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# ABSTRACT

# Is Labour Market Discrimination against Ethnic Minorities Better Explained by Taste or Statistics? A Systematic Review of the Empirical Evidence*

Scholars have gone to great lengths to chart the incidence of ethnic labour market discrimination. To effectively mitigate this discrimination, however, we need to understand its underlying mechanisms because different mechanisms lead to different counteracting measures. To this end, we reviewed the recent literature that confronts the seminal theories of taste-based and statistical discrimination against the empirical reality. First, we observed that the measurement operationalisation of the mechanisms varied greatly between studies, necessitating the development of a measurement standard. Second, we found that 20 out of 30 studies examining taste-based discrimination and 18 out of 34 studies assessing statistical discrimination produced supportive evidence for said mechanisms. However, (field) experimental research, which predominantly focuses on hiring outcomes, yielded more evidence in favour of taste-based vis-à-vis statistical discrimination, suggesting that the taste-based mechanism might better explain ethnic discrimination in hiring.

**JEL Classification:** J71, J15, J23

**Keywords:** taste-based discrimination, statistical discrimination, ethnicity, race, labour market, systematic review

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# 1. Introduction

Labour market discrimination on the grounds of ethnicity per definition implies the disadvantageous, differential treatment of minority group members on the basis of their ethnic characteristics (Blank, Dabady, & Citro, 2004; Gaddis, 2018). Both (prospective) employees and employers face the negative consequences of this discrimination. On the one hand, minority employees (i) repeatedly experience unfavourable treatment when applying for a job (Baert, 2018; Zschirnt & Ruedin, 2016), which is persistent across many European and North American countries (Baert, 2018; Quillian et al., 2019); (ii) are generally remunerated worse than their majority counterparts (e.g. Altonji & Pierret, 2001; Barr & Oduro, 2002; Charles & Guryan, 2008; Epstein, Gafni, & Siniver, 2016); (iii) are less satisfied with their job, less committed to the organisation they work for and more inclined to quit (Triana, Jayasinghe, & Pieper, 2015); and (iv) are more likely to experience mental and physical health issues (Paradies et al., 2015; Pascoe & Smart Richman, 2009). On the other hand, employers who engage in discriminatory hiring practices are, according to a recent study, more likely to go out of business in the medium term (Pager, 2016). Our review narrows in on the topic of ethnic labour market discrimination by examining the empirical evidence of its theoretical mechanisms.

Historically, economists have described and explained labour market discrimination by two leading mechanisms: taste-based discrimination and statistical discrimination (Guryan & Charles, 2013).[1] Taste-based discrimination is based on the notion of (racial) prejudice by which personal preferences lead to discrimination against minority employees (Becker, 1957, 1971; Borjas, 2020). This discrimination mechanism adopts three distinct yet closely related forms (Becker, 1971). First, employer discrimination involves an employer experiencing distaste from employing a minority employee, as the perceived cost associated with hiring this employee exceeds the perceived cost of hiring an equally productive employee from the majority group. Second, employee discrimination includes employees experiencing distaste (e.g. the perception of lower wages) from working alongside minority colleagues. Third, customer discrimination entails customers experiencing distaste (e.g. the

[1] For a more detailed overview of the theoretical constructs underpinning these mechanisms we refer to Lang and Lehmann (2012) and Neumark (2018).

perception of higher prices for goods and services) from interacting with minority employees. Employee and customer discrimination might, in turn, result in employers discriminating against ethnic minorities despite the fact that they themselves do not have any aversion to employing these minorities (e.g. Bodvarsson & Partridge, 2001; Combes, Decreuse, Laouénan, & Trannoy, 2016; Laouénan, 2017). Alternatively, statistical discrimination is based on the notion of statistical inference by which an employer uses information about productivity-related group characteristics to predict the productivity of an individual in the absence of perfect information about the true productivity of that individual (Aigner & Cain, 1977; Arrow, 1973; Borjas, 2020; Phelps, 1972). This absence arises because only limited information about the individual's productivity is known or because the known information is imprecise (Altonji & Blank, 1999). For example, employers may attribute group-level information on language competency, educational attainment or personality to a minority candidate, putting them at a disadvantage in terms of remuneration or hiring chances (e.g. Carlsson, 2010; Kaas & Manger, 2012; Schaeffer, Hoehne, & Teney, 2015).

While the debate on whether the taste-based or the statistical mechanism better explains discrimination has returned to its roots, it is still ambiguous as to which theory prevails (Guryan & Charles, 2013).[2] On the one hand, the taste-based mechanism focuses more on an irrational, subjective animosity expressed by employers, colleagues or customers towards ethnic minorities (Becker, 1971). This animosity is so strong that individuals are willing to pay a certain price to avoid interaction with members of the minority out-group (Becker, 1971). However, in formulating this theory, Becker (1971) did

[2] We are aware that there are alternative approaches to explaining labour market discrimination, notably outside the field of economics (Guryan & Charles, 2013; Neumark, 2018). Some of the insights from psychological and sociological research have already been incorporated into economic research (Guryan & Charles, 2013). Bertrand, Chugh, and Mullainathan (2005), for example, put forward 'implicit discrimination' as an alternative explanation for the findings of their preceding, seminal work (Betrand & Mullainathan, 2004). While there is an ongoing debate regarding the psychometric qualities of the implicit association test (IAT), the measure on which most implicit discrimination research relies, academics have continued their efforts to examine the relationship between IAT outcomes and discriminatory conduct (Blommaert, van Tubergen, & Coenders, 2012; Derous, Ryan, & Nguyen, 2012; Greenwald, Banaji, & Nosek, 2015; Greenwald, Poehlman, Uhlmann, & Banaji, 2009; Oswald et al., 2013; Rooth, 2010). Nevertheless, our review focuses on taste-based and statistical discrimination, the two mechanisms of labour market discrimination that are most firmly rooted in economic theory (Guryan & Charles, 2013; Neumark, 2018).

not state what exactly causes individuals to experience this distaste, but rather explained the consequences of discrimination given a set of assumptions (Borjas, 2020). In this respect, both sociologists and psychologists have made substantial efforts to outline the possible theoretical motives for ethnic hiring discrimination (Derous & Ryan, 2019).[3] On the other hand, the statistical mechanism focuses more on the rational, objective reaction of employers to information asymmetry (Arrow, 1973, 1998; Phelps, 1972). The resulting uncertainty about the productivity of the prospective employee incites the employer to make an estimation based on (stereotypical) group features (Aigner & Cain, 1977; Altonji & Blank, 1999; Arrow, 1998). In contrast to stereotypes as defined by the stereotype content model (Fiske, Cuddy, Glick, & Xu, 2002), the theory of statistical discrimination presumes that the attribution of group characteristics is based on data that is on average correct—that is, until novel information is presented that eventually updates previous beliefs (Altonji & Blank, 1999; Borjas, 2020). Moreover, the reaction is profit-maximizing as the employer either (i) pursues cost-efficient ways of gaining information about the prospective employee by consulting readily available group-level information and, in doing so, avoiding additional assessment costs and/or (ii) attempts to mitigate the risk of making a wrong decision that could result in, for example, unwanted training costs or lost revenue due to sub-par employee productivity (Aigner & Cain, 1977; Arrow, 1973; Phelps, 1972).

Following the seminal works of Becker (1957) and Arrow (1973), researchers have shown great interest in measuring the incidence of labour market discrimination (Gaddis, 2018). Only since the early 2000s, however, have scholars redirected their focus from measuring differences in labour market outcomes for minorities towards uncovering the motivation behind discriminatory practices and hence revealing the underlying mechanisms of discrimination (Gaddis, 2018; Guryan & Charles, 2013). Several recent studies have charted the literature on the prevalence of (ethnic) labour market discrimination and subjected it to thorough review (see Baert, 2018; Bartkoski, Lynch, Witt, & Rudolph, 2018; Bertrand & Duflo, 2016; Heath & Di Stasio, 2019; Lane, 2016; Lang & Lehmann, 2012; Neumark, 2018; Quillian, Pager, Hexel, & Midtbøen, 2017; Quillian et al., 2019; Rich, 2014; Zschirnt & Ruedin, 2016). Collectively, these reviews surveyed the (field) experimental

[3] For a concise overview of the socio-economic and psychological theories of ethnic hiring discrimination we refer to Table 1 in Derous and Ryan (2019).

evidence and the methods by which labour market discrimination has been measured. Some of these studies, in minor order, also elaborated on the empirical relevance of the economic mechanisms of discrimination. Rich (2014), for example, concluded that the field experimental evidence from the product market literature proved to be consistent with statistical discrimination, yet was inconclusive with regard to findings from the labour market. Moreover, Zschirnt and Ruedin (2016) applied meta-analytical methods to data from previous field experiments on ethnic discrimination in hiring and found diverging evidence regarding the mechanisms—a finding that is also shared by Lane (2016) in his meta-analysis of laboratory studies on discrimination. However, to date, no study has provided us with a systematically composed overview of research that focuses on the quantitative, empirical evidence related to the leading economic mechanisms of ethnic labour market discrimination.

