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From Green Goals to Social Gaps? An assessment of Brazil's Sustainable Taxonomy from a gender perspective

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Resumo | Abstract

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This paper investigates the challenges of adopting the *sustainability approach* – which addresses environmental and social objectives together – in the design of public taxonomies as instruments of climate policy. Using the Sustainable Taxonomy of Brazil (STB) as a case study and focusing on its key socioeconomic objective – reducing gender and race inequalities – it emphasizes risks other than greenwashing and particularly related to labor market indicators and permeated by a gender (and racial) perspective. From existing taxonomies, we identify three risks of the *sustainability approach*: the winner-takes-all effect, social-washing, and structural incompatibility. Then, we conduct a two-step empirical analysis, combining a macro-overview of Brazil's productive, occupational, and emission structures with a microdata analysis of STB-eligible sectors focused on key gender (and racial) inequality indicators. Our findings reveal a core contradiction: the sectors most critical for emission reduction in Brazil (such as agriculture and livestock) feature relatively small, predominantly male-dominated, and low-paying jobs. On top of that, a discussion of the STB's Gender and Racial Equity Index (GREI) demonstrates that structural gender inequality and female underrepresentation operate independently of other inequality indicators and require specific analysis and targeted policies. We conclude that although the STB identifies both key emitting sectors and underrepresented activities from a gender (and racial) perspective, it cannot ensure that risks mentioned above are out of question. Despite recognizing the inner limitations of an instrument that supports sustainable finance, we argue that public taxonomies should consider structural features regarding both the environmental and the socioeconomic dimension.

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1. Introduction

The transition to low-carbon economies is expected to require substantial investments from both the public and private sectors (Mazzucato and Semieniuk, 2018; Gabor and Braun, 2025). It implies governance challenges that concern how institutions, regulations, and instruments establish adequate frameworks to help achieve proposed goals (Gabor, 2021). Consequently, new macro-financial regimes are expected to emerge, as the speed and nature of decarbonization depend on "monetary, fiscal and financial institutions that shape the creation and allocation of credit/money" (Gabor and Braun, 2025, p. 543).

Following the expansion of climate finance in the past decade, the relevance of green and sustainable taxonomies to support these macro-financial regimes has spread among both developed and developing countries. Originally proposed by the private sector but soon adopted by governments, taxonomies have emerged as instruments to guide the mobilization and allocation of resources under principles of environmental, social and governance (ESG) (Eccles et al., 2019). They can be defined as technical classification systems that indicate the criteria by which companies, activities, assets or projects are aligned or not with environmental or sustainable goals. The main objective of taxonomies is to provide informational guidance and improve decision-making for an ecosystem of users (investors, financial institutions, credit rating agencies, NGOs, among others), reducing the risks of greenwashing (Ehlers et al., 2021; Bortz, 2024). Taxonomies, therefore, have played a central role in "making sustainable finance mainstream" (Och, 2025, p. 367).

This paper discusses some of the potential contradictions arising from the elaboration and implementation of green and sustainable taxonomies by national governments. It particularly focuses on the latter, as it investigates the challenges of adopting the *sustainability approach* – which addresses environmental and social objectives together – under the same institutional design. Sustainable taxonomies are conceived according to the United Nations' Sustainable Development Goals (SDG) and there is little discussion on which are the advantages and disadvantages of this endorsement. One of the existing arguments is that "multiple objectives such as GHG emission reduction and social inclusion run the risk of increasing greenwashing due to reduced market transparency resulting from complex weighting schemes to aggregate the objectives" (Ehlers et al., 2021, p.18). In contrast, the OECD (2020, p. 43) indicates that, because taxonomies can be designed in different ways, they "have the potential to embrace a multiplicity of dimensions". The key question therefore is whether environmental and social objectives can be simultaneously addressed by sustainable taxonomies. This challenge applies not only to the risks of greenwashing but may also be extended to the social dimension, giving rise to potential *social-washing* practices. While literature has advanced in discussing the former, the latter remains little explored.

The discussion highlighted above is particularly relevant to developing economies, which have increasingly relied on sustainable finance to reconceive development strategies by explicitly targeting economic, social and environmental deficits (Gabor and Sylla, 2023; Porcile et al., 2023). Moreover, it is also permeated by the growing interest of ecological macroeconomics on the potential trilemma arising from the implementation of policies that pursue converging trajectories of economic growth, inequality reduction and mitigation of climate change (D'Alessandro et al., 2020; Rodrigues et al., 2025; Ravaioli et al., 2025).

Considering this, the paper proposes a case study of the Sustainable Taxonomy of Brazil (STB) to empirically assess the key issues concerning the adoption of a sustainability approach under a taxonomy. Since 2023, the Brazilian government has dedicated effort to establish a decarbonization strategy organized around the protagonism of sustainable finance (Marques, 2025; Montalvão, 2026), indicating that it chose to endorse the "hegemonic approach to climate policy" (Gabor and Braun, 2025, p. 543) that renders "green infrastructure assets 'investible' and green manufacturing assets profitable" (idem, p. 548). For countries like Brazil, this approach entails the possibility to promote the low-carbon transition under constrained fiscal space by relying on de-risking initiatives led by the state to attract national and foreign investments from the private sector. Moreover, this strategy has officially outlined the need to promote "sustainable and technological development", which implies pursuing economic growth with reduced environmental impact, higher added value, technological complexity and better-paid jobs, together with more equitable distribution (Brazil – Ministry of Finance, 2024). Not surprisingly, one of the key priorities has been the establishment of a national sustainable taxonomy, the STB.

The paper is organized in five sections in addition to this introduction. The next section briefly presents two different models of public taxonomies that turn to the sustainability approach – the EU taxonomy and the Mexican taxonomy. Following this, it theoretically elaborates around the potential risks coming from the sustainability approach when concerning social objectives: the *winner-takes-all* risk, the *social-washing* risk and the *incompatibility* risk. The third section succinctly describes the STB and explains its functioning. The focus is dedicated to STB's socioeconomic objectives, which explicitly address the reduction of socioeconomic inequalities by considering gender and racial aspects. The fourth and fifth sections employ complementary methodologies to examine whether the integration of environmental and socioeconomic criteria within the STB reflects alignment between decarbonization priorities and social objectives, using gender-based labor market indicators as proxies for the social dimension. First, we conduct an economy-wide structural mapping using the extended input-output model to analyze greenhouse gas (GHG) emissions and sectorial labor distribution by gender and race in Brazil. Second, building on this analysis, we carry out a micro-level assessment of the STB using formal occupational microdata. Principal Component Analysis (PCA) is applied to a set of gender (and racial) related labor market indicators in order to evaluate whether the eligible activities under the STB are structurally positioned to sustain an expansion of female participation. Finally, the sixth section presents the main conclusions of the paper.

2. Risks and advantages of sustainable taxonomies

This section aims to identify potential risks and advantages of considering environmental and social objectives under a single taxonomy. It is relevant to recall that it also implies challenges already existing in green or social taxonomies, which are exclusively oriented to guide climate finance toward one of these goals. As argued by the European Union (EU)'s Final Report on Social Taxonomy discussed below, environmental (green) and social taxonomies can be differentiated by at least two aspects. First, since fossil fuel-based economic production is directly related to environmental depletion, mitigating greenhouse gas (GHG) emissions is an expected shared goal of all green taxonomies. Social taxonomies, in contrast, are subjected to different socioeconomic realities, which imply a variegated set of social goals. Second, and relatedly, indicators to measure progress of green goals are likely to be more consensual than those related to social goals. This is because the latter can be more dependent on qualitative evaluations and subject to more political divergence. Considering this, the EU framework recommends that social taxonomies follow international norms and principles, include dimensions related to policies, procedures and governance, and rely on both qualitative and quantitative indicators. All these elements are relevant when considering the design of a sustainable taxonomy. As discussed in the next section, the STB explicitly commits to the sustainability approach and declares that the EU taxonomy and Mexico's Sustainable Taxonomy are among its main influences (STB – *Introdução*, fn. 7). Considering this, the analysis below discusses these two cases and identifies three potential risks related social objectives within the sustainability approach.

2.1. EU Taxonomy

In 2020, the EU began the implementation of a public taxonomy[1]. Initially designed to exclusively address environmental objectives, the EU taxonomy established whether, and to what extent, an economic activity contributes to those. It mapped key priority sectors based on their relevance to decarbonization, then identified the activities and projects that would indicate the alignment of a company to the taxonomy. An activity can be understood as a set of tasks carried out by companies to produce a good or service by employing specific inputs and processes[2]. Depending on how companies exert these activities, which are subjected to technical screening criteria, the latter can be said to be aligned or not with the EU Taxonomy. The activity is considered aligned only if it fits all the EU Taxonomy's three-level criteria[3]:

- make a substantial contribution to at least one of the predefined environmental objectives through technical criteria;
- meet the "Do No Significant Harm" (DNSH) criteria[4];
- comply with minimum safeguards[5].

[1] For a review on the impacts of the EU Taxonomy implementation, see Brabec and Macháč (2025).
[2] For a formal definition, see https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Economic_activity
[3] Alignment with these criteria is assessed at the level of specific activities and projects within a company. In other words, companies operating in specific sectors may promote particular activities and projects that fall within the taxonomy framework. If any of the three criteria are not met, the activity or project is considered "not aligned" with the taxonomy. The classification applies not to the company, but to individual activities and projects.
[4] The principle of the DNSH criteria is that an eligible activity or project must not cause significant harm to any of the taxonomy's objectives, even when it contributes positively to one or more of them.
[5] The minimum safeguards aim to guarantee social norms, including human rights and labor rights, along with governance principles. This is a binary criterion and applies at the company level: it is either in compliance or not.

In 2021, the EU taxonomy began to be rediscussed with the aim of amending a social taxonomy to the environmental one. The EU's Final Report on Social Taxonomy, released in February 2022[6], summarizes their proposal. The report suggests *two models* to integrate the sustainability approach in the EU taxonomy. In the first model, the social and green taxonomies are separated frameworks linked through minimum safeguards. The social taxonomy, for instance, would demand that companies substantially contribute to social goals and respect DHNS concerning the latter. Minimum safeguards, however, would include environmental and governance aspects. In the *second model*, all activities would be required to comply with both environmental and social DNSH criteria. Activities would then be sustainable if they make a substantial contribution to either a social or an environmental objective while meeting DNSH criteria for both. In this case, the role of minimum safeguards is complemented by a more detailed set of social DNSH requirements.

Until 2025, the EU had not yet decided on its preferred model but each of them would probably imply slightly different impacts. The *first model* would likely consider a larger set of activities under the category of either socially or environmentally adequate. In contrast, the second model would likely include less activities as sustainable, as they would have to simultaneously align with stricter social and environmental DNSH criteria. On the one hand, the first model could mobilize more investments labeled as sustainable as there would be more eligible companies and activities. On the other hand, the second model, due to more strict eligibility criteria, could reduce potential contradiction arising from overlapping social and environmental goals. In this case, there would not be, for instance, environmentally adequate activities without social commitment or *vice versa*.

2.2. Mexico's Sustainable Taxonomy

Mexico was one of the first developing countries to implement a public sustainable taxonomy (SHCP, 2023). Overall, the Mexican framework follows the standard three-level criteria employed by the EU Taxonomy. It defines a set of environmental and social objectives, establishes DNSH criteria to prevent trade-offs between objectives, and includes minimum safeguards. Designed to account for the sustainability approach, the Mexico's Sustainable Taxonomy presents an institutional framework that is similar to the EU's second model. Whether contributing to either a social or an environmental objective, the specific economic activity must meet DNHS criteria that necessarily cover both dimensions.

Mexico's Sustainable Taxonomy prioritized three objectives in its first phase: climate change mitigation and adaptation, sustainable cities, and contribution to gender equality. When considering the first and the second objectives, technical criteria considered in the taxonomy define the eligible sectors[7]. However, for the gender equality objective, there is not a delimitation of eligibility. The taxonomy considerer that this objective will only be satisfactorily addressed if considered across all sectors of the Mexican economy. The rationale is that the national economy will generally benefit from improvements in gender equality, particularly expressed by the increase in women's participation in the labor force and the reduction in the income gap between men and women (SHCP, 2023, p. 27).

Finally, Mexico's Sustainable Taxonomy offers an institutional alternative to specifically define social goals, a challenge outlined in the EU's Final Report on Social Taxonomy. It argues for the identification of agreeable quantifiable metrics, particularly, the design of an index which offers a standardized framework to account, measure and report the performance of the companies. Particularly, Mexico's Sustainable Taxonomy establishes a Gender Index to assess companies' actions to promote gender equality. The Gender Index accounts for specific information[8] obtained through a structured questionnaire answered by each company when applying for alignment. Each question is assigned a score[9] across three pillars (decent work, well-being, and social inclusion) as well as to specific axes within each pillar.

