	74 535	32 843	8 616	13 872	1 246	760	2 321	2 287	1 025
	Manufacture of machinery and equipment	0.516	187 518	38 693	42 236	61 647	4 483	3 163	8 704	2 674	4 590
	Manufacture of motor vehicles, trailers and coachwork	0.536	141 173	13 179	10 649	32 994	33 650	29 805	10 460	16 501	2 216
	Manufacture of other transport equipment, except motor vehicles	0.449	115 742	26 067	39 116	21 557	170	106	4 347	1 313	1 471
Traditional industry	Manufacture of furniture and miscellaneous industrial products	0.365	141 941	47 403	24 704	28 347	3 695	1 389	3 343	6 155	1 274
Maintenance, repair and installation of machinery and equipment	Maintenance, repair and installation of machinery and equipment	0.333	181 171	15 927	61 230	37 709	11 401	4 327	3 298	2 511	2 520
Production and distribution of electricity, gas and water, for example	Electricity, gas and other utilities	0.569	15 969	2 027	2 262	2 458	1 571	713	279	329	3 451
	Water, sewerage and waste management	0.289	33 232	5 024	5 876	6 803	3 742	1 579	831	858	778

Group of sectors – Classification based on Alves-Passoni and Freitas (2017)	Activities—Harmonized classification between the National Classification of Economic Activities (CNAE) domicile 2.0, CNAE 2,0 and the System of National Accounts level 67	Total employment quality indicator	Employment content – Imports								
			Total	China	United States	European Union	South America	Argentina	Japan	Mexico	United Kingdom
Construction	Construction	0.199	113 433	17 414	21 409	24 179	9 396	3 043	1 638	1 720	1 151
Commerce	Trade and repair of automobiles, motorcycles	0.285	964 847	179 698	174 892	188 029	110 480	60 047	24 481	28 280	16 713
Transportation, storage, support activities for transportation and postal services	Land transportation	0.258	2 203 036	336 587	407 927	446 256	255 044	126 731	46 690	52 421	41 164
	Water transportation	0.381	1 502	183	199	389	112	37	21	17	12
	Air transportation	0.556	11 003	1 965	2 796	2 675	540	162	244	172	62
	Warehousing, support activities for transportation and postal activities	0.408	100 523	15 197	19 304	21 471	12 723	6 748	2 071	2 504	1 685
Accommodation and food services	Accommodation	0.352	152 479	2 448	26 540	45 553	9 480	2 161	1 780	1 292	1 610
	Food services	0.167	164 171	5 361	90 383	19 778	25 712	10 392	516	8 690	444
Information and communication	Publishing and printing	0.569	14 616	1 982	4 238	3 357	546	282	143	268	854
	Television, radio, cinema, sound and image recording and publishing activities	0.488	22 293	2 127	7 995	3 851	1 861	1 048	436	528	337
	Telecommunications	0.319	12 687	1 627	3 180	2 802	1 039	594	281	320	170
	Development of information systems and other information services	0.526	111 346	7 773	53 672	21 720	4 494	2 357	1 180	1 297	760
Financial activities, insurance and related services	Financial intermediation, insurance and supplementary pension plans	0.711	87 487	7 036	22 200	22 583	5 100	2 415	1 330	1 480	929
Real estate activities	Real estate activities	0.377	6 778	597	3 026	1 043	418	191	104	101	73
Scientific, professional and technical activities	Legal, accounting, consulting and head office activities	0.430	199 466	24 295	50 757	40 446	17 016	7 766	8 337	3 960	4 546
	Architectural, engineering, technical analysis and R&D services,	0.485	75 101	4 737	35 799	15 050	3 641	1 809	1 863	997	655
	Other professional, scientific and technical activities	0.393	64 448	6 659	21 649	11 645	5 890	3 327	1 375	1 594	1 078
	Non-real estate rental and management of intangible non-financial assets	0.368	284 431	3 233	28 563	33 075	7 975	1 478	7 182	730	535
	Other administrative activities and complementary services	0.279	293 407	32 007	54 812	56 707	21 910	10 221	5 103	6 512	4 389
	Surveillance, security and investigation activities	0.300	83 248	11 653	16 966	17 655	8 595	4 573	1 956	2 324	1 411
Administration and social security	Public administration, defence and social security	0.685	18 381	2 675	3 696	3 721	1 983	1 001	406	464	368
Public and private health and education	Education	0.499	19 324	1 669	5 884	3 857	1 399	667	398	323	275
	Public and private health	0.454	1 972	25	562	481	74	13	13	59	3
Art, culture, sports and leisure	Creative, arts and entertainment activities	0.295	102 177	2 310	44 157	23 764	2 314	1 458	405	490	365
Other service activities	Associative organizations and other personal services	0.215	45 075	6 686	9 745	8 709	4 093	1 988	1 017	1 052	819
	Domestic services	0.066	-	-	-	-	-	-	-	-	-
Total		0.400	7 973 866	1 187 750	1 597 641	1 552 705	1 010 708	500 365	169 658	192 530	122 998

Source: Prepared by the authors, on the basis of P. Alves-Passoni and F. Freitas, “Estrutura produtiva e indicadores de encadeamento na economia brasileira entre 2010 e 2014: uma análise multisetorial baseada no modelo insumo-produto”, Second National Meeting on Industrial Economy and Innovation, *Blucher Engineering Proceedings*, vol. 4, No. 2, Rio de Janeiro, Editora Blucher, 2017; P. Alves-Passoni and F. Freitas, “Estimação de matrizes insumo-produto anuais para o Brasil no Sistema de Contas Nacionais: referência 2010”, *Texto para Discussão*, No. 25, Institute of Economics, Federal University of Rio de Janeiro (UFRJ), 2020; Continuous National Household Survey 2022; Computerized Integrated System of Foreign Trade (SISCOMEX), and Integrated System of Foreign Trade in Services, Intangibles and other Operations that Produce Variations in Equity (SISCOSERV).

Note: A beige border is used to indicate the 10 activities with the highest job quality indicator.