Moreover, to effectively combat discriminatory conduct, we need to understand which theoretical mechanism explains discrimination best because different mechanisms lead to different counteracting measures (Neumark, 2018). An evident measure to counter taste-based discrimination is increasing the penalty to employers who discriminate, thus neutralizing the perceived additional cost associated with hiring a minority employee (Neumark, 2018). The implied 'disutility' cost is then offset by, for example, a fine which discriminatory employers have to pay. In this respect, Hedegaard and Tyran (2018) found that discrimination against ethnic minorities was reduced when a financial penalty linked to such conduct was introduced. In contrast, a logical counter-response to statistical discrimination is issuing interventions that increase the quantity and reliability of information about the productivity-related characteristics of the applicant or employee, therefore diminishing information asymmetry (Neumark, 2018). Encouraging applicants to submit reference letters, academic transcripts, certificates or test scores may, for example, augment the amount and/or the quality of information from the employer's perspective, thus lowering the urge to fall back on average group characteristics (Edo, Jacquemet, & Yannelis, 2019; Kaas & Manger, 2012; Kristinsson & Sigurdardottir, 2020; Vuolo, Lageson, & Uggen, 2017).

The aim of the current study was threefold. Our first ambition was to survey the existing research that quantitatively assesses the empirical evidence regarding taste-based and

statistical labour market discrimination on the grounds of ethnicity. For the purpose of this review, we considered ethnicity as a broad concept that comprises ethnic components such as nationality, culture and religion as well as more racially-oriented characteristics such as skin colour (Britannica, 2020). Our second objective was to more closely examine how the mechanisms of discrimination were methodologically operationalised and measured in the selection of retained studies. Our third goal was to evaluate how the findings contextually differed with respect to labour market outcome, region, minority classification and research design. By addressing these aims, we aspired to provide answers, from an economic frame of reference, to the 'why' of ethnic and racial labour market discrimination and therefore identify how it can be counteracted.

# 2. Methods

We followed the directives provided by Petticrew and Roberts (2006) with regard to refining the central review question, the eligibility criteria for study selection, the literature search and the appraisal of the selected studies. We also followed the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) guidelines (Moher et al., 2009) with regard to the rationale and objectives of the study, the reporting of the methods and the description of the results and discussion section—to the extent they were transferrable to the qualitatively-oriented coverage of the review. These guidelines can be viewed as a set of minimum required items for reporting in systematic reviews (Moher et al., 2009). In the following paragraphs we describe (i) the eligibility criteria (i.e. inclusion and exclusion criteria), (ii) the search strategy, including the consulted information sources, and (iii) the process of selecting eligible studies.

## 2.1. Eligibility criteria

Table 1 provides an overview of the eligibility criteria used to refine the selection of studies included in this review. We adopted the SPIDER-framework (Sample, Phenomenon of Interest, Design, Evaluation, Research type) for research retrieval and evaluation (Cooke,

Smith, & Booth, 2012). This framework is a systematic search strategy tool focusing on qualitative review questions and mixed methods research—both apply to our study. To satisfy the aims outlined in the introduction, we adhered to the following standards: (i) the 'Sample' criterium was limited to ethnic and racial minorities; (ii) the 'Phenomenon of Interest' criterium was restricted to taste-based discrimination and statistical discrimination; (iii) the 'Design' and 'Research type' criteria were limited to primary, quantitatively-oriented empirical studies; and (iv) the 'Evaluation' criterium was restricted to labour market outcomes. Moreover, we only included peer-reviewed articles written in English that were published between 2000—the moment around which researchers increasingly reoriented their focus towards uncovering the mechanisms of labour market discrimination (Gaddis, 2018)—and 2019—the most recent full calendar year.

<Table 1 about here>

## 2.2. Search strategy

We conducted multiple systematic, electronic searches using relevant, predefined search terms related to taste-based and statistical discrimination. First, a basic search was executed on the database Web of Science with the keywords 'taste(-based)', 'preference(-based)', 'employer', 'employee', 'customer' and 'statistical' in combination with 'discrimination', 'prejudice' and 'ethnicity', 'race', 'ethnic' and 'racial'. Second, a cited reference search was performed, also on Web of Science, on the seminal works of Becker (1957, 1971), Arrow (1971), Arrow (1973) and Aigner and Cain (1977) using the same keywords to filter relevant results.[4] For all searches on Web of Science, we a posteriori excluded categories from which we expected no relevant results to appear, maintaining our focus on research from the social sciences; these were the categories related to arts and humanities (e.g. history and literature), life sciences and biomedicine (e.g. medical ethics and sport sciences, with the exception of the subcategory 'behavioural sciences'), physical sciences (e.g. mathematics and physics) and technology (e.g. engineering and robotics). Third, the (updated)

[4] A cited reference search was conducted to ensure that a maximal proportion of relevant papers was included in this review. The search started with the seminal works on the economic theories of labour market discrimination. By moving forward in time, a list of studies referring to these works was compiled. After filtering on the basis of specific keywords, the remaining selection of papers was added to the review's database of records obtained from search.

correspondence register by Baert (2018, 2020), which provided us with a comprehensive overview of all correspondence tests conducted since Bertrand and Mullainathan (2004), was consulted to identify additional studies using an in-text search with a combination of the aforementioned keywords. Fourth, while screening the full texts of the selected studies, we paid attention to literature we potentially missed in the previous steps using the 'snowball method', where the full text was our starting point from which relevant citations were extracted (Barends, Rousseau, & Briner, 2017).

## 2.3. Study selection

Figure 1 provides an overview of the study selection process. First, we excluded all duplicate records from the various searches, resulting in 1,029 articles. Second, the titles and abstracts (including keywords) were evaluated against the eligibility criteria. If the article was deemed relevant on the basis of the title or if the title was too ambiguous to warrant exclusion, the abstract was screened. In total, 919 studies were excluded in the second step, resulting in a subtotal of 110 research papers. Third, the full texts were assessed on the basis of the eligibility criteria—48 articles were eventually retained. In 62 cases, not all criteria were met, and the respective articles were excluded. The criteria on the basis of which studies were excluded were: (i) different context than the labour market (*N* = 26, 41.94%); (ii) no distinctive evidence with regard to the mechanisms of discrimination (*N* = 18, 29.03%); and (iii) no collection of quantitative data (*N* = 11, 17.74%). Further grounds for exclusion were related to the research (iv) being of secondary or qualitative nature (*N* = 6, 9.68%) or (v) only focusing on mechanisms other than taste-based or statistical discrimination (*N* = 1, 1.61%). Finally, we invited the corresponding author of each of the selected studies to validate the interpretation and classification (in terms of evidence of taste-based and statistical discrimination) of their findings as summarised in Table 2 and 3. About half of the contacted authors (*N* = 27, out of 46; 58.70%) eventually provided us with feedback.[5]

<Figure 1 about here >

Because of the vast amount of research into ethnic labour market discrimination leading to a large pool of studies to assess, we followed the advice of Barends et al. (2017) to have

[5] There were 46 unique corresponding authors for the 48 studies in scope of this review.

a secondary reviewer perform an additional evaluation after completion of the third step of the study selection. The product of this review process was an inter-rater-reliability (IRR) estimate that captures the consensus between the primary and secondary reviewer with regard to the selection decisions (Hallgren, 2012). In addition, the eligibility criteria were refined based on the outcome of this process. To this end, we drew a random sample of 55 studies (out of 110; 50.00%). The secondary reviewer independently assessed, without prior knowledge of the decisions made by the primary reviewer, whether the sampled studies met the inclusion criteria. In this process, the secondary reviewer (i) evaluated the title and the abstract of each sampled study against the criteria and (ii) re-evaluated the full texts of the resulting selection. We obtained an IRR estimate of .85 with an associated Kappa, a measure of inter-rater agreement correcting for chance, of .71 (Cohen, 1960). Based on the classification of Landis and Koch (1977), this estimate can be viewed as a substantial agreement between the raters. Between-rater disagreement was resolved (and consensus was reached) by a joint re-evaluation of the disputed papers. Following this process, the full texts of the remaining half of the papers identified after the second step of the study selection ($N$ = 55) were also reassessed on the basis of the refined eligibility criteria.

# 3. Results and discussion

In the following subsections we present and discuss the findings of our review. First, we describe how taste-based and statistical discrimination are measured in the selected literature. This provides us insights into the methodological operationalisation of the mechanisms in ethnic labour market discrimination research. Second, we describe the empirical evidence of taste-based versus statistical discrimination in general. Third, we assess the heterogeneity in the empirical evidence by labour market outcome, region, minority classification and research design.

## 3.1. Measurement operationalisation of the mechanisms

Table 2 provides an overview of the various measurement operationalisations of taste-

based and statistical discrimination. The classification of the included studies in terms of evidence of taste-based and statistical discrimination is based on the interpretation of the findings made by the respective authors. Evidence for taste-based discrimination is generally measured through four operationalisations: (i) customer contact (i.e. customer discrimination; N = 10, out of 30; 33.33%); (ii) prejudiced views and attitudes (N = 7; 23.33%); (iii) similarity in characteristics (N = 6; 20.00%); and (iv) co-worker contact (i.e. employee discrimination; N = 4; 13.33%).[6] The general hypothesis is that if one of these factors positively moderates the relationship between ethnicity and a specific labour market outcome, the result is considered to be empirical evidence in favour of taste-based discrimination.