[6] The Final Report on Social Taxonomy was developed by EU´s Platform on Sustainable Finance, an advisory body composed of experts from the private and public sectors to advise the Commission on sustainable finance policies. The report is a non-binding technical document intended to inform the Commission's future work. At present, there is no expected timeline for advancing an official EU regulation in this regard. For more information, see https://finance.ec.europa.eu/sustainable-finance/overview-sustainable-finance/platform-sustainable-finance_en#introduction

[7] (i) Agriculture, animal ranching and farming, and forestry; (ii) Generation, transmission, distribution, and commercialization of electrical energy and water supply; (iii) Construction; (iv) Manufacturing industries; (v) Transportation; (vi) Waste management and remediation services.

[8] The information concerns wage gaps, the share of women in managerial positions, diversity training, (un)paid leave, the provision of care services within the company, policies against gender-based violence, among others.

[9] The questionnaire assesses gender equality across three levels. First, a company is considered to have taken the first step towards an objective when it declares formal commitments through policies. Second, it can advance when, in addition to implementing policies, is able to concretely deploy actions to meet gender equality goals. Finally, the organization reaches a level of maturity when it can measure the effectiveness of its actions and adjust them appropriately. The higher the policy commitment and implementation, the higher the score.

2.3. Identifying potential risks of the sustainability approach

Based on the frameworks proposed by the EU Taxonomy and Mexico's Sustainable Taxonomy, this subsection suggests the existence of at least three main potential risks for social objectives that stem from the adoption of the sustainability approach in taxonomies: the *winner-takes-all* risk, the *social-washing* risk and the *incompatibility* risk.

The *winner-takes-all* risk originates from the selection of eligible sectors and activities during the making of a taxonomy. While activities from eligible sectors will be subjected to potential improvement coming from the implementation of the taxonomy, all activities from non-eligible sectors are left aside, forming a "catch-all category" irrespective of their contribution to, or potential impact on, social and environmental goals (Zetzsche and Bodellini, 2024). To reduce this risk, taxonomies can adopt a transition-focused approach, which implies considering not only *ex-ante* beneficial projects, but all those that, despite not conforming to key goals, can contribute to a low-carbon and less unequal economy afterwards.

The *winner-takes-all* risk is especially interesting in the case of sustainable taxonomies, as sectors that have inherently low environmental impact or already exert clean activities with low or no potential for decarbonizing the economy will be inevitably left out (Moscon et al., 2024). Some low-carbon activities might have significant socioeconomic potential but will not be included in taxonomies if one of the key goals is to decarbonize high-emitting sectors. This could be the case of activities related to the care economy (Ilkkaracan, 2013; Onaran and Oyvat, 2023). Grown et al. (2025), for instance, suggest that "comprehensive care services – encompassing early childhood care and education (ECCE), health care, and long-term care – are themselves a climate adaptation strategy as they strengthen preparedness and response efforts to climate hazards" (Grown et al., 2025, para. 4). In the Mexican case, the *winner-takes-all* risk is addressed by establishing that all sectors can be eligible to improve social goals, in that case, gender equality. This solution, however, might present some difficulties if a social taxonomy is implemented after key sectors have been defined according to a previously implemented green taxonomy.

The *social-washing* risk can emerge from the challenge of aggregating social and environmental objectives under the same framework developed fundamentally to guide decarbonization. The key question is whether the prioritization of the green agenda might neglect or undervalue the importance of social objectives. In that case, risks can vary according to the institutional design of the sustainable taxonomy, or whether environmental and social criteria must be taken into consideration simultaneously or not. For instance, if a taxonomy allows a company to claim sustainable compliance by effectively contributing only to environmental goals, this could imply a risk of *social-washing*. The EU report indicates that this issue can be attenuated by incorporating broad social, environmental and governance considerations when elaborating DNSH principles and the minimum safeguards' structure. Also, the risk of *social-washing* can stem from the way technical criteria are employed to assess a substantial contribution to social objectives. For example, in cases where social criteria do not consider structural social issues and focus only on measurable outcomes[10]. Regarding social goals, as recognized in the EU report, there seems to exist more difficulties in forging consensus around social goals than in the case of environmental goals, which generally converge on widely accepted targets. Also, one should argue that social phenomena are more context-dependent and harder to measure than environmental depletion.

While the EU report recommends that internationally agreed norms and principles could guide a social taxonomy, the alternative suggested by the EU report of adopting the Sustainable Development Goals (SDGs) as a benchmark might also be risky. The multiplicity of goals can hinder the creation of a unified framework and generate contradictions between different objectives, as seen within the SDG agenda itself (Liverman, 2018). Another possibility is the inclusion of qualitative indicators related to policies, procedures, and governance to contrapose the challenge of accounting for social goals under quantifiable criteria. Yet these indicators often measure intent or formal compliance rather than actual impact (Bromley and Powell, 2012). Still concerning the *social-washing* risk, the Mexican case introduces the Gender Index, a solution that address the problem of quantifiable criteria by providing a standardized framework to identify, measure, and report companies' impact on promoting gender equality. Nevertheless, the caveat refers to the exclusive focus on observable labor market criteria, such as representation of women in firms and sectors and wage equalization, to account for gender-oriented social goals.

[10] For the gender equality objective, this could happen if the criteria consider only measures such as gender representativeness and wage differentials but leaves aside key sectors necessary for women to be able to participate in the labor market, such as care sectors.

The third risk concerns the potential structural *incompatibility* between social and environmental objectives. Decarbonization, when effectively on course, may generate unintended side effects that can harm social indicators. Recent research suggests, for example, the improbability of a universal "win–win" solution for decarbonization in which climate policy and sustainable finance simultaneously deliver lower emissions, sustained economic growth, and reduced inequalities (D'Alessandro et al., 2020; Rodrigues et al., 2025). The *incompatibility* risk can be partially mitigated through the existence of minimum safeguards, as well as the establishment of common DNSH criteria. However, while DNSH principles and minimum safeguards ensure that activities do not violate basic social norms, they do not guarantee that social and environmental objectives are going to be simultaneously achieved. The *incompatibility* risk radically suggests that, in practice, these goals may not be fully attainable at the same time. This risk implies, in the end, that sustainable taxonomies might not be suitable instruments for the established purposes.

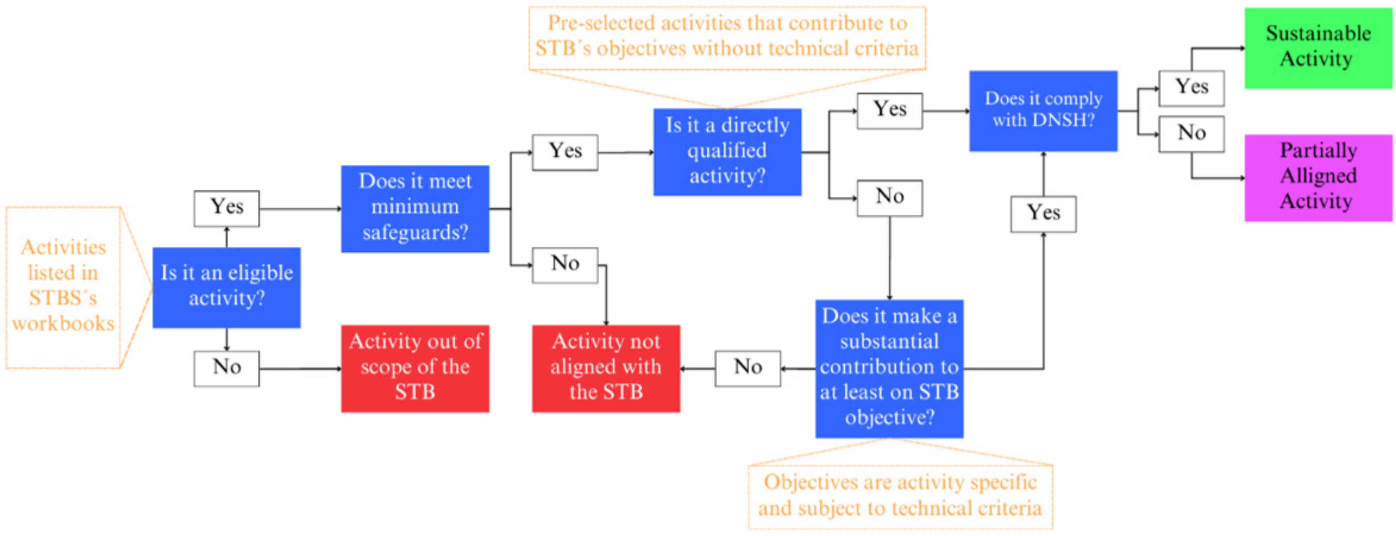
3. The Sustainable Taxonomy of Brazil: underlying risks of the sustainable approach

The STB is part of Brazil's decarbonization initiative led by the Ministry of Finance (New Brazil – Ecological Transformation Plan), which dedicates particular attention to sustainable finance. It was officially established by a presidential decree on October 31st, 2025, after an elaboration process that began in 2023. During this period, interministerial discussions led to the formation of technical working groups that came up with a draft version in 2024, presented in the occasion of the UN Conference of the Parties held in Azerbaijan (COP 29). Then, it was followed by a public consultation process that occurred until March 2025.

The STB follows some guidelines presented in the EU's Final Report on Social Taxonomy and Mexico's Sustainable Taxonomy (STB – *Metodologia*, 2025). Like those, it adopts the three-level framework, according to which eligible activities are considered sustainable if and only if they: i) contribute to one or more predefined objectives, ii) meet DNSH criteria and iii) comply with minimum safeguards. The STB lists eleven climate, environmental and socio-economic objectives, but indicates that only three of them will be addressed in the first phase of implementation. For climate/environmental objectives, it defines two priorities: climate change mitigation and adaptation. For the socioeconomic side, it prioritizes the reduction of inequalities considering race and gender aspects. Other objectives are expected to be addressed in future stages of implementation, which is likely to imply changes in the functioning of the framework.

Figure 1 resumes the process of evaluating an activity under the STB framework. Activities can either directly qualify as substantially contributing to the taxonomy's objectives or as enabling activities that support other sectors in achieving their contribution. First, each sectorial technical working group lists potentially eligible activities to receive the sustainability label. All these pre-selected activities must comply with minimum safeguards. If they are directly qualified activities, they automatically become sustainable when meeting DNSH criteria. Following the second model proposed by the EU social taxonomy report, DNSH cover both climate/environmental and socioeconomic criteria. If it does not offer evidence of meeting DNSH criteria, the activity is said to be partially aligned to the STB. The same label is also attributed to enabling activities that contribute to one or more objectives of the STB but do not offer alignment with DNSH criteria. The decision to include such cases is due to "regulatory and institutional environments which are heterogeneous in technical capacities, information asymmetry and low maturity of classification and verification systems of activities and economic or financial assets" (STB - *Metodologia*, 2025, p. 7). The STB therefore adopts a transition-focused approach, which might help mitigate the *winner-takes-all* risk by considering the impact of enabling sectors, at least concerning the environmental criteria of the STB.

Figure 1. Categorization of activities in the STB



Source: Adapted by the authors from STB – *Introdução* (2025, p. 18).

In its current state, the STB organizes eligible economic activities in nine sectors (officially called thematic workbooks): *agriculture*, *livestock*, forestry, fishing, and aquaculture (Workbook A); extractive industries (Workbook B); manufacturing industries (Workbook C); electricity and gas (Workbook D); water supply, sewage, waste management, and remediation activities (Workbook E); construction (Workbook F); transportation, storage, and postal services (Workbook H); social services for quality of life and planning. Each workbook enumerates its set of eligible activities and projects that, under predefined technical criteria, could be considered sustainable. Table 1 presents selected economic sectors and activities from Workbook C as an example of the STB's structure.

It is worth noting that different reasons justify the selection of sectors listed above. According to official documents, the working groups considered a range of criteria when selecting sectors. These include economic indicators (such as GDP, employment, capital flows), environmental indicators (GHG emissions and water use), regulatory commitments (for instance, the Nationally Determined Contribution – NDC) and the sectoral scope by other taxonomies. In the case of *agriculture* and *livestock*, for example, their significant impact on Brazil's GHG emissions (around 30% if deforestation is not included) justifies the consideration in the STB (SEEG, 2024). Other sectors are selected not necessarily for their direct outputs, but for the nature of the sectors that demand their products. This is the case of construction, which is taken into consideration not only because of the environmental impact of the construction process itself, but also due to the purpose of the construction – for example, whether it is intended for a renewable energy facility.