More specifically, 'customer contact' is assessed by looking at differences in discrimination between high-customer-contact and low-customer-contact jobs where higher discrimination rates in jobs requiring higher contact with customers are viewed as evidence in favour of taste-based discrimination (e.g. Bertrand & Mullainathan, 2004; Drydakis, 2012; Laouénan, 2017). In addition, 'prejudiced views and attitudes' are mainly measured by surveying said aspects (e.g. Baert & De Pauw, 2014)—yet also, for example, by accounting for racial animus in the form of the assignment of unpleasant tasks to workers (Glover, Pallais, & Pariente, 2017) or by assessing the influence of interethnic conflict on discriminatory conduct (Hjort, 2014). Furthermore, 'similarity in characteristics' is evaluated by measuring the association between discrimination and (i) similar personal (ethnic) characteristics between employees and employers (e.g. in terms of immigrant status; Åslund, Hensvik, & Skans, 2014); (ii) geographical or cultural distance (Boyd-Swan & Herbst, 2019: Vernby & Dancygier, 2019); or (iii) by assessing nepotism or ethnic homophily (Barr & Oduro, 2002; Edo, Jacquemet, & Yannelis, 2019). Lastly, 'co-worker contact' is assessed by looking at differences in discrimination between jobs that require a considerable amount of contact with co-workers vis-à-vis jobs that do not (e.g. Weichselbaumer, 2017). Similar to the measurement operationalisation of 'customer contact', higher discrimination rates in jobs requiring higher contact with colleagues are considered as evidence for taste-based discrimination.

[6] Several studies measure taste-based discrimination through different operationalisations within the same study, hence percentages do not add up to one—the same applies to measurement operationalisations of statistical discrimination.

Other—less frequently employed—operationalisations of taste-based discrimination include firm competition (N = 1, out of 30; 3.33%), economic cycle (N = 1; 3.33%), financial penalty (N = 1; 3.33%), firm financial health (N = 1; 3.33%) and variability in employment and wages (N = 1; 3.33%). In this respect, taste-based discrimination theory predicts that (i) discrimination is lower when (a) firm competition plays a positively moderating role, (b) levels of variability in employment and wages increase or (c) financial penalties for discriminatory conduct are imposed; (ii) discrimination is higher in times of economic downturn; and (iii) discrimination worsens the financial health of the firm (Asali, Pignatti, & Skhirtladze, 2018; Baert, De Meyer, Moerman, & Omey, 2018; Becker, 1971; Bjerk, 2007; Borowczyk-Martins, Bradley, & Tarasonis, 2017; Hedegaard & Tyran, 2018).

<Table 2 about here>

Evidence for statistical discrimination is generally measured through two operationalisations: (i) information (*N* = 22, out of 34; 64.71%) and (ii) statistical learning (*N* = 6; 17.65%). First, 'information' is always operationalised by adding a condition in which additional information is provided about language skills, academic skills or job qualifications, amongst other signals. Generally, it is assessed whether this condition moderates the relationship between ethnicity and discriminatory conduct—if discrimination is higher (lower) in the information condition, this is considered as evidence against (for) statistical discrimination (e.g. Baert et al., 2017; Blommaert, Coenders, & van Tubergen, 2014; Kaas & Manger, 2012; Oreopoulos, 2011; Vuolo, Lageson, & Uggen, 2017). Second, 'statistical learning' is measured by assessing whether gaining additional information about the experience, skills and competencies of employees over time is affiliated with differences in discrimination (e.g. Altonji & Pierret, 2001; Fryer, Pager, & Spenkuch, 2013). Typically, if levels of unequal treatment decrease over time, controlling for covariates, this is interpreted as evidence in favour of statistical discrimination.

Other operationalisations of statistical discrimination are related to stereotyping (*N* = 2; 5.88%), first- and second-generation minorities (*N* = 2, out of 34; 5.88%), firm size (*N* = 1; 2.94%), selective attention (*N* = 1; 2.94%) and screening error (*N* = 1; 2.94%). In this regard, the authors of the respective studies hypothesised that the results are in favour of statistical discrimination if discrimination increases when (i) employers' stereotypical views about ethnic minorities' average performance play a positively moderating role; (ii) the minority

candidate is first- rather than second-generation, where one presumes that the former are less acquainted with the host country than the latter in terms of language and cultural habits, amongst other aspects; (iii) firm size increases, which presumably results in a higher degree of formalisation throughout the HR process and/or a higher screening capacity and thus in an increased capacity to acquire more (accurate) information about the minority applicant; (iv) employers' diminished attention to applications from ethnic minorities plays a positively moderating role in the overall relationship; and (v) the variance of the screening error first significantly increases then decreases with employability (see e.g. Aeberhard, Coudin, & Rathelot, 2017; Baert & De Pauw, 2014; Baert et al., 2018; Bartoš, Bauer, Chytilová, & Matějka, 2016; Carlsson, 2010).

To empirically distinguish between the taste-based and statistical discrimination mechanism, the included studies sometimes rely on strong assumptions in their measurement operationalisation.[7] First, with respect to taste-based discrimination, the moderating effect of 'prejudiced views and attitudes' (or 'stereotypical views' when considering statistical discrimination) on unequal treatment is, in several cases, operationalised through self-report measures, as mentioned above. This is detrimental in the sense that respondents often display socially desirable behaviour when directly answering questions (related to their own attitudes and behaviour) about sensitive topics such as discrimination and racism (Krumpal, 2013)—this is difficult to account for a posteriori in the analysis of the empirical evidence of the mechanisms. Moreover, there is limited uniformity in the way the interaction between employer–employee similarity in personal characteristics and discriminatory behaviour is conceptualised. This could be on the basis of resemblances in ethnic or racial characteristics, but also in terms of similarities in geographical location or the extent to which ethnic peers are preferred over members of the out-group, which raises the question to what extent these operationalisations are conceptually valid. Second, with regard to statistical discrimination, the effect of 'statistical learning' on discrimination is generally determined by estimating differences in discriminatory levels over time (e.g. Epstein et al., 2016; Fryer et al., 2013; Kreisman &

[7] This criticism is also shared by Guryan and Charles (2013), who assert that authors may claim that they empirically distinguish between the two mechanisms, yet for many of the studies on the mechanisms of labour market discrimination alternative models could generate equally convincing empirical patterns pointing in the opposite direction.

Rangel, 2015). The premise is that if the employer gradually interacts more with the minority employee, they gather additional (more accurate) information on the productivity of the minority employee, which, in turn, leads to an improvement in unequal treatment. Yet, this effect could also be due to the exposure itself, where the mere increase in interaction between employer and employee yields a decrease in discrimination (i.e. contact hypothesis; Allport, 1954; Pettigrew & Tropp, 2006). Third, looking at the differences in discrimination between first- and second-generation minorities, one assumes that employers have the unspoken perception that first-generation minorities have adapted less well to the host country in terms of language, culture or other related aspects (Busetta, Campolo, & Panarello, 2018; Carlsson, 2010). However, the results from the two included correspondence experiments examining this hypothesis provide no evidence for substantial differences in unequal treatment between these two groups, which warrants additional research on this research hypothesis.[8]

## 3.2. General findings on the empirical evidence of the mechanisms

Table 3 provides an overview of the literature assessing the empirical evidence of taste-based and statistical labour market discrimination on the basis of ethnicity. In addition, Figure 2 presents descriptive statistics on the evidence regarding the mechanisms. We observe that 30 out of the 48 included studies (62.50%) report empirical evidence with regard to taste-based discrimination, of which 20 are found (out of 30; 66.67%) in favour of the mechanism, 8 against the mechanism (26.67%) and 2 with mixed evidence (6.67%)—the

[8] In line with these remarks, Neumark (2018) discusses the various disadvantages of testing the empirical evidence of the mechanisms of labour market discrimination in greater detail—we highlight some of those disadvantages here. First, particularly when distinguishing between taste-based and statistical discrimination in nonexperimental research, one generally has to make strong assumptions on what employers already know about the productivity of employees—and, more importantly, what they do not know. Second, in experimental research in general, it is difficult to interpret studies that find little or no difference in treatment when an information condition is introduced. This is simply because, unless it is meticulously measured, one cannot know whether the additional information is used in the decision-making process or what unobserved characteristics are taken into account by the employer to make assumptions about the productivity of the minority employee. Third, while field experimental research (e.g. correspondence experiments) addresses the external validity problem of lab experiments—in that we can infer something about real-world effects—the frequently used 'low-information condition' might not accurately reflect the actual information employers have at their disposal in real-life settings.

latter meaning that both evidence for and against the mechanism was found within the same study. Comparably, 34 out of the 48 included studies (70.83%) include empirical evidence with respect to statistical discrimination, of which 18 (out of 34; 52.94%) are in favour of the mechanism, 13 against (38.24%) and 3 with mixed evidence (8.82%).[9] From this first glance at the literature, the general empirical evidence seems to favour taste-based discrimination rather than statistical discrimination, yet the evidence is inconsistent when statistically comparing inter- and intra-mechanism differences. If we compare inter-mechanism differences via a one-tailed two-sample test of proportions, the proportion of evidence in favour of taste-based discrimination is not significantly greater (at the 5% significance level) than the proportion of evidence in favour of statistical discrimination ($z$ = 1.12, $p$ = .13). In contrast, if we compare intra-mechanism differences via a one-tailed one-sample test of proportions, the proportion of evidence in favour of taste-based discrimination is significantly greater than an equal proportion—here our null hypothesis is that half of the included studies provide supportive empirical evidence for the respective mechanism ($z$ = 1.83, $p$ = .03). If we make the same comparison regarding the evidence for statistical discrimination, however, the result is not statistically significant ($z$ = .34, $p$ = .37).