The STB commits to the sustainability approach by consistently referring to "climate, environmental and socioeconomic objectives" simultaneously. However, when specifying technical criteria, these objectives are treated separately. In the case of climate/environmental objectives, each thematic workbook details information about the identification, evaluation, selection and prioritization of sectors and activities. As for socioeconomic objectives, they are explored in a workbook called "Confronting Inequalities", which is dedicated to describing the functioning of a "Gender and Racial Equity Index" (GREI) inspired by Mexico's Sustainable Taxonomy Gender Index. The GREI is based on a company-level[11] questionnaire of 33 qualitative and quantitative binary indicators (with Yes-or-No response options). The total score is a weighted average of indicators with affirmative responses delineated according to five dimensions: (i) governance, (ii) relation with workers, (iii) relation with suppliers, (iv) relation with consumers, and (v) relation with the community. The index has a minimum score above which all companies are considered to substantially contribute to gender and racial equity. Take dimension (ii) as an example. Positive indicators associated with that include the presence, in the company, of equal pay practices, higher employment rates of underrepresented groups, more diversity in managerial positions, extended maternity and paternity leave, on-site childcare, working hours flexibility, and the implementation of broader diversity policies, such as training programs and inclusive research initiatives (STB – *Enfrentamento das Desigualdades*, 2025).

[11] It is important to stress that different criteria apply to publicly traded companies or those with operational revenues or employees above specific thresholds and small or medium companies (STB – *Enfrentamento das Desigualdades*, 2025). This section focuses on the first case.

Table 1. Selected economic sectors and activities from Workbook C of the STB

Thematic workbook	Economic sector	Economic activity (CNAE code)	Technical screening criteria for activities and projects	Ineligibility Criteria
Manufacturing industries (Workbook C)	Cement production	Cement production (2320-6/00)	The activity must meet either (i), (ii), (iii), or (iv): i. Comply with pre-defined threshold for direct emission intensity associated with cement production for new investments. ii. When alternative fuels are used to replace fossil fuels as the main source of thermal energy, the activity is automatically eligible (if it complies with the same standards defined in the biofuels criteria (Process C4, CNAE C). iii. The production of Portland cement with clinker substitution is automatically eligible. iv. The installation of carbon capture and storage technology is automatically eligible.	Production of refractory cement. Production of dental cement.
	Production of Organic Chemical Products	Manufacture of basic petrochemical products (2021-5/00) Manufacture of intermediates for plasticizers, resins, and fibers (2022-3/00) Manufacture of other organic chemical products not elsewhere classified (2029-1/00)	The activity must meet either (i) or (ii): i. Be based wholly or partially on renewable or circular raw materials and meet all of the following. The use of biofuels as a renewable energy source must comply with the same standards defined in the biofuels criteria (Process C4, CNAE C). Plastic waste used as raw material must consist of at least 50% renewable carbon sources. The total percentage of renewable or circular raw materials must be higher than what is currently practiced at the industrial site. ii. Be based wholly or partially on renewable energy and meet all of the following. The use of electricity from renewable sources must comply with the same standards defined under the Electricity and Gas criteria of STB (CNAE D). The use of biofuels as a renewable energy source must comply with the same standards defined in the biofuels and biogas criteria (Process C4, CNAE C). The total share of renewable energy must be greater than currently practiced at the industrial plant.	Production of ethane, propane, and butane obtained from oil extraction and refining. Production of thermoplastic and thermoset resins, plasticizers, and fibers. Production of synthetic rubber and base plastic materials. Production of essential oils. From 2040 onwards, circular raw materials composed only of fossil carbon are excluded from the taxonomy.

Source: Authors' elaboration based on the official STB documents.

The key aspect here is to map out which are the potential risks stemming from STB's sustainability approach. As explained by official documents, STB's sectors of interest were pre-selected by working groups based on several criteria. Nevertheless, there is little information on whether quantitative and qualitative information on social conditions has been considered in this process. This is the case for considering the *winner-takes-all* risk: by underestimating the interaction between socioeconomic and environmental/climate conditions in sector selection, the STB's framework might have excluded potentially relevant activities. One example is the absence of activities related to the care economy. Moreover, in the current framework of STB, the sustainability label cannot come exclusively from the socioeconomic side. This is because GREI only applies to companies acting in sectors and conducting activities that are eligible to environmental/climate objectives (STB - Workbook 9, p. 25)[12].

In contrast, some key features of STB seem to address the *social-washing* risk. First, the STB endorses the second model proposed by the EU social taxonomy report. The use of shared DNSH criteria reduces potential contradictions, as activities deemed sustainable, even if contributing only to one of the three objectives of the STB, would be refrained from worsening the conditions for all of them. This approach, however, presents some caveats. It might narrow the number of compliant activities and projects, which might limit capital inflows and investment attraction (Platform on Sustainable Finance, 2022, p. 75).

In addition, shared DNSH and minimum safeguards do not ensure that companies will effectively improve GREI punctuation. According to STB's official documents, the activities (and, therefore, companies) can be labeled as sustainable if they contribute substantially to at least one of STB's objectives. This might underestimate the importance of gender and racial inequality reduction for companies if their focus relies on the environmental objectives. However, the requirement for a minimum punctuation in GREI (30% in STB's first stage) is a way of minimizing this risk. It is relevant to stress that GREI itself – a measurable indicator that evaluates significant contributions to the socioeconomic objective – might help reducing the discretionary assessment of companies' performance.

At the same time, GREI's emphasis on labor market indicators for addressing gender and racial inequalities might be insufficient. The persisting labor market inequalities, which manifest in observable variables such as occupational segregation and wage gaps, have underlying causes that extend beyond the labor market. For instance, the socially structured gender division of labor results in differential bargaining power between women and men, with direct implications for wages (Seguino, 2005). Furthermore, the unequal gender division of unpaid care work constitutes a fundamental structural driver of these observed inequalities, yet it remains outside the scope of the GREI approach.

Considering this, a more structural question arises when analyzing the risks of the sustainability approach employed by the STB: what are the limits of GREI's framework in terms of effectively addressing gender and racial inequality in Brazil under decarbonization? This refers to the *incompatibility* risk that might stem from the complex interaction of productive structure, the resulting emission pattern of a country and social issues and conditions. Although the STB explicitly aims at pursuing a "just transition", the path toward a converging trajectory of environmental/climate and socioeconomic indicators is not necessarily straightforward. This paper states that the *incompatibility* issue represents a central concern for the design and implementation of sustainable taxonomies. Hence, in what follows, it proposes an initial assessment of this issue by employing a two-step analysis of the Brazilian case, with particular focus on the STB.

4. The two-step analysis: methods and data

Since green and sustainable taxonomies (especially those developed by governments) are recent institutional innovations, any effort to assess them will inevitably be constrained by the lack of information and data on their functioning. This can be especially critical in developing economies with relatively limited supply of national statistics. For example, despite the growing interest on Brazil's decarbonization, data and information under a socio-environmental or socio-ecological perspective is scarce. Environmental accounts of Brazilian National Accounts System, for example, are limited both in terms of themes and years considered.

[12] The inclusion of activities with low environmental impact/that already exert clean activities to the STB due to social relevance is under consideration. We thank Brazil's Ministry of Finance's undersecretary for Sustainable Economic Development, Matias Cardomingo, for this information.

The methodologies presented in this section aim to provide an analytical framework that minimizes the unavoidable issue of limited information without compromising the paper's main goal – the (ex-ante) assessment of STB's sustainability approach by focusing on the potential risks associated to socioeconomic objectives. The development of a two-step analysis – first providing a macro-level overview of Brazil's productive, occupational and emission structure, and then focusing specifically on microdata of STB's eligible sectors and activities – addresses a few limitations, most of them listed below:

i. The inexistence of official input-output tables that integrate GHG emissions.

ii. The impossibility of disaggregating input-output tables at the level of STB's activities.

iii. The lack of integration between input-output tables and specific national surveys.

iv. The distinct information accounting for Brazil's labor structure coming from National Accounts and national surveys, especially concerning race and gender disaggregation.

v. The impossibility of specifically evaluating STB's technical criteria applicability to the company level.

vi. The impossibility of making a causal evaluation of the STB, which is yet to be implemented.

Moreover, due to the emphasis on the STB's socioeconomic objective – which is particularly associated with the reduction of race and gender inequalities at the firm level (as expressed in GREI's structure) - the methods described below focus exclusively on labor market indicators as proxies. Consequently, a caveat is that conclusions will follow an approach centered on representativity in the occupational structure, which cannot account for the complexity of the socioeconomic issue implicated by the process of decarbonization and is a limitation of the STB itself. As previously discussed, the sole focus on measurable labor market indicators of the GREI approach leaves aside structural drivers of such inequalities.

4.1. The macro landscape: Brazil's productive structure, GHG emissions and jobs

The first part of the two-step analysis aims to offer a panorama of the interconnections between Brazil's production, its occupation composition and patterns of environmental impact. The goal is to provide a "business-as-usual" (BAU) overview that characterizes sectors according to the interaction of these three dimensions. We refer to it as a BAU scenario because it represents the configuration of the Brazilian economy before the implementation of the STB.

While part of the literature focuses on the relationship between a country's productive structure and its emissions (Boleti et al., 2021; Mealy and Teytelboym, 2022; Arto and Dietzembacher, 2014; Arcanjo et al., 2025), another strand seeks to incorporate the social dimension into the analysis (Porcile et al., 2023; Gramkow and Porcile, 2022; Magacho, 2023). This analysis contributes to the discussion by considering these three dimensions – a productive structure, occupational structure, and environmental impact – and incorporating gender and race. It relies on the input-output (IO) model, a methodology widely used to characterize the structure of an economy and its evolution over time. This method allows for an assessment of the inter-dependence of industries through intermediate input flows. In doing so, the model captures not only the direct effects associated with each sector's production, but also the indirect effects that propagate along supply chains (Miller and Blair, 2009).

Through its various extensions, the canonical IO framework has also been applied to analyze environmental pressures and labor market dynamics. We present an environmental extension of the canonical IO model to capture these structural relationships through the composition of IO multipliers. Although the exposition is developed using emissions, the same formulation applies directly to labor market analysis, where jobs per unit of output replace emission intensities, allowing the derivation of job multipliers within the same framework. In this approach, sectorial emissions (e) are obtained by combining emission intensities with the production requirements generated throughout the economy. The vector of sectoral GHG emission intensities ($\mathcal{E}$), defined as emissions per unit of gross output, is given by:

$$\varepsilon = e\hat{x}^{-1} \tag{1}$$

where e represents the vector of emissions (excluding land-use change) by sector and x is the diagonal vector of sectoral gross output. Total sectoral emissions associated with final demand are then calculated as:

$$e = \varepsilon \times (I - A_d)^{-1} f \tag{2}$$

where A_d represents the matrix of domestic technical coefficients and $(I - A_d)^{-1}$ is the Leontief inverse matrix and f. Within this framework, emission multipliers can be derived to measure the total amount of emissions generated throughout the economy as a result of producing the set of goods and services required to deliver one additional unit of output in each sector. These indicators reflect how the country's production structure – through the interconnections among sectors and their supply chains – amplifies or dampens the emissions associated with that output. Formally, the emission multipliers vector is calculated as the row sums of the extended Leontief matrix ($\varepsilon \times (I - A_d)^{-1}$).

For the input-output table (IOT), we use Alves-Passoni and Freitas (2023) estimation of Brazilian IOT for 2019 in current prices. The IOT employed therefore disaggregates the economy into 126 commodities and 67 sectors defined by the Brazilian System of National Accounts. Although the authors also provide an estimate of the Brazilian IOT for 2021, this version presents distortions associated to effects of COVID-19 pandemic that might bias the result.

Brazil's official IOT system does not provide environmental accounts associated with economic production. To address this limitation, the sectoral emissions vector employed is based on Costa and Costa (2023), following the methodology of Alvarenga (2024), which uses SEEG data (Brazil's System of Estimates of Greenhouse Gas Emissions) excluding land-use change. SEEG follows the IPCC methodology, classifying emissions by economic activity or process. Building on this classification, Alvarenga (2024) proposes correspondence tables to link these emissions to national accounts framework. For energy and industrial processes, specific fuel and input tables were weighted by each sector's intermediate consumption, allocating emissions from productive processes to sectors and capturing total emissions from intermediate and final goods production. Land-use change emissions were calculated for the 67 sectors using MapBiomas (2025), which provides detailed land cover and land-use change data in transition matrices showing shifts between land cover types over consecutive years.

Brazilian emissions are highly concentrated in the *agriculture* and *livestock* sectors. When land use, land-use change, and forestry (LULUCF) data are included, 77% of total emissions originate from these two sectors (15.75% from *agriculture* and 61.7% from *livestock*). Even without land-use change, they remain predominant, but other sectors also register relatively significant emissions. Given this high concentration, land-use change emissions were excluded from the analysis to better highlight the relative contribution of other sectors.