<Figure 2 about here>

<Table 3 about here>

## 3.3. Heterogeneity of the findings

In the following paragraphs we discuss to what extent the findings on the empirical evidence of taste-based and statistical discrimination are heterogenous (i.e. contextually differ) with respect to (i) the type of labour market outcome measure, (ii) the geographical location, (iii) the minority or racial group considered and (iv) the design of the research.

[9] Several studies report empirical evidence of both taste-based discrimination and statistical discrimination; hence frequencies do not add up to the total number of selected studies ($N$ = 48).

### *3.3.1. By labour market outcome*

First, we consider the heterogeneity of evidence by labour market outcome.[10] In the majority of the cases—35 out of 48 studies (72.92%)—researchers examined employment outcomes (i.e. recruitment and outplacement). In this respect, a wide variety of specific variables is assessed, ranging from employer call-back (Agan & Starr, 2018) and hiring intentions in Fantasy Football (Bryson & Chevalier, 2015) to unemployment rates (Combes et al., 2016) and the representation of minority players on NHL (National Hockey League) teams (Longley, 2003). Remuneration outcomes are examined in 16 papers (33.33%). In all cases where remuneration is assessed, wage (also operationalised as 'earnings', 'salary' or 'income') or wage differentials serve as the main outcome variable (Drydakis, 2012; Kreisman & Rangel, 2015). Other labour market outcomes are examined in two studies (4.17%) and include job performance (Glover, Pallais, & Pariente, 2017) and firm productivity (Hjort, 2014).

<Figure 3 about here>

Figure 3 provides a graphical representation of the heterogeneity of the empirical evidence of taste-based and statistical discrimination by labour market outcome. Research focusing on taste-based discrimination and in which employment outcomes are considered generally favour the mechanism: 16 out of 25 studies (64.00%) provide support for the taste-based mechanism. Moreover, five out of eight studies (62.50%) that report remuneration outcomes provide evidence in favour of taste-based discrimination. In contrast, the empirical evidence is mixed with respect to statistical discrimination on the basis of employment outcomes: less than half of the studies (i.e. 12 out of 25; 45.83%) provide support for the statistical mechanism. Similar to findings on taste-based discrimination, the lion's share of the studies that consider remuneration as a labour market outcome (i.e. seven out of 11; 63.64%) report evidence in favour of statistical discrimination.

In addition, we discern a notable relationship between labour market outcome and research design: studies considering employment outcomes rely more on (quasi-)experimental research, while studies taking into account remuneration outcomes rely more

[10] Several studies report multiple outcomes; hence frequencies do not add up to the total number of selected studies ($N$ = 48).

on correlational research. The majority of studies (17 out of 25; 68.00%) reporting evidence on taste-based discrimination on the basis of employment outcomes are built on a (quasi-)experimental research design. We observe a similar pattern for 22 out of 24 studies (91.67%) reporting evidence on statistical discrimination—this includes all 12 studies reporting evidence against the mechanism. In contrast, remuneration is mostly measured via correlational research: six out of eight studies (75.00%) reporting evidence on taste-based discrimination on the basis of remuneration outcomes and nine out of 11 studies (81.82%) reporting evidence on statistical discrimination depend on this design. Moreover, we observe that (quasi-)experimental research produces more empirical evidence against the mechanisms, in particular with respect to statistical discrimination, while the opposite applies to correlational research (see Subsection 3.3.4). The logic behind these findings becomes apparent when examining the inverse relationship—all (field) experimental studies in scope of this review take into account employment outcomes. This is a rational consequence of the dominance of the correspondence testing method, which is generally used in labour market discrimination research that focuses on employer call-back and hiring intentions (i.e. the initial phase of the personnel selection process; Baert, 2018; Gaddis, 2018; Guryan & Charles, 2013; Neumark, 2018).

### *3.3.2. By region*

Next, we consider the heterogeneity of the evidence by region. To facilitate interpretation, the regions are pooled in three broadly defined categories: 'Europe', 'The Americas' and 'Other'. In the majority of the studies, that is in 25 out of 48 studies (54.17%), the analysis is based on European data, of which ten (out of 25) on Western European (40.00%), six on Northern European (24.00%), five on Central European (20.00%), two on Southern European (8.00%) and one on Eastern European (4.00%) data. In addition, one study is based on data from various European Union countries (4.00%). In 20 out of 48 studies (41.67%), the analysis depends on (North) American data. More specifically, data from the USA (United States of America) is the base for this research in 18 cases (90.00%), while the analysis depends on Canadian data twice (10.00%; of which one time in combination with data from the USA). Finally, with respect to the remaining three out of 48 studies (6.25%), two are based on African and one on Middle Eastern data.

<Figure 4 about here>

Figure 4 provides a graphical representation of the heterogeneity of the empirical evidence of taste-based and statistical discrimination by region. The evidence regarding taste-based discrimination is generally mixed in research on European data (i.e. ten out of 18 studies report evidence in favour of the mechanism; 55.55%), while it predominantly supports the mechanism in research on American data (i.e. nine studies out of 11 in total; 81.82%). This also applies to evidence regarding statistical discrimination: in research on European data, ten out of 20 studies (50.00%) are in favour of the statistical mechanism while, in the Americas, seven out of 12 studies (58.33%) report supportive evidence.

Although we cannot rule out the role of contextual differences between Europe and the Americas, in particular North America, it appears that the relationship between region and research design plays a part in these results—similar to the findings on the heterogeneity of the evidence by labour market outcome.[11] The majority of studies relying on European data (15 out of 18; 83.33%) and reporting evidence on taste-based discrimination are based on a (quasi-)experimental research design. We observe comparable findings (17 out of 20 studies; 85.00%) with regard to statistical discrimination. In contrast, studies relying on American data reporting evidence on taste-based discrimination are mostly based on correlational research (eight out of 11 studies; 72.73%), while six out of 12 studies (50.00%) reporting evidence on statistical discrimination are built on said design. Again, we note that (quasi-)experimental research seems to produce more empirical evidence against taste-based and statistical discrimination, while correlational research appears to generate more empirical evidence in favour of the mechanisms (see Subsection 3.3.4). This at least partially explains the heterogeneity of the empirical evidence by region.

### *3.3.3. By minority classification*

Subsequently, we consider the heterogeneity of the evidence by minority classification. Also here, to facilitate interpretation, ethnic minorities are pooled into five more broadly defined

[11] For example, the extensive flexibility of the US job market in terms of securing employment-related rights (i.e. employment at will) differs from the more relationship-based approach in Western Europe (McCall & Werhane, 2009). Several scholars argue that the wide discretion that comes with the employment at will doctrine facilitates discriminatory conduct, which employers can get away with even if the unequal treatment is based on distaste or other, seemingly eligible, reasons (Suk, 2007).

categories: 'Various Origins', 'Black', 'Asian', 'African' and 'Other'. This categorisation is based on the United Nations' M49 Standard for nationality (United Nations, 2020) or the authors' own classification when considering race and religion. The 'Other' category comprises the groups that are examined in only one of the included studies, namely whites, Europeans, Muslims and Americans. Blacks appear as the racial minority group in 14 out of 48 studies (29.17%). This proportion is identical to the selection of studies in which minorities of various origins are included. With regard to the latter, Åslund, Hensvik and Skans (2014), for example, evaluated differences in hiring rates and wages between native Swedes and Nordic, Western, Eastern European, Former Yugoslavian, Latin American, Asian, African as well as Middle Eastern minorities. Furthermore, both Africans and Asians are observed as minorities in eight studies (16.67%), while other minorities are considered in four studies (8.33%).

<Figure 5 about here>

Figure 5 provides a graphical representation of the heterogeneity of the empirical evidence of taste-based and statistical discrimination by minority classification. The variability across classifications makes it difficult to uncover clear patterns. However, we observe two notable results. First, research in which various ethnic minority groups are taken into account generally produces empirical evidence against the mechanisms: in five out of ten (50.00%) and seven out of 11 studies (63.64%), the authors argued against taste-based and statistical discrimination, respectively. Second, research in which Africans or blacks serve as the racial minority group mainly generates evidence in favour of taste-based and statistical discrimination. In line with our findings regarding heterogeneity by labour market outcome and region, we observe a similar relationship between minority classification and research design. More specifically, 11 out of 14 (78.57%) studies that take into account minorities of various nationalities are based on (quasi-)experimental research (which seemingly produces more evidence against the mechanisms), while 14 out of 22 studies (63.64%) focusing on blacks and Africans are based on correlational research (which seemingly generates more evidence in favour of the mechanisms; see Subsection 3.3.4).