Emission multipliers are used to measure the total amount of emissions generated throughout the economy as a result of producing the set of goods and services required to deliver one additional unit of output in each sector. These indicators reflect how the country's production structure – through the interconnections among sectors and their supply chains – amplifies or dampens the emissions associated with that output. Formally, the emission multipliers vector is calculated as the row sums of the extended Leontief matrix ($\varepsilon \times (I - A_d)^{-1}$).

To complement the characterization of the Brazilian economy, we also analyze job multipliers associated with sectorial activity. The number of jobs by sector is obtained from IOT. However, it does not provide information on the demographic composition of jobs, such as gender and race. To address this limitation, we harmonize the IOT data with the 2019 Continued National Household Sample Survey (PNADC), which provides data necessary to estimate detailed information on the job composition across demographic groups. It is important to note that while the IOT reports the number of jobs by sector, allowing for multiple jobs per individual, PNADC identifies employed individuals (formal and informal). Since a single individual may hold more than one job, these measures are not strictly equivalent. In PNADC, employed individuals are defined as those who, during the reference week, performed at least one hour of remunerated economic activity or were temporarily absent from work (due to reasons such as vacation, medical leave, or strike) while maintaining active job or economic activity status. The number of employed individuals serves as a proxy for sectorial employment. PNADC data are therefore used to estimate the proportion of employed individuals by gender and race, which are then applied to the IOT job totals. We also analyze wage disparities across sectors. Sectoral average wages were calculated using the total wage bill from the IOT, divided by the number of jobs in each sector. For average wages, we used the *main earnings* of each category from the PNAD as a proxy, summing these values and dividing by the number of individuals in that group.

It is important to stress that the job structure traditionally differs across sectors, with marked disparities in distribution of jobs between man and women. This sectorial segregation reflects socially constructed gender roles that shape the types of work performed by men and women. As Kergoat (2009) explains, the sexual division of labor is a socially and historically constructed system that tends to assign men to productive roles and women to reproductive ones, with men occupying positions that are more highly valued. Within this framework, certain jobs are regarded as "male" and others as "female," and those associated with men occupying higher-valued functions.

4.2. Assessing STB's sectors and activities to account for its socioeconomic objective

The second part of the two-step analysis is specifically focused on discussing STB's socioeconomic objective by analyzing eligible sectors and activities according to available public labor market microdata. The first goal is to provide a descriptive assessment of key indicators that allow a better qualification of the workforce employed in sectors and activities contemplated by the first phase of STB's implementation. Data is retrieved from RAIS (*Relação Anual de Informações Sociais*), an administrative database containing detailed information on formal labor market relationships in Brazil, for 2024. Data refers to STB's 240 eligible activities at a 6-digit CNAE 2.0 code level[13] organized across eight thematic workbooks[14]. The final dataset comprises all active formal employees as of December 2024, totaling 54,706,385 observations[15].

This micro-analysis proceeds by quantifying six dimensions that are mentioned in GREI's punctuation framework: (i) gender and (ii) racial wage gaps, (iii) gender and (iv) racial participation in sectoral workforce and (v) gender and (vi) racial participation on managerial positions by economic activity. We add two other variables – Gini Index and the educational level – commonly employed by the literature to address the inequality debate and are indirectly correlated to the objectives included in GREI. Considering those, the second goal is to delineate their importance for STB's eligible sectors (by looking at CNAE 2.0 eligible activities). For that, the analysis resorts to the Principal Component Analysis (PCA), a dimensionality reduction technique commonly used in multivariate statistics, to explore the underlying structure of our dataset. Since examined variables are often correlated and may contain overlapping information, PCA transforms a set of possibly correlated variables into a new set of uncorrelated variables called principal components (Saccenti, 2024)[16]. By representing linear combinations of the original variables ordered by the amount of variance they explain, PCA can synthesize multiple indicators into a smaller number of dimensions, facilitating comparison across scenarios and revealing dominant trade-offs.

It is important to recall that this micro-analysis could not be performed by employing IOT because of challenges regarding sectorial disaggregation. In addition, it does not explicitly consider environmental impact measured by emissions. However, this is already addressed by the STB's list of eligible sectors and activities and the macro landscape provided by IOT analysis. Also, differently from the STB, it does not consider technical adherence due to data availability. Implicitly, we assume that the distribution of jobs characteristics is random between aligned and non-aligned companies within the same economic activity. It implies that conclusions should be interpreted with caution, being likely to apply only to a subset of the total jobs. Finally, results are focused mainly on gender aspects for two related reasons. First, racial information in RAIS is not fully reliable, as it suffers from high rates of missing or unreported values. Moreover, unlike survey data, this information in RAIS is provided by employers rather than self-reported by workers, which raises additional concerns about accuracy and consistency. Second, PCA results presented in the next section suggest that racial inequality within the STB's activities can be partially captured by other socioeconomic indicators. In contrast, gender-related patterns behave differently in the data and are less explained by the remaining variables, indicating that gender inequality follows a distinct dynamic and deserves special attention.

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[13] CNAE 2.0 (Classificação Nacional de Atividades Econômicas 2.0) is a standardized coding system used by the Brazilian government to classify economic activities. These codes are compatible with the International Standard Industrial Classification of All Economic Activities (ISIC 4.0).

[14] Note the STB has 9 workbooks (listed on Section 3). The last workbook (*Social services for quality of life and planning*) is excluded from the empirical analysis for two reasons. First, it provides a list of CNAE codes at higher aggregation levels, which are too broad to be reliably linked to technically eligible activities and their inclusion could introduce bias by capturing data unrelated to the scope of the STB. Second, this workbook lists CNAE codes across different sectors related to tourism, urbanization, and information and communication technology projects. Its significant sectoral heterogeneity does not follow the same logic as the other workbooks, making it incomparable.

[15] Informality remains a significant feature of the Brazilian labor market. It accounts for approximately 41% of total employment. The STB, however, does not directly address this issue, as it refers mainly to formally registered companies.

[16] Starting from a correlation matrix among n variables, n principal components are generated as a result of linear combinations among the variables, such that: the first component from this linear combination explains as much as possible of the total variance of all variables; the second component is independent (orthogonal) to the first and, from a second linear combination, explains as much as possible of the variance not explained by the first component; and so on, up to the nth linear combination (that is, the nth principal component), which will not be correlated with any of the previous components and will explain the remainder of the total variance not explained by the preceding components. From this algebraic manipulation, it is possible to analyze the principal components as indicators that combine information from different variables, always seeking to explain as much as possible of the variance of the population that generated the data by focusing on the x main components that explain a substantial amount of the variance, reducing the dimensions from n to x.

5. Digging into the STB's sustainability approach by a gender (and racial) perspective

Following the methods discussed above, this section begins with a panorama on the nexus between production, occupation and environmental impact coming from Brazil's IOT for 2019. The goal is to describe the "business as usual" scenario, the landscape which STB's is expected to alter by mobilizing sustainable finance. To account for that, it is relevant to recall that Brazil is known for having an emission pattern essentially associated with the rural landscape. Data available since 1990 shows that, with a few exceptions, both deforestation and *agriculture/livestock* have been the two most significant sources of the country's GHG emissions (SEEG, 2024). One reason for this prominent relative contribution is that, contrary to other countries, Brazil relies considerably less on fossil fuels to produce energy. In 2025, for instance, more than 80 per cent of electricity generated in the country came from renewable sources. In the following subsection, it is discussed how these structural characteristics are reflected in Brazil's productive system by analyzing sectoral emission patterns together with the distribution of employment across sectors, gender, and race, drawing on emission and employment multipliers derived from the input–output framework.

5.1. The macro landscape: Brazil's productive structure, emission pattern and labor distribution

An analysis of the level of sectoral emissions, excluding land-use change, reveals a highly concentrated pattern in the Brazilian economy. These sectors include the main direct emitters – particularly *livestock* (52.1%), *land transport* (14.5%), and *agriculture* (12.2%)—as well as key upstream activities such as *energy* and *basic industries*. Out of the 67 sectors considered in the Brazilian IOT, only 17 are responsible for almost all emissions in the economy (98.5%)[17].

While this concentration reflects the scale of emissions across sectors, it does not capture how emissions are generated and transmitted throughout the production structure. While sectoral emission levels reflect the scale of emissions across sectors, emission multipliers measure emissions per unit of gross output and capture how they propagate through production linkages. Figure 2 presents the sectorial emissions multipliers for 2019, expressed as emission intensities (in $MtCO_2eq$ per R$1 million of gross output). Black bars represent direct multiplier associated with emission coefficients, while red bars capture indirect multiplier derived from the Leontief inverse, reflecting the chain of emission associated with production linkages. Taken together, these multipliers represent the total emissions generated throughout the production network per unit of output, combining sectoral emission intensities with the economy's input-output structure.

These results reveal that the composition of emissions varies significantly across sectors, particularly in the balance between direct and indirect components. In some sectors, emissions are primarily associated with their own production processes, whereas in others they are more strongly linked to upstream inputs. This heterogeneity is clearly reflected in the data: sectors such as *livestock* and *waste management* are overwhelmingly dominated by direct emissions, while others, particularly in *manufacturing*, exhibit a more balanced structure or a stronger contribution from indirect emissions.

Even excluding land-use changes, *livestock* is the sector with the highest level of associated emissions, largely driven by direct production. The size of the direct impact is also relevant for *agriculture* and other key sectors for the STB, such as iron production and steelmaking, waste management, and land, water and air transport. In this sense, the results of the IO model suggest that STB's workbooks are indeed reflecting key emitting sectors. This is especially expressed by those with larger shares of direct emissions, for instance, *agriculture* and *livestock* (Workbook A), mineral extraction (Workbook B), transportation (Workbook H) and waste management (Workbook H).

At the same time, the indirect component of the emission multiplier highlights the central role of production linkages in shaping environmental impacts. Emission-intensive primary sectors, such as *agriculture* and *livestock*, continue to play a central role in shaping environmental impact. Activities such as *meat & dairy products*, *sugar manufacturing & refining, biofuel production, tobacco manufacturing* and *food products* are brought to prominence, as they rely heavily on inputs from highly emission-intensive activities. Taken together, the indirect effects are relevant enough to affect total emissions and define Brazil's productive emission pattern.

[17] These sectors, ranked by their contribution to total emissions, are: *livestock; land transport; agriculture; water, sewage and waste management; electricity, gas and other utilities; iron and steel production; non-metallic mineral products; petroleum refining; oil and gas extraction; chemical production; air transport; meat and dairy products; pulp and paper; non-ferrous metals; water transport; pesticides and other chemicals; and iron ore extraction.*

However, the sectoral distribution of jobs does not mirror the concentration observed in emissions. Figure 3 shows that the 17 sectors with the highest emissions accounted for only 19.6% of total (formal and informal) jobs in 2019. Large emitting sectors, such as *livestock, land transport and agriculture*, were responsible for, respectively, 5.5%, 4.1% and 6.1% of total jobs. These patterns are relevant, but not sufficient to establish a close correspondence between jobs and emissions. Another important difference is that *livestock* employs fewer workers than *agriculture*, while generating substantially higher emissions, indicating a higher level of emissions per job in *livestock*. A comparison with emission patterns, as captured by emission multipliers (Figure 2), reveals that sectors with the largest shares of jobs are not those with the highest emission multipliers. Instead, jobs are concentrated on service-related activities with relatively low emission intensity, such as *wholesale and retail* (17.9%), *construction* (7.3%), *domestic services* (6.5%), and *food services* (5.6%).

Figure 3 also provides information about gender and racial criteria, which is relevant to the socioeconomic objective of the STB. It shows that jobs distribution is heterogeneous when examining men and women, with even stronger disparities observed for black women. Large emitting sectors are predominantly male-dominated, while women are more concentrated in service activities with low emission intensity. Black women are predominantly concentrated in domestic services and, to a lesser extent, in wholesale and retail.