### *3.3.4. By research design*

Finally, we consider the heterogeneity of the evidence by research design. We look at three

broad categories: 'experimental', 'correlational' and 'quasi-experimental'. Half of the studies (24 out of 48; 50.00%), use an experimental design to examine the empirical evidence regarding the mechanisms of discrimination—this is generally in the form of a field experiment. The second most frequently used design is correlational research, as is the case in 21 studies (43.75%). Only three studies (6.25%) implement a quasi-experimental design, either in the form of an N-RCT (non-randomized, controlled, before-after study; e.g. Bryson & Chevalier, 2015) or by combing an N-RCT with observational data (e.g. Glover et al., 2017).

<Figure 6 about here>

Figure 6 provides a graphical representation of the heterogeneity of the empirical evidence of taste-based and statistical discrimination by research design. We discover a congruent pattern when examining differences with respect to taste-based discrimination. With the exception of a few studies that use a quasi-experimental design, similar shares of experimental (11 out of 16; 68.75%) and correlational research (eight out of 11; 72.73%) report evidence in favour of the taste-based mechanism. Conversely, 12 out of 21 studies (57.14%) that are based on experimental research provide evidence against statistical discrimination, while eight out of 11 studies (72.73%) that are based on correlational research support said mechanism. As mentioned in Subsection 3.3.1, experimental research on labour market discrimination typically focuses on the first step of the selection process, sometimes referred to as 'resume screening', using the correspondence testing method (Derous, Ryan, & Nguyen, 2012; Gaddis, 2018). It appears that research based on this method (and more broadly experimental research) provides more evidence in favour of taste-based as opposed to statistical discrimination. If we compare inter-mechanism differences via a one-tailed two-sample test of proportions, the proportion of experimental evidence in favour of taste-based discrimination is significantly greater than the corresponding proportion in favour of statistical discrimination ($z = 1.85$, $p = .03$). In contrast, except for two studies that report mixed evidence regarding statistical discrimination, there are no substantial between-mechanism differences when considering correlational research. This heterogenous finding and the fact that one is able to draw causal inference from experimental labour market discrimination research suggests that ethnic discrimination in hiring might be better explained by taste-based discrimination rather than

statistical discrimination (Guryan & Charles, 2013; Leary, 2012; Neumark, 2018).[12]

# 4. Conclusion

In this review, we charted the recent ethnic labour market discrimination literature that confronts the theories of tasted-based and statistical discrimination against the empirical reality. Following the classic structure of a systematic review, we used various search methods to identify peer-reviewed articles published between 2000 and 2019 that assessed the empirical evidence on the mechanisms of ethnic labour market discrimination. Next, we made a selection of these articles, focusing on the following eligibility criteria: (i) primary, empirical, quantitatively-oriented research with a (quasi–)experimental, field experimental or (regression-based) correlational research design; (ii) studies considering minorities who are discriminated against on the basis of their ethnicity; and (iii) studies evaluating differential treatment in terms of labour market outcomes such as employment and remuneration. Finally, we surveyed three main aspects of the included studies: (i) the measurement operationalisation of the discrimination mechanisms; (ii) the general findings on the quantitative, empirical evidence of taste-based and statistical discrimination; and (iii) the heterogeneity of these findings by (a) the labour market outcome in scope of the selected studies, (b) the region of data collection, (c) the adopted minority classification and (d) the research design used. Based on the eligibility criteria, articles solely focusing on qualitative research methods were not included in the review. Nevertheless, we recognise that this type of research may be suitable for assessing the root cause of discriminatory behaviour, too, and could provide us with equally interesting insights (see e.g. Midtbøen, 2014; Pager & Karafin, 2009). In addition to the analyses we have presented here, we therefore suggest future research to compile an overview of the evidence from qualitative research on the mechanisms of ethnic labour market discrimination.

[12] Neumark (2018) rightly notes that correlational research often relies on regression-based methods that cannot fully control for all relevant covariates (i.e. productivity-related characteristics). Therefore, it is difficult to establish causal relationships in this type of research. Covariates can also reflect feedback effects (e.g. ethnic minorities having less work experience because they are discriminated against) which can result in understating discrimination.

First, the measurement operationalisations appeared to vary greatly between the included studies. On the one hand, taste-based discrimination was generally operationalised by examining the moderation effect on unequal treatment of (i) increased contact between ethnic minorities and their colleagues from the majority group and customers of the firm (i.e. employee and customer discrimination); (ii) employer–employee similarity in terms of personal characteristics; or (iii) self-reported prejudiced views and attitudes. On the other hand, statistical discrimination was typically operationalised by (i) assessing differences in levels of discrimination between high- and a low-information conditions or (ii) evaluating the effects of statistical learning (i.e. the acquisition of additional information on individual employees over time) on unequal treatment. These different operationalisations identified in the selection of studies bring about major limitations, however. Because there was very limited consistency in measurement operationalisation, it was difficult to statistically compare the evidence between the studies. Beyond the discrepancies in research design, this was one of the reasons why meta-analytical methods were not used to analyse the empirical evidence of the mechanisms. Moreover, several studies relied on strong assumptions in their measurement operationalisation. For example, most of the research providing evidence for statistical discrimination on the basis of statistical learning depended on the premise that employers gain information on the individual-level productivity of employees over time and will subsequently act on this information, hence reducing unequal treatment. In contrast, an equally plausible explanation, in line with the contact hypothesis (Pettigrew & Tropp, 2006), is that the mere exposure to interaction with ethnic minorities could (also) lead to less discrimination. In se, distinct yet closely related measurement operationalisations of discrimination mechanisms can coexist as long as they produce empirical evidence based on theoretically valid assumptions and do so in a reliable, consistent manner. However, whereas the correspondence testing method has become the standard in examining the incidence of labour market discrimination, we count on future research efforts focusing directly on differentiating between the mechanisms of (ethnic) labour market discrimination to ultimately converge into a 'golden' measurement standard for evaluating the empirical evidence of said mechanisms.

Second, the empirical evidence of taste-based and statistical discrimination appeared to be somewhat mixed. A majority of the included studies provided empirical evidence for both taste-based as well as statistical discrimination. In this respect, we did not find a statistically

significant difference when comparing the proportion of evidence in favour of the taste-based mechanism with the proportion of evidence in favour of the statistical mechanism. However, the proportion of evidence in favour of taste-based discrimination was significantly greater than an equal proportion—in which our null hypothesis was that half of the studies examining empirical evidence on the mechanism support it—while the result was statistically insignificant when considering statistical discrimination. These findings indicate that there is a discrepancy in the prevalence of the evidence on economic discrimination mechanisms, suggesting ethnic labour market discrimination cannot be fully explained by either mechanism in itself.

Finally, narrowing in on the heterogeneity of the empirical evidence, we observed the following: (i) research focusing on employment outcomes (e.g. employer call-back, hiring intentions or unemployment rates) as the outcome variable provided more evidence in favour of the taste-based mechanism; (ii) research on North American data typically produced evidence in favour of both mechanisms, while the evidence produced by research on European data was generally mixed; (iii) studies in which the minority classification comprised several minorities of various origins yielded more evidence against both mechanisms; and (iv) research based on an experimental research design provided more evidence for taste-based discrimination and against statistical discrimination. In addition to the latter, we observed a notable relationship between the research design of the selected studies and the other three aspects by which heterogeneity was assessed: studies that (i) focused on employment outcomes (i.e. recruitment and, to a minor extent, outplacement), (ii) were administered in a European context or (iii) included several minorities of different origins in their design were typically based on experimental research. Together with the fact that most (field) experimental research enables us to make causal inferences, the above findings suggest that ethnic discrimination in hiring may be better explained by taste-based discrimination vis-à-vis statistical discrimination. Therefore, a key policy implication from our review seems to be that—rather than requiring applicants to provide additional information signalling their skills, knowledge or competence—increasing the price of hiring discrimination against ethnic minorities is expected to reduce this unequal treatment.

# Declarations

### Ethics approval and consent to participate

Not applicable.

### Consent for publication

Not applicable.

### Availability of data and materials

Raw data of the descriptive statistics in this review are available upon reasonable request.

### Competing interests

Not applicable.


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### Authors' contributions

LL led the systematic review process, wrote the majority of the manuscript and drafted all tables and figures. SB supervised the review process. AG participated in the study selection process by re-evaluating studies against the eligibility criteria of the review. All authors revised multiple intermediary versions of the manuscript and provided substantial feedback. All authors read and approved the final manuscript.

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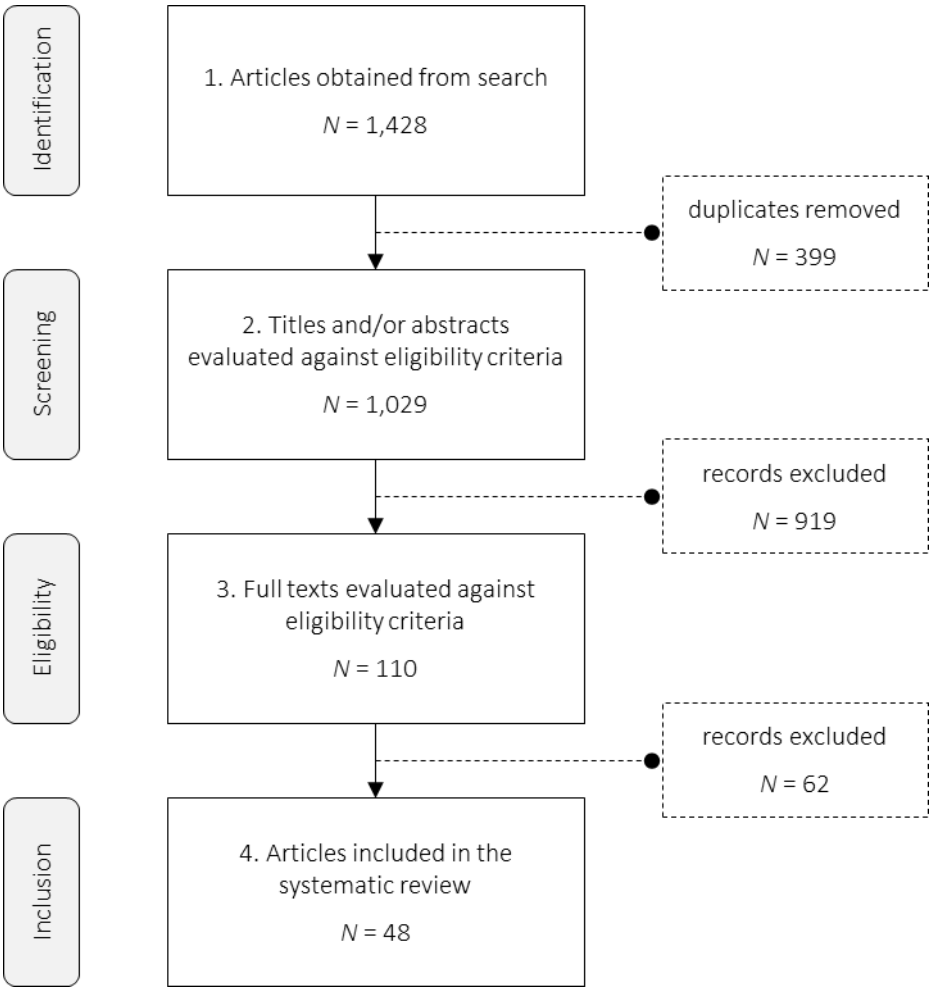
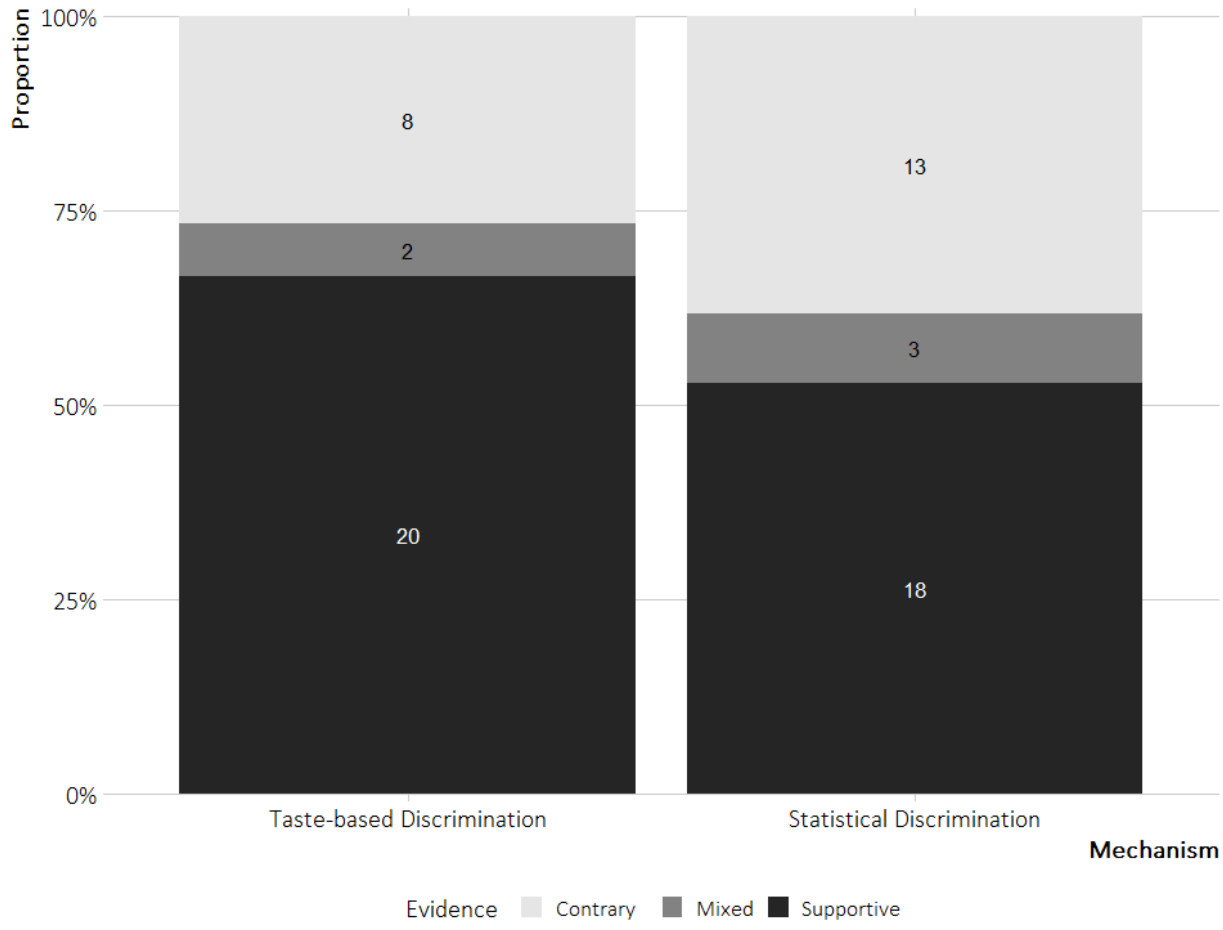
Figure 1. Flow chart of the study selection




*Notes*. Figure adapted from Moher et al. (2009, p. 267).

Figure 2. Comparison of the studies assessing the empirical evidence regarding taste-based and statistical labour market discrimination on the basis of ethnicity




*Notes*. Numbers in the stacked bars are frequencies.

Figure 3. Heterogeneity of the empirical evidence by labour market outcome of taste-based and statistical labour market discrimination on the basis of ethnicity