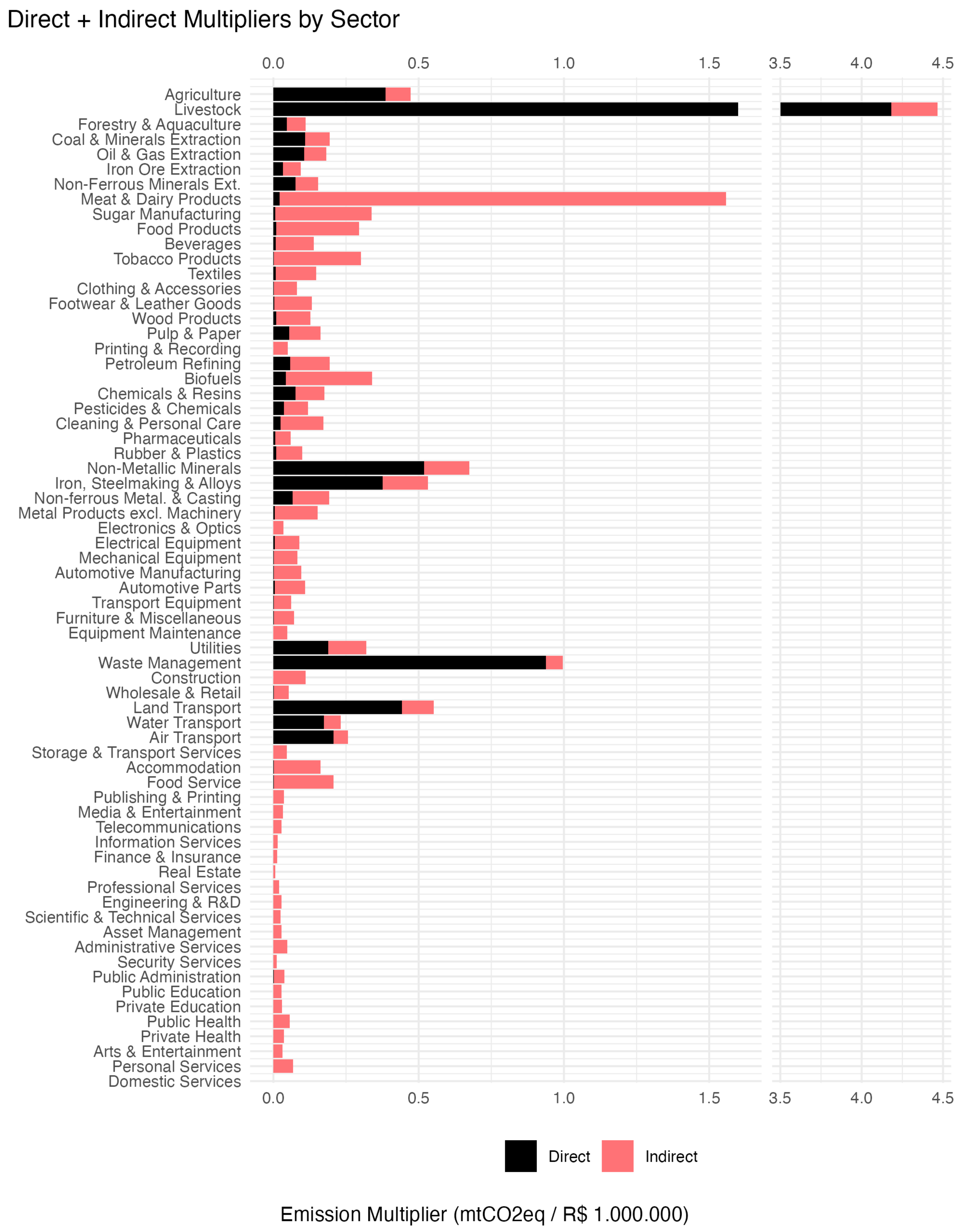
Building on the previous analysis, Figure 4 examines wage disparities across sectors and gender. The black line marked at 1 represents the economy-wide average wage. Values above this line indicate that the group earns more than the average, while values below indicate lower-than-average earnings. In this case, Black women were not included in the analysis of average wages because they are not statistically representative. It shows that, in most sectors, men earn wages above the economy-wide average wage, while women earn below it. In highly emitting sectors, such as *agriculture*, *livestock*, and *land transport*, men's average wages are higher than women's. In contrast, gender wage gaps tend to be smaller in sectors in which both groups earn wages close to the economy average. The exception are Utilities, which women's share in jobs is relatively important, and Construction, but in this case the share in jobs is very low.

Figure 5 presents a scatter plot comparing jobs multipliers and emission multipliers across sectors. Jobs multipliers reflect the total job requirements associated with each sector, including both the jobs generated directly within the sector and those sustained indirectly throughout the production chain. The vertical axis displays multipliers (both total and disaggregated by men, women, and black women), while the horizontal axis shows emission multipliers.

Figure 5 indicates that the highest job multipliers are found in low-emission sectors such as *food services* (47), *private education* (62), *arts & entertainment* (65), *personal services* (66), and *domestic services* (67), which are associated with higher job multipliers for women. However, job multipliers are also substantial in some sectors with higher emission multipliers, such as *livestock* (2) and *meat & dairy products* (8), where they tend to be higher for men. Other sectors present relatively high values for both job and emission multipliers, including *clothing & accessories* (14), *non-metallic minerals* (26), *waste management* (39), *construction* (40), and *land transport* (42). Overall, the results suggest a gendered pattern in which low-emission sectors tend to exhibit higher job multipliers for women, while more emission-intensive sectors tend to exhibit higher job multipliers for men.

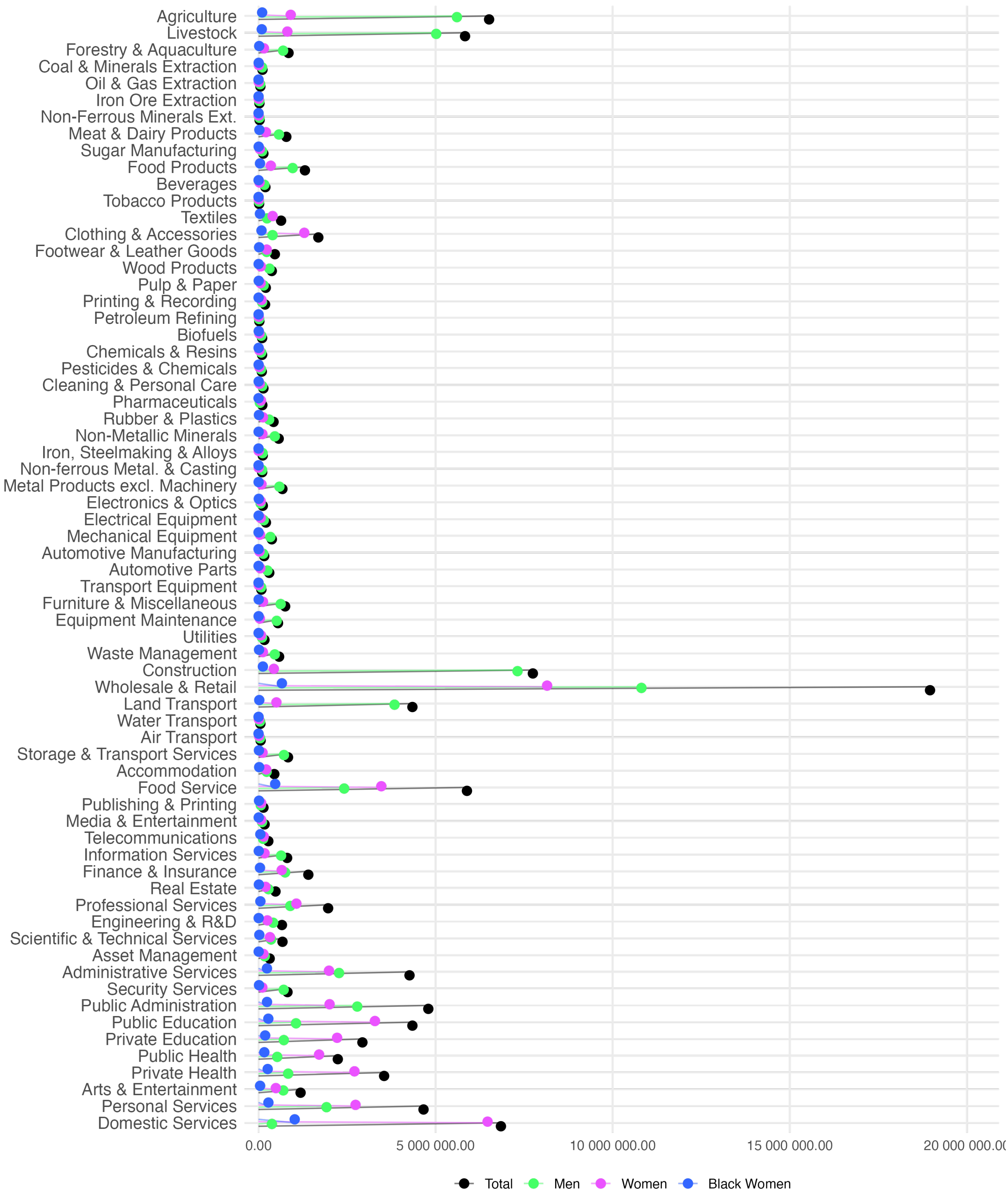
The results presented above indicate structural challenges to the sustainability approach proposed by the STB. With a few exceptions, the sectors with the highest emission multipliers do not coincide with those with the highest job multipliers. On the one hand, it suggests that prioritizing either environmental or socioeconomic objectives through a taxonomy may lead to diverging trajectories for decarbonization and inequality reduction, particularly considering the labor structure. On the other hand, precisely because these potentials *incompatibility* risk can be anticipated by policymakers, the sustainability approach might serve precisely to accommodate these divergences.

Figure 2. Brazilian emission multipliers not excluding land-use change (LUC), 2019



Source: Own elaboration based on Costa and Costa (2023), Alvarenga (2024) and Alves-Passoni e Freitas (2023).

Figure 3. Jobs by sector in Brazil, by gender and race, 2019

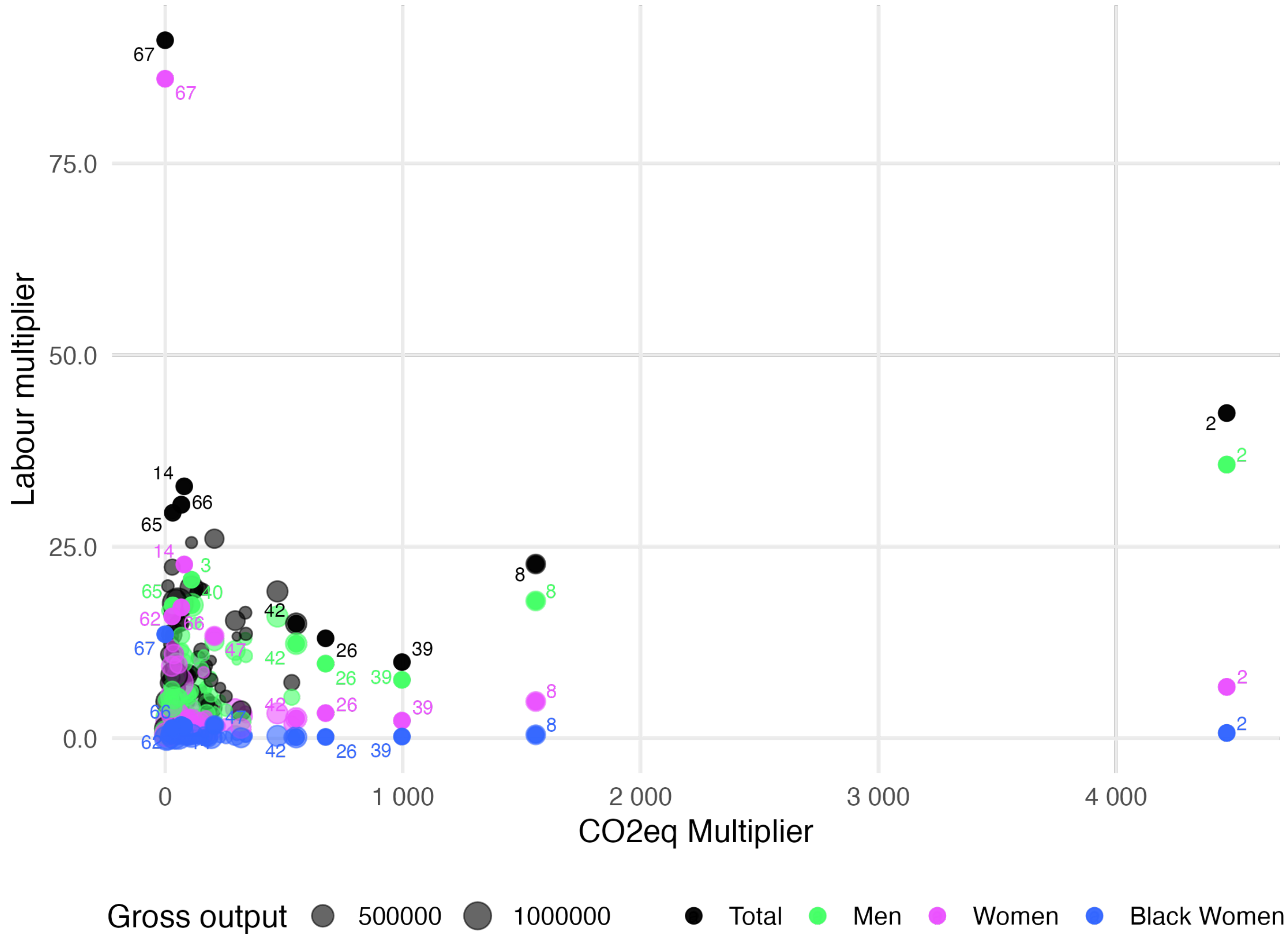


Source: Own calculation based on PNAD (IBGE, 2019) and IOT (Alves-Passoni and Freitas, 2023).