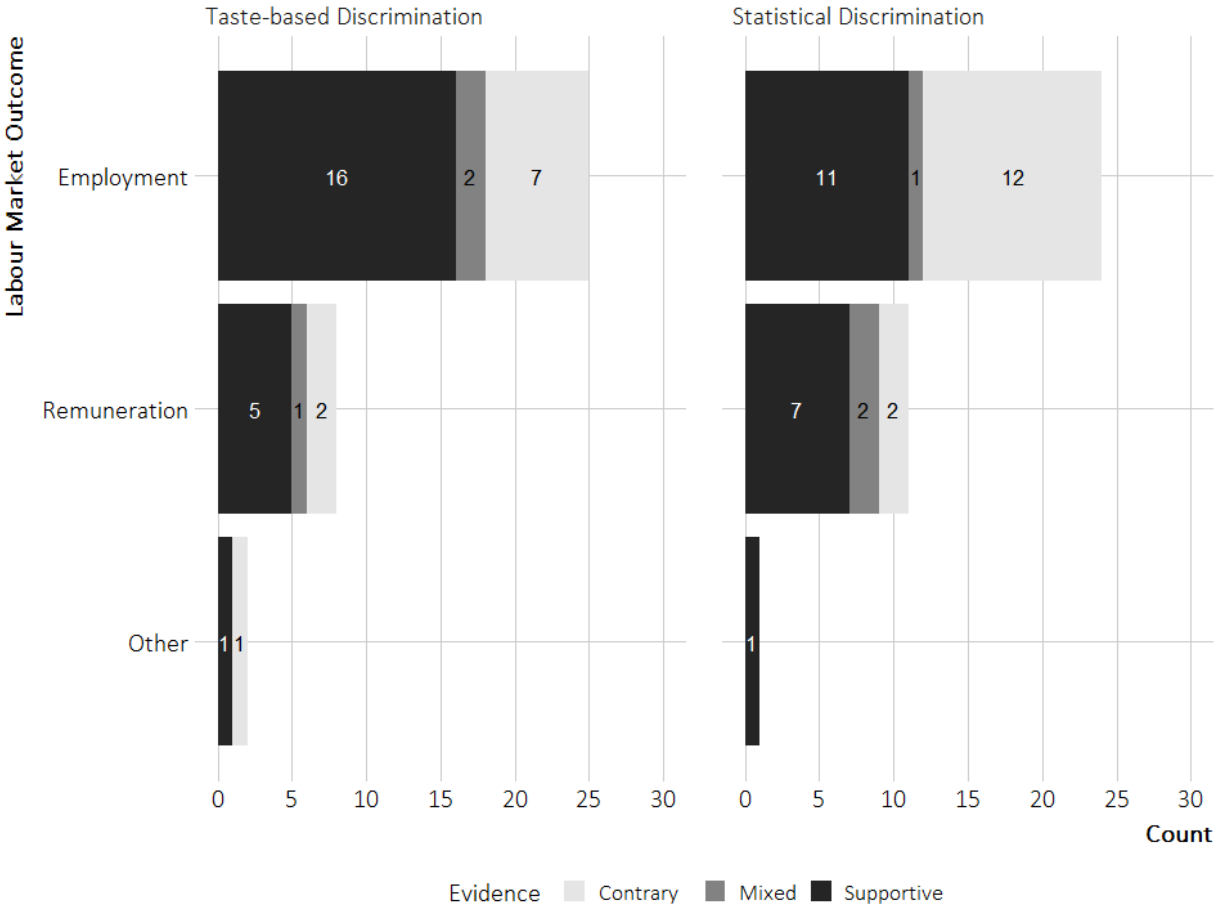


Figure 4. Heterogeneity of the empirical evidence by region of taste-based and statistical labour market discrimination on the basis of ethnicity

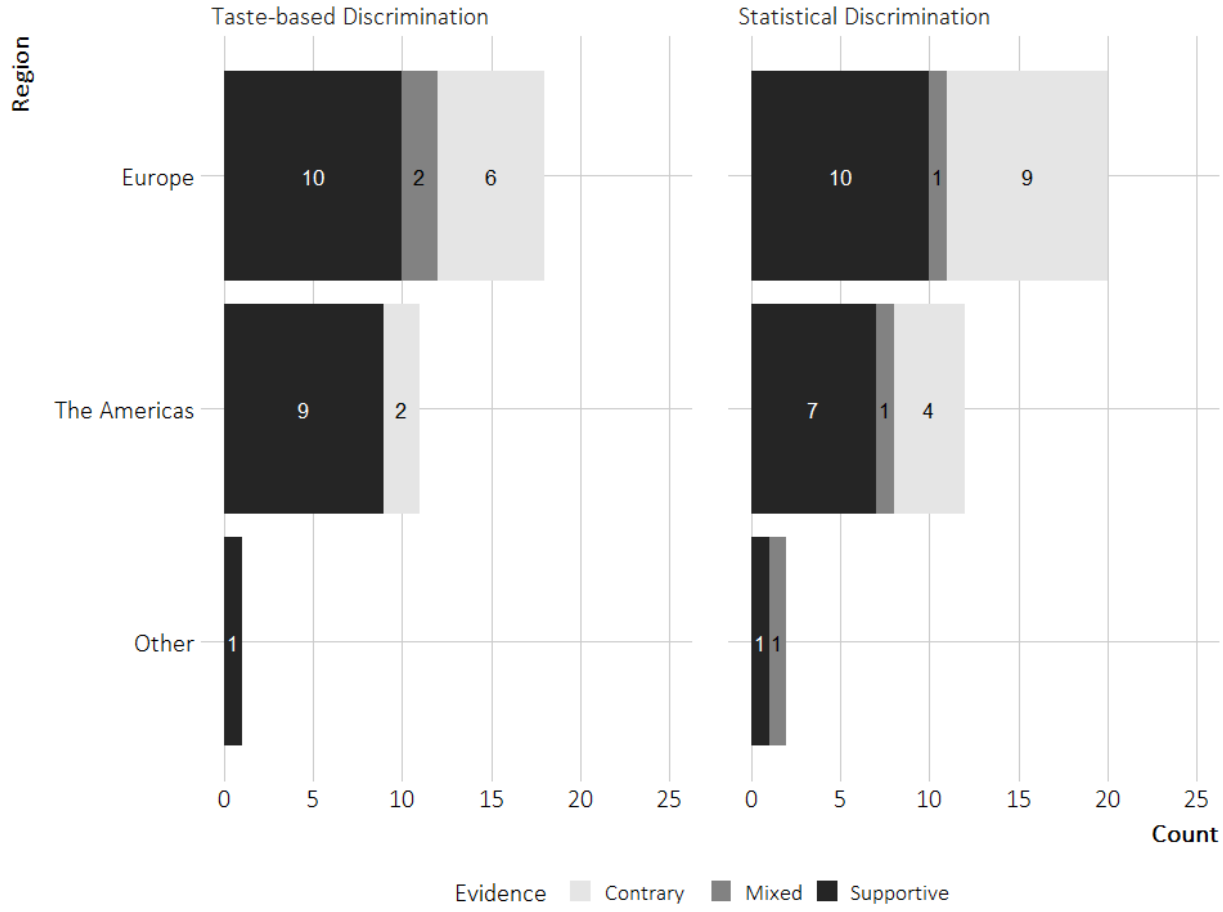


Figure 5. Heterogeneity of the empirical evidence by minority classification of taste-based and statistical labour market discrimination on the basis of ethnicity

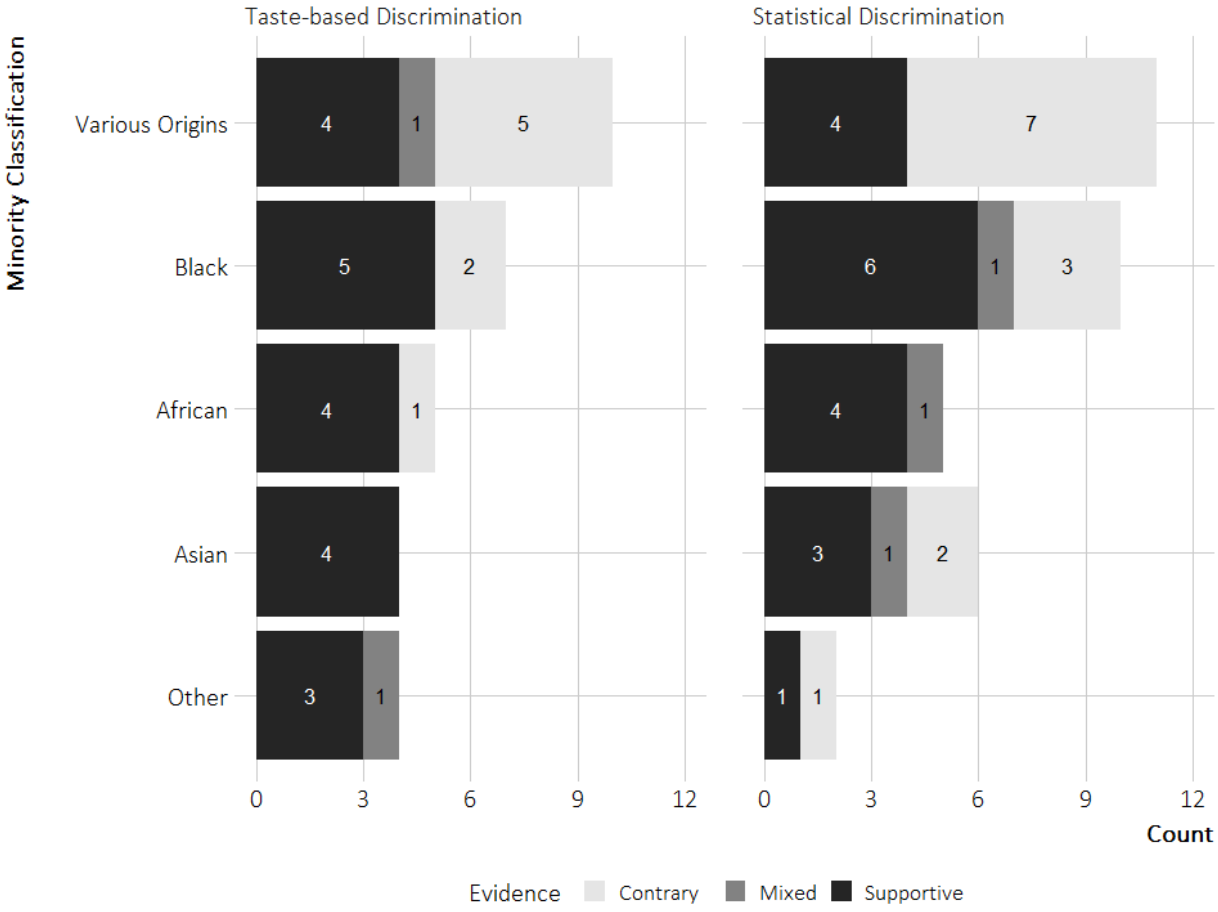


Figure 6. Heterogeneity of the empirical evidence by research design of taste-based and statistical labour market discrimination on the basis of ethnicity