Figure 4. Relative average wages by sector and gender in Brazil, 2019 (sectoral average = 1)

Source: Own calculation based on PNAD (IBGE, 2019) and IOT (Alves-Passoni and Freitas, 2023).

Figure 5. CO_2 Coefficient and Labor Coefficient by Gender and Race, 2019



Source: Own calculation based on PNAD (IBGE, 2019) and IOT (Alves-Passoni and Freitas, 2023). Note: Only the top five sectors with the highest multipliers for jobs and CO_2eq were highlighted for each category. They are: 1 - agriculture; 2 - livestock; 3 - forestry & aquaculture; 8 - meat & dairy products; 14 - clothing & accessories; 26 - non-metallic minerals; 39 - waste management; 40 - construction; 42 - land transport; 47 - food service; 62 - private education; 65 - arts & entertainment; 66 - personal services; 67 - domestic services. Unlike figure 3, it considers both direct and indirect jobs.

5.2. STB's eligible activities and gender (racial) inequalities

The macro-overview provided the BAU conditions for the nexus between production, emissions and employment to which the STB is expected to influence. This subsection focuses specifically on eligible sectors and activities listed by the STB's workbooks. It provides a panorama of key gender (and racial) inequality indicators within these sectors and activities with the aim of identifying potential issues arising from the design of STB's socioeconomic objective. The analysis is based on GREI's central role for the latter and particularly addresses disparities among employees, one of the dimensions of GREI's punctuation structure.

5.2.1 General overview of STB's related employees: composition, remuneration and education

Table 2 presents indicators relevant for the GREI punctuation that allow for a comparison between Brazil's total formal workers and those employed in STB-related sectors. It shows that, according to RAIS 2024, STB's 240 economic activities accounted for 9,652,826 formal jobs, which represented 16.7% of all formal jobs in Brazil. The largest share (3.99 million or 6.91% of total jobs) is associated with STB's Workbook H (Transportation, storage, and postal services). Following that, activities from Workbook F (Construction) accounted for 2.4 million formal jobs (4.2%). In contrast, Workbook B (Extractive Industries) presented the lowest share of jobs (194,551 or 0.3% of total jobs).

In general, STB's eligible activities paid similar average monthly earnings to the Brazilian average, U$ 775 against U$ 783 respectively.[18] However, when comparing STB sectors, heterogeneity is a key feature. Extractive Industries (Workbook B), for instance, employed the least number of workers (0.3%), but paid highest average earnings (US$ 1578)[19]. Higher wages are also present in other industry-related sectors: Electricity and Gas (D), Manufacturing Industries (C) and Water supply, sewage, waste management, and remediation (E). In contrast, the lowest wages were paid by sectors from Workbook A (*Agriculture*, *Livestock*, Forestry, Fishing and Aquaculture) and Workbook F (Construction), the most job-intensive workbooks. It is relevant to recall that, as pointed out in the last section, Workbook A also accounts for high emission coefficients.

Higher wages are expected to be correlated with higher educational levels, but this does not necessarily hold among STB workbooks. Despite receiving similar average earnings to the Brazilian average, STB-related workers are less educated than the average of total workers (5.6 vs. 6.2). This suggests that higher levels of education yield a larger wage premium in STB-related sectors. Also, it suggests that sectorial differences might be partially explained by disparities in the educational level: Workbook A, for example, was characterized by the lowest average wage and the lowest educational level ($545 and 4.5), while Workbook B had the highest average wage and the highest educational level ($1,578 and 6.8).

The sectorial Gini Index provides a more comprehensive analysis of wage inequality. Results reaffirm observations highlighted above: although income inequality is similar between STB-related formal workers (0.41) and Brazil's total formal workers (0.44), heterogeneity is present among STB's workbooks. Particularly, it is among those with higher average earnings (Workbooks B, C, D and E) that income inequality measured by the Gini Index is the highest. First, it suggests that higher wages in STB-related activities might be concentrated on fewer workers. Second, it indicates that higher average earnings do not necessarily assure lower income inequality, a result that suggests potential challenges when considering that GREI is fundamentally informed by labor market indicators.

The Gini Index, however, does not provide enough elements to assess gender inequalities in that context. Table 2 shows, for instance, that the STB-related gender pay gap varies widely by workbook, and that men's share of STB-related workers is higher than the Brazilian average (55%) both in general (81.2%) and in each workbook (men are above 68% in all of them). Considering this, the apparent low STB-related average gender pay gap (2.9%), when compared to Brazil's (11.8%), needs to be considered carefully, as it is the result of a complex compositional effect across very heterogenous sectors. This will be explored in the next subsection.

[18] We consider an exchange rate of 5.14 BRL/USD verified on 23 February 2026. Moreover, it is relevant to stress that, in 2024, Brazil's minimum wage was equal to 1,412 reais (U$ 258) and the average total income, including all sources of income, was equal to 3057 reais (U$ 558).
[19] This is possibly attributed to the inclusion of petroleum-related sectors, mostly represented by the role played by the state-owned oil company *Petrobras*.

Table 2. Summary of Key Social Variables for the STB and Brazil

Workbook/Sectors	# formal workers	Share workforce (%)	Avg earnings US$	Gini index	Share male (%)	Share white (%)	Male managers (%)	White managers (%)	Gender pay gap (%)	Racial pay gap (%)	Avg education level
A - Agriculture, livestock, forestry, fishing, and aquaculture	791,643	1.4	545	0.29	86.1	38.8	86.2	48.0	17.9	8.4	4.5
B - Extractive industries	194,551	0.3	1,578	0.49	68.1	45.6	58.4	62.3	-0.3	39.9	6.8
C - Manufacturing industries	675,330	1.2	951	0.41	81.4	45.9	78.7	62.8	13.8	29.4	5.7
D - Electricity and gas	1,177,231	2.0	1,070	0.47	77.3	45.2	69.6	58.6	7.7	40.1	6.4
E - Water supply, sewage, waste management, and remediation	395,844	0.7	916	0.43	84.6	40.5	83.5	48.5	-11.7	37.4	5.6
F - Construction	2,422,683	4.2	595	0.33	85.4	36.8	82.4	46.7	-7.2	21.8	5.4
H - Transportation, storage, and postal services	3,995,544	6.9	751	0.39	79.1	44.7	69.7	57.5	12.8	25.6	5.7
Sustainable Taxonomy of Brazil (STB)	**9,652,826**	**16.7**	**775**	**0.41**	**81.2**	**42.2**	**74.6**	**54.7**	**2.9**	**30.2**	**5.6**
Brazil	**57,800,651**	**100.0**	**783**	**0.44**	**55.0**	**47.2**	**57.0**	**57.3**	**11.8**	**30.8**	**6.2**

Souce: Authors' own elaboration based on RAIS 2024 and Sustainable Taxonomy of Brazil workbooks.

Furthermore, gender inequalities, expressed in the labor market through job segregation and wage gaps, are the result of deeper structural relations. The disproportionate responsibility assigned to women within the family for care activities is, for example, a key determinant of labor market inequalities. It not only constrains women's integral participation in the labor market, affecting their average earnings, but it also reverberates in the occupations that are traditionally considered feminine. Gender occupational segregation, the deviation of the gender composition within occupational groups or sectors from that of the overall population (Oliveira, 2016), is a primary driver of gender wage gaps (Blau and Khan, 2017). This segregation stems from social stratification that partly arises through exclusion, which is reinforced by norms and stereotypes regarding what types of work are appropriate for men and women based on their socially assigned gender roles (Seguino and Braunstein, 2019). In the following subsections, we propose a gender-centered assessment that relies on decomposition exercises to call the attention for these complexities regarding the definition of STB's socioeconomic objective and GREI's design.

Before advance on that, however, it is important to highlight that segregation discussed above is even more pronounced when race is considered (Gonzalez, 2020). The limitation of RAIS data regarding racial characteristics has been already acknowledged and must not be underestimated. However, given the topic's relevance not only for Brazil's employment structure but also to STB's socioeconomic goal, a few considerations about racial inequalities coming from RAIS data must be carefully identified. Table 2 indicates a slightly lower share of formal white workers in STB-related activities (42.2%) when comparing with Brazil's structure (47.2%), which is also replicated for each workbook. This difference is most pronounced in Construction (Workbook F), the one with the second largest number of formal employments, which contributes to elevate black workers' participation in STB's average.

One key indicator of GREI is the company's share of black and female workers in leadership and managerial positions. In line with the stark gender participation imbalance discussed above, RAIS data shows that women were more underrepresented in managerial positions in STB workbooks (24.4% vs. 75.6% of men) than in Brazil formal labor structure (43% vs. 57% of men). Workbook A presented the highest share of male managers (86.2%), corroborating the male dominance in formal *agriculture* labor market. The lowest share of male managers is observed in Extractive Industries (Workbook B) (58.4%). Though this figure remains slightly above the national average, it reaffirms the structural divergences between Workbooks A and B when STB's socioeconomic objective is at stake.

The distribution of managerial positions in STB's workbooks highlights the challenge to overcome persistent barriers faced by black workers concerning vertical mobility limitation and segregation patterns reinforcement. While STB-related activities exhibit a relatively equitable racial composition in the overall workforce, the picture changes when focusing on managerial positions. Despite being 42.2% of all STB-related workers, white workers are overrepresented in managerial positions and account for 54.7% of all managers, an expression of the resources that have historically been distributed unevenly across racial groups, privileging white workers to ascend.

5.2.2. Assessing gender gaps among STB-related activities with respect to GREI indicators

The STB recognizes the need to reduce or avoid increases in male concentration among eligible firms as it proposes minimum safeguards or GREI's minimum punctuation. Furthermore, GREI's questionnaire requires the company to respond whether it "continually implements policies to improve pay equity, based on a systematic analysis of gender and race disparities in employee salaries, benefits, and compensation" (STB - *Enfrentamento das Desigualdades*, p. 35). This subsection furthers discuss two key gender indicators relevant for GREI: the representation of women and the wage disparities.

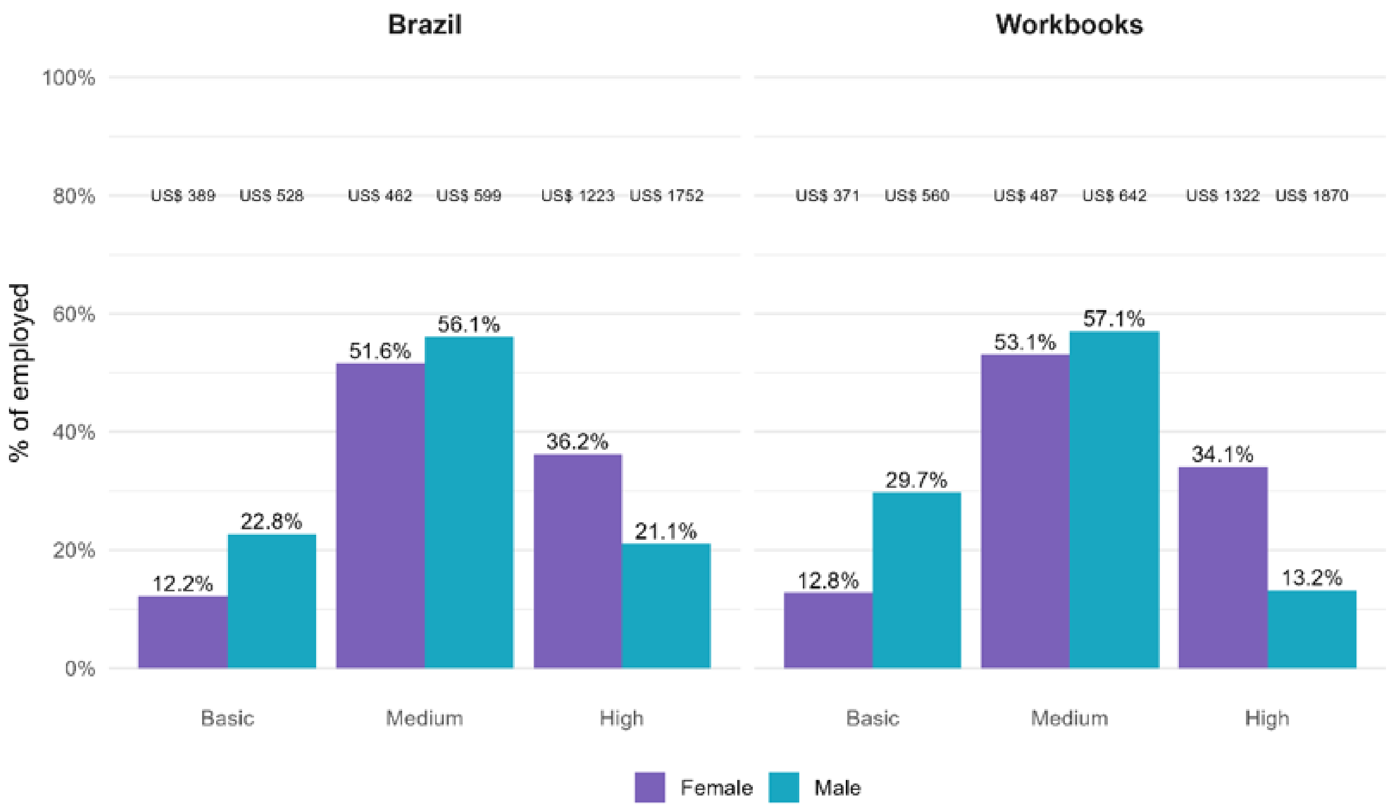
Table 2 allows us to see how STB and Brazil's labor force are different from each other with respect to the two gender indicators considered by GREI. The first sharp difference is that women are much less likely to be found within STB firms. Among all STB-related formal jobs, 81.2% was occupied by men and only 18.8% by women. This represents a significant divergence from the gender distribution of Brazil's total formal jobs (around 55% occupied by men). This feature corroborates the argument that climate finance prioritizes sectors and activities where women are underrepresented (Heckwolf and Soubeyran, 2025). The second striking difference is that the average STB female worker receives a 2.9% lower salary than the average STB male worker, while the average Brazilian female formal worker receives 11.8% less than men. From this overall scenario, we could infer that within the STB framework the gender pay gap would be an issue easier to address than the low participation of women and that those two goals would not be in conflict with each other. In this section we investigate the gender pay gap together with workbooks' gender compositions to refute that idea and discuss the potential gains and risks of taxonomy's approach.

The first step is to consider differences across workbooks, also presented in Table 2. Although the low participation of women is a common trait of all workbooks, the gender pay gap vary widely, from women being paid almost 18% less in Workbook A to around 11% more in Workbook E. The higher average wage for women is also a feature of Workbook F, Construction. This peculiarity of Construction was studied by Madalozzo (2010), who verified, using PNAD, that women presented higher average hourly wages both in 1978 and in 2007. According to her, this was due to the fact that women employed in that sector presented a higher level of education and were likely hired for very specific occupations associated with higher earnings. As for our analysis, the case of Construction (Workbook F) appears as emblematic, as it suggests that gender pay gaps are not just a reflection of direct discrimination, but the result of differences in the composition of the labor force in terms of educational level, occupation, sectors and participation of women.

One way of investigating if the gender pay gap entails a purely discriminatory element is to compare men and women of similar characteristics. In that respect, educational level is a key variable. Figure 5 presents the proportion of men and women and their average earnings by level of education for Brazil and STB workbooks. It shows that for both STB-related workers and total workers in Brazil, more women completed higher education than men. Although STB-related activities replicate the national pattern of highly-educated women, we observe a larger distance from men's educational accomplishments in the former, as in Brazil 21% of formal male workers have high education and in STB workbooks, they are only 13%.

Two aspects of Figure 5 help to understand the relatively smaller gender pay gap in STB sectors. First, women have a relative educational advantage, but this is a reflection of men's concentration on lower educational levels. This indicates that the smaller pay gap is due to men's lower wages, not women's higher. Second, at all levels of education, women still earn less20. This indicates that the small gender pay gap is not a reflection of a lack of discriminatory elements, on the contrary, there is sign of even higher discrimination in STB sectors, as the gap for each educational level is higher, despite being masked at the aggregate level.

Figure 6. Brazil and STB's Workbooks: Percentage of employed workers by level of education and corresponding average earnings in U$



Source: Prepared by the authors, Rais (2024).

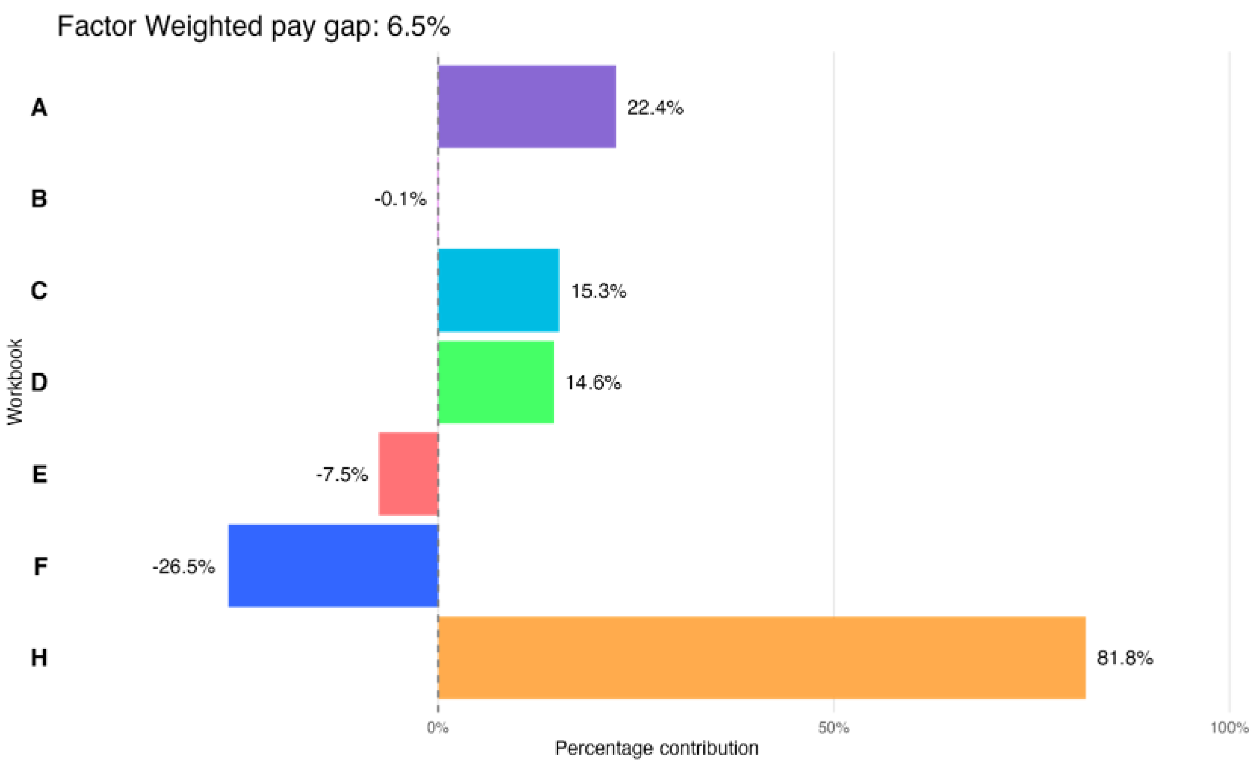
[20] At the basic education level (incomplete and complete elementary school), the pay gap reaches 34% in STB and 26% in Brazil; at the medium level (high school), 23% in STB vs. 24% in Brazil; and at the high level (graduate and post-graduate), 30% vs. 29% in Brazil, to the detriment of women.

In light of the great variation between workbooks and of the evidence of discrimination highlighted by figure 6, we perform two decomposition exercises. So far, we observed the simple gender pay gaps, also known as the raw gender pay gap (GPG) which is computed as the difference between average male and female wages, expressed as a percentage of male wages. As discussed, the raw GPG can differ substantially across groups in the population, potentially reflecting differences in the characteristics of women and men in the labor market rather than pure wage discrimination. This calls for a measure of pay differences that accounts for these compositional differences and compares the wages of similar men and women in employment. This is particularly relevant in contexts where women and men are clustered in specific sectors rather than being uniformly distributed across different job types.

A simple exercise of decomposition can be accomplished by calculating the factor-weighted GPG, following ILO (2024). First, we divide our population into subgroups, for this exercise we will look into the gender pay gap at each workbook and within each workbook within each level of education (this will give us first 7 subgroups and then 21 subgroups when we combine the two characteristics). Intuitively, the exercise can be interpreted as a calculation of a counterfactual GPG that would be observed if all subgroups had the same composition of men and women. Consequently, we would eliminate one compositional effect of the aggregate gap, and the differences would no longer be explained by women being concentrated in a better paying job (or workbook) or overrepresented at a high educational level. This decomposition not only allows us to see which would be the pay gap in this alternative scenario but also to calculate the percentage contribution of each considered group to the pay gap.

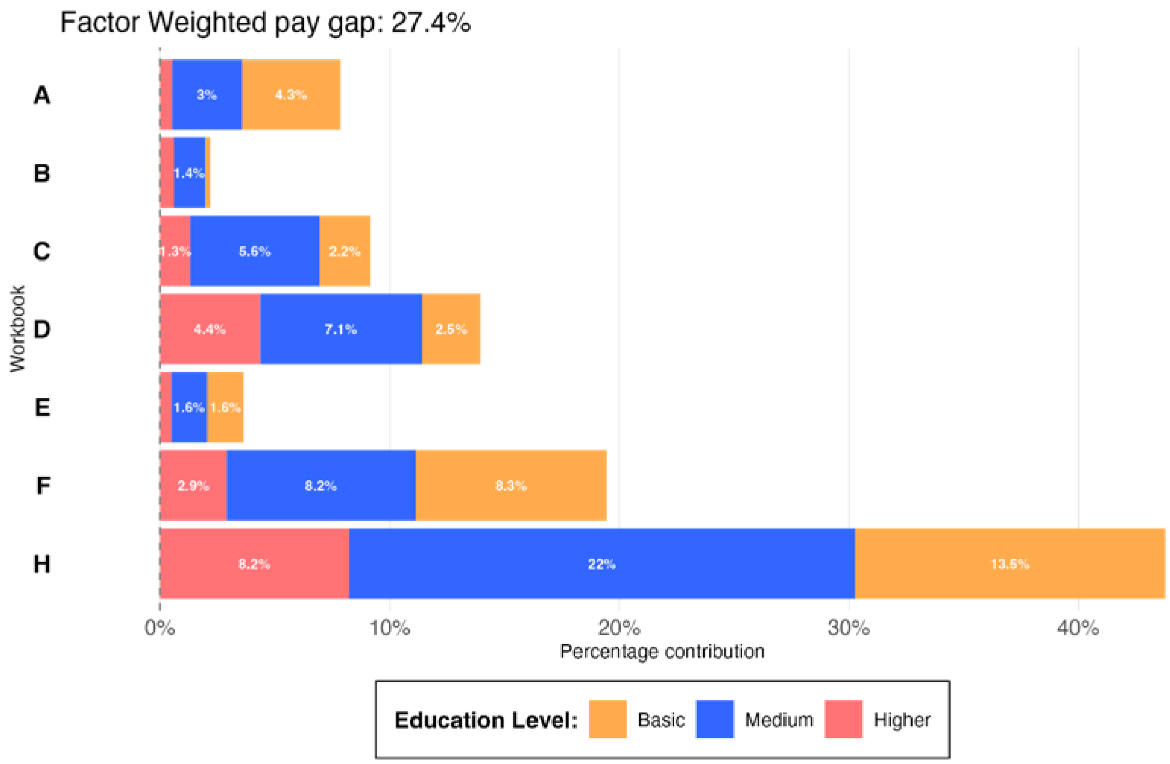
In the following, the exercise is conducted in two stages to isolate the effects of different compositional factors. In the first exercise, groups are defined solely by STB workbooks (A through H). It provides the contribution of each STB workbook to the overall GPG before accounting for educational differences within them. First, the analysis reveals that, if all STB workbooks had the same share of men and women, the GPG would actually be 6.5%, almost twice the original 2.9%. The results also extend to a large contrast between sectors. Workbook H (Transportation, Storage, and Postal Services) stands out with a dominant positive contribution of 82% to the factor-weighted GPG, underscoring the significant weight of its large number of jobs in shaping aggregate inequality. In contrast, Workbook F (Construction) exhibits a strong negative contribution of -26%, meaning that its internal wage structure, where women earn more than men in some segments, actually pulls the overall GPG downwards. Other STB workbooks show varying levels of contribution (Figure 7).

Figure 7. Workbooks contribution to the Factor Weighted Gender Pay Gap



Source: Authors' elaboration based on RAIS 2024 and STB's official documents.

Figure 8. Decomposition of the Factor Weighted Gender Pay Gap according to workbook and educational level



Source: Authors' elaboration based on RAIS 2024 and STB's official documents.

The second exercise introduces a further layer of analysis by expanding subgroups, based on both the workbook and the educational level within each workbook (three categories: basic, medium, and higher). As mentioned before, this results in 21 distinct subgroups, allowing us to compare male and female workers with more closely aligned observable characteristics. For each of these 21 subgroups, we estimate the gender wage differential separately.

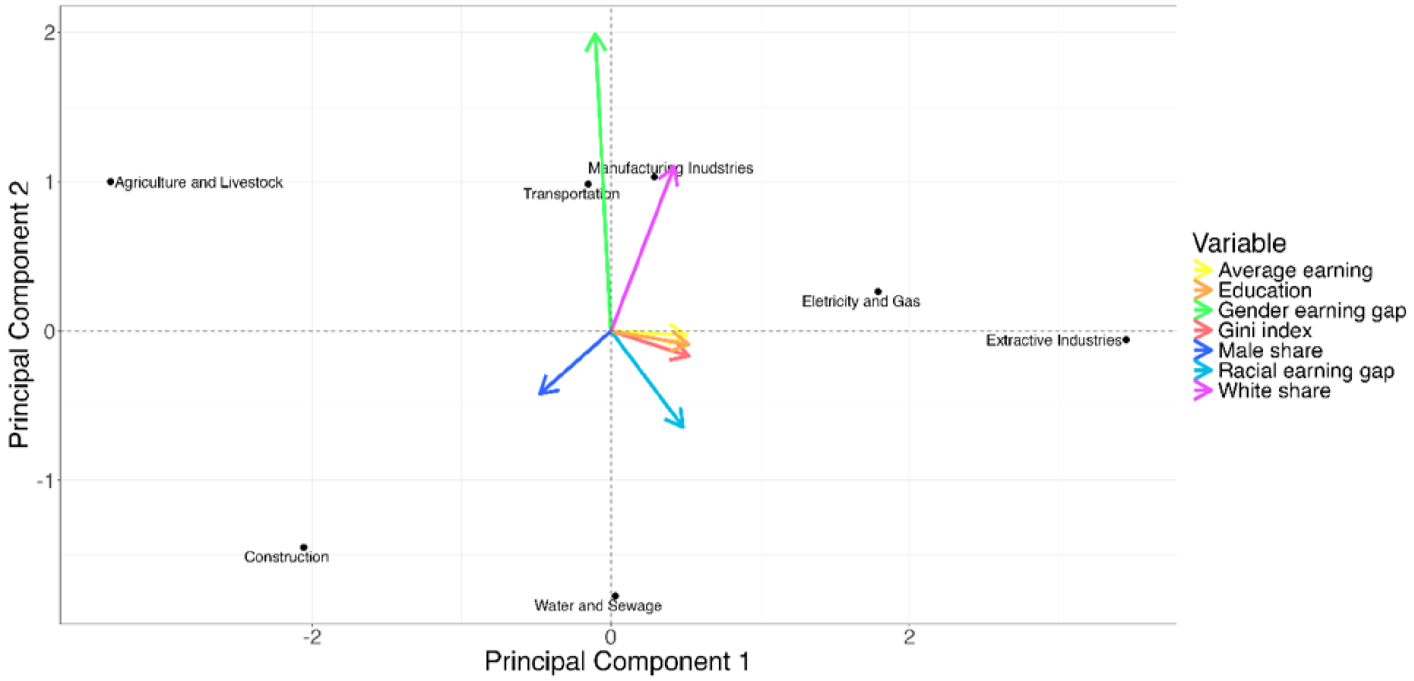
The detailed results of this second exercise are presented in Figure 8. The most striking information is that if we eliminate compositional effects, the GPG would be 27.4%, almost ten times higher than the original one. This highlights that a new panorama is presented when gender pay gap is considered within each level of education and each workgroup. Also, it informs that some workbooks contribute more than others for this gap. Workbook H is a key determinant of the gender pay gap, contributing to almost half of it with 22% coming from medium level. Notably, once we control for the disparate concentration of women in higher-skilled positions within Workbook F (Construction), its contribution becomes positive, confirming that the earlier negative contribution was driven by educational compositional effects rather than wage equality within the sector.

This exercise allowed us to show that the relatively small gender pay gap in STB workbooks is masking discriminatory aspects and it indicates that addressing the pay gap within the STB framework might not be as easy as the aggregate indicator suggested. Furthermore, it suggests that as firms implement representativeness policies and women become less sparse and less concentrated among specific positions, the raw gender pay gap might increase. It is only by addressing issues of unequal pay for men and women of equal abilities that firms within STB sectors could meaningfully contribute to achieving equal wages.

5.3.2. Principal component analysis

To analyze patterns of variation across the social indicators discussed in Table 2, we apply a Principal Component Analysis (PCA), which transforms a set of correlated variables into a new set of uncorrelated variables, known as principal components. These components are linear combinations of the original variables and are ordered by the amount of variance they capture from the data. The first principal component accounts for the largest possible share of variance, followed by subsequent independent components with decreasing explanatory power. In our context, this transformation allows us to condense the complex discussion of multiple social indicators and sectoral heterogeneity presented thus far into more generalized arguments. Specifically, it allows us to combine multiple social indicators into a smaller number of principal components, helping to interpret how these variables interact, what they reveal about Brazil's formal labor market, and what they imply for the STB implementation.

Figure 9 – Principal Component Analysis (PCA) Biplot of Socioeconomic Indicators by Sector



Source: RAIS (2024). Author's own elaboration.

PCA was performed on 7 socioeconomic indicators: average earnings, Gini index, racial and gender wage gaps, average education level, and the percentage of male and white workers21. The selected variables correspond to the same ones analyzed thus far (Table 2) and capture the key dimensions reflected in GREI's punctuation system. The quantitative results are presented in Figure 9.

The PCA results indicate that the first (PC1) and second (PC2) principal components explain, respectively, 73% and 19.9% of total data variability. Together, PC1 and PC2 explain almost all the data variability, indicating that the sectoral heterogeneity observed across the various social indicators discussed thus far can be summarized into two broader components, which are interpreted as two generalized arguments.

The first argument comes from PC1, which is strongly and positively correlated with average earnings, the Gini index, racial wage gap, and educational levels, while being negatively correlated with the share of male workers. This is interpreted as a paradox of development axis. Sectors with higher average earnings and educational levels are also characterized by the highest levels of income inequality measured by the Gini index and the most pronounced racial wage gaps. In other words, PC1 differentiates high-wage/high-education/unequal activities in Extractive Industries, Electricity and Gas, and Manufacturing Industries from low-wage/low-education/more equal ones in *Agriculture* and *Livestock*, and Construction. Furthermore, the negative loading for the share of male workers suggests that these high-income, high-inequality sectors have a higher relative concentration of female workers compared to low-status sectors.

On the other hand, PC2 is heavily influenced by the gender pay gap. Because PC2 is orthogonal to PC1, it suggests that gender pay gaps in STB's sectors and activities do not necessarily follow the same logic as income, education or racial inequalities. Therefore, the second argument isolates gender-based inequality, indicating that it is a distinct structural issue in the Brazilian formal labor market. The independence of the gender wage gap (main contributor to PC2) from the PC1 suggests that policies aimed at reducing gender inequality must be specifically targeted, as they will not naturally improve simply by increasing the average educational or income level of a sector, nor its distribution.

For the STB, this implies that gender inequality requires targeted policy interventions, rather than being addressed indirectly through general social or economic upgrading. Although this concern is partially incorporated through the development of GREI, which focus on gender and racial inequalities, the large emitting sectors prioritized within the STB framework are predominantly male dominated, meaning that progress within these sectors may

[21] We do not include the share of male and white managers due to their high correlation, and therefore redundancy, with the share of male and white managers.

have limited spillover effects on gender inequality in the broader economy. In this context, *the winner-takes-all risk* and the *social-washing* risk interact. By prioritizing environmentally strategic sectors that have a relatively small impact on overall gender disparities, the green agenda could inadvertently sideline the scale of structural social challenges even though some located improvement is observed.

6. Conclusion

This paper addressed the relevance of sustainable taxonomies for low-carbon transitions by discussing the challenges of pursuing environmental and social objectives simultaneously. It explored the contradictions of the 'sustainability approach' by, first, emphasizing risks other than greenwashing and particularly related to the social sphere, and second, analyzing them under a gender (and racial) perspective. The reason to follow this path was to expand the debate on sustainable taxonomies beyond the green agenda and discuss policy effectiveness constraints related to socioeconomic variables. We selected the Sustainable Taxonomy of Brazil as a case study as, among other reasons, it explicitly focuses on gender (and racial) inequalities when delimiting socioeconomic objectives.

By considering the concrete policy experiences of public taxonomies in Mexico and in the EU, the paper identified at least three potential risks for socioeconomic objectives of taxonomies when designed under the sustainability approach: the *winner-takes-all* risk, which entails that the selection of a taxonomy's eligible sectors might leave aside a group of sectors and activities that could be relevant to pursue its social objectives; the *social-washing* risk, where the prioritization of environmental objectives might understate the importance of social objectives; and, finally, the *incompatibility* risk, according to which the possibility of converging environmental and social goals is potentially undermined by the particularities of socio-economic and environmental patterns. Our discussion suggests that the sustainability approach might end up overstating the importance of socioeconomic objectives, which can either be neglected or find themselves in conflict with environmental targets.

Guided by these reflections, our comprehensive assessment of Brazil's Sustainable Taxonomy' (STB) addressed STB's guidelines that require companies to adopt practices and procedures that reduce gender and racial disparities regarding labor force composition and earnings. Since the STB is in the implementation phase, ex-post evaluations would require data that is not yet available. To tackle that methodological limitation, this paper built on a descriptive analysis of the STB workbooks and relied on a two-step methodology to empirically guide the discussion of risks associated with the sustainability approach. By employing a macro-level overview of Brazil's productive, occupational and emission structure, and then focusing specifically on microdata of STB's eligible sectors and activities, we identify two features that help elaborating on the STB's exposition to the risks underscored above.

First, there is a core contradiction coming from Brazil's structural patterns of production, employment and environmental impact that represent a challenge for the sustainability approach adopted by the STB. The sectors that are most critical for successfully promoting decarbonization in Brazil employ a relatively small share of the labor force and are characterized by predominantly male-dominated low-paying jobs. Results from the macro-overview indicate that the STB recognizes the possibility of addressing together the high emission intensity and the gender disparities that characterize these sectors. However, by defining eligible activities within them, the STB is potentially subjected to the *winner-takes-all* risk, as deliberately does not refer to low-emitting labor-intensive sectors, such as care economy related sectors. It should be noted that, in these sectors, gender disparities in terms of representativeness also present better indicators.

The consideration above allows us to advance for the *social-washing* risk. By proposing GREI, the STB identifies metrics and delineates pathways by which companies would be constrained to improve gender and racial equality. Although GREI's design reflects the need to reduce male/white concentration and earning advantages among STB workbooks' sectors, the STB's scheme is flexible enough to allow the risk of *social-washing*. For example, since activities are required to make a substantial contribution to at least one of the STB's objectives, if the company contributes to the environmental one, it will not have the incentive to recognize the importance of the socioeconomic objective beyond minimum safeguards and GREI's minimum threshold. These incentives can still be reframed, and our paper indicates that this should be considered by policymakers.

Finally, the micro-analysis of the labor force occupied in STB-related activities provides relevant evidence to discuss the *incompatibility* risk, at least concerning potential contradictions that characterize labor force distribution and remuneration by race and gender. Results indicate that women's participation is lower among STB-related activities and that they do not receive, in any of the workbooks, a salary premium associated with higher education. Moreover, one of the decomposition exercises indicates that the apparent small gender pay gap among STB-related activities masks discriminatory aspects that can be better delineated by analyzing sectorial contributions together with educational levels of the labor force. In addition, the PCA reinforces this perception by suggesting that gender inequality is a distinct structural issue in the Brazilian formal labor market, behaving independently from other inequality indicators when analyzed among STB workbooks. The results above imply that gender inequality solutions will not directly stem from improvements in average education, income levels or earnings distribution.

Although we recognize the limits of the STB as an institutional framework to support climate finance mobilization, our results stress that the sustainability approach should not be overestimated. The promise of simultaneously addressing economic, social and environmental objectives is discursively relevant, but entails significant challenges that come from structural features of productive sectors, labor force composition, emission pattern and gender/racial discrimination. Even if sustainable taxonomies cannot directly incorporate mechanisms to deal with the contradictions brought by the sustainability approach, policymakers should recognize that the social sphere is the fragile side of that promise, especially with the current global race on decarbonization. Our paper calls the attention for these contradictions in the Brazilian case, indicating potential weaknesses, in terms of social impact, of the institutional framework that is being established to help the transition to a low-carbon economy.

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