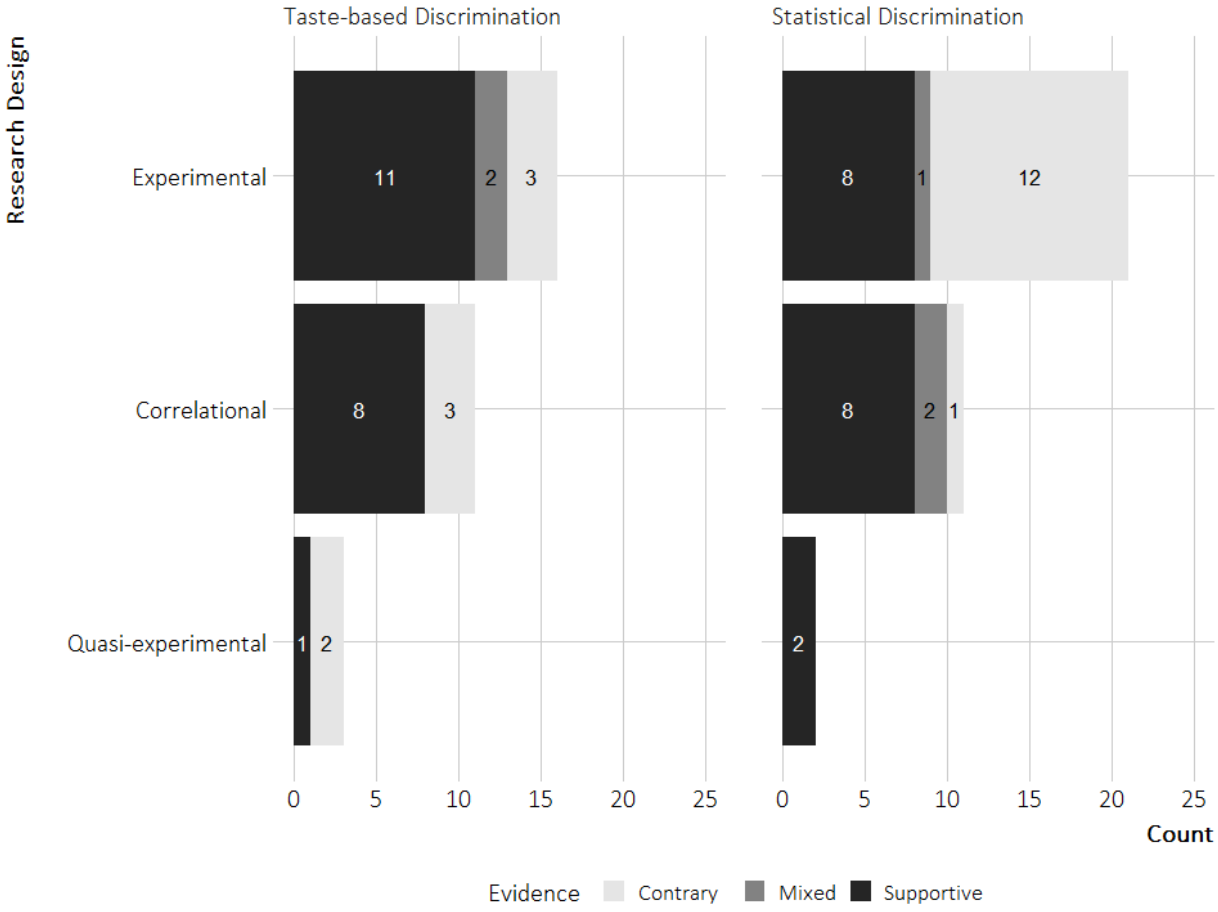


Table 1. Eligibility criteria of the systematic review

| (1)<br>Criterium | (2)<br>Description |
|---|---|
| Sample | I: Ethnic/racial minorities (in comparison with ethnic/racial majorities). E: Minorities who are discriminated against on the basis of other (legal) grounds than ethnicity or race. |
| Phenomenon of Interest | I: The economic mechanisms of labour market discrimination most firmly rooted in economic theory: taste-based discrimination and statistical discrimination. E: Other, (non-)economic mechanisms and theories of discrimination. |
| Design | I: (Quasi-)experiments, field experiments and (regression-based) correlational research. E: meta-analyses, (systematic) reviews, case studies, interview-type studies and theoretical papers. |
| Evaluation<br>*(Outcome)* | I: Differential treatment in terms of labour market outcomes, such as employment, employee productivity, remuneration, work conditions and outplacement. E: Studies solely focusing on outcomes related to other markets, such as the product, service, retail or real estate market. |
| Research type | I: Primary, quantitative, empirical research (including mixed methods). E: Secondary and qualitative research. |

*Notes*. 'I' denotes 'inclusion'. 'E' denotes 'exclusion'. The SPIDER-framework presented here is based on Cooke, Smith, and Booth (2012).

Table 2. Overview of the various measurement operationalisations of taste-based and statistical labour market discrimination on the basis of ethnicity in the selected studies

| (1)<br>Operationalisation | (2)<br>Description | (3)<br>Illustration |
|---|---|---|
| A. Taste-Based Discrimination | | |
| Co-worker contact | Differences in discrimination between high- and low-contact jobs with regard to co-workers. | Weichselbaumer (2017) assessed whether the unfavourable treatment was due to co-worker preferences by introducing a 'team contact' variable which captured whether the interaction with co-workers was explicitly mentioned in the job advertisement. The results show that discrimination does not vary by team contact. The author interpreted this as evidence against employee discrimination (i.e. taste-based discrimination). |
| Customer contact | Differences in discrimination between high- and low-contact jobs with regard to customers. | Bertrand and Mullainathan (2004) assessed the relationship between different job types (i.e. administrative jobs and sales jobs) and discrimination. They did not find higher discrimination levels in high-contact jobs, which they considered evidence against customer discrimination (i.e. taste-based discrimination). |
| Economic cycle | Discrimination moderated by economic cycle (e.g. economic downturn). | Asali, Pignatti, and Skhirtladze (2018) found that hiring discrimination was positively moderated by the effects of economic downturn, which is in line with predictions of Becker's (1971) taste-based discrimination theory. |
| Financial penalty | Differences in discrimination when discriminatory conducted is financially penalised. | Hedegaard and Tyran (2018) found that discriminatory conduct diminished when the price of doing so increased (in the form of a financial penalty). |
| Firm competition | Discrimination moderated by competition between firms. | Bjerk's (2007) evaluated whether firm competition, related to competition for high-skilled talent, mitigated discrimination in the white-collar sector. His findings show that this relationship exists, which is in line with the predictions of Becker (1971) based on taste-based discrimination theory and hence provides support for the taste-based mechanism. |
| Firm financial health | Discrimination yields difference in financial health of the firm. | Baert, De Meyer, Moerman, and Omey (2018) evaluated the relationship between the financial health of the firm and hiring discrimination. In contrast to predictions from taste-based discrimination theory, the results indicate that unequal treatment does not yield worse financial health for the firm. |
| Prejudiced views and attitudes | Differences in discrimination because of differences in views or attitudes towards ethnic minorities. | Baert and De Pauw (2014) linked the outcome of a vignette experiment with survey questions regarding potentially prejudiced views of the participants vis-à-vis ethnic minorities. They found that the views negatively mediated the relationship between ethnic origin and the likelihood of a job interview invitation, which they considered to be evidence in favour of taste-based discrimination. |

| | | |
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| Similarity in characteristics | Differences in discrimination due to (perceived) similarity (e.g. candidates sharing overt characteristics with employer), nepotism, ethnic homophily, physical distance (e.g. location) or cultural distance. | Boyd-Swan and Herbst (2019) evaluated the relationship between ethnicity, hiring chances and neighbourhood composition on the basis of ethnicity. The results indicate that racial and ethnic shares (in neighbourhoods) correlate with hiring decisions, benefitting applicants from the most strongly represented ethnic group. This was interpreted as evidence in favour of the taste-based mechanism. |
| Variability in employment and wages | Discrimination moderated by variability in wage. | Borowczyk-Martins, Bradley, and Tarasonis (2017) found that, in line with predictions of Becker's (1971) model of taste-based discrimination, the lower employment chances and wages of black workers vis-à-vis white workers varied less when looking at jobs requiring higher skills. |
| B. Statistical Discrimination | | |
| Firm size | Discrimination moderated by the size of the firm. | Baert, De Meyer, Moerman, and Omey (2018) hypothesised that larger firms tend to discriminate less than smaller firms as having a dedicated, formalised human resources department and a greater capacity to process applications leads to being able to acquire more accurate information about job applicants. The results show no relationship between firm size and hiring discrimination, unlike predictions based on statistical discrimination theory. |
| First- and second-generation minorities | Differences in discrimination as a consequence of perceived dissimilarity in skills or competencies (e.g. language skills or educational attainment) between first- and second-generation minorities. | Carlsson (2010) hypothesised that first-generation immigrants would have lower chances of receiving job interview invitations vis-à-vis second-generation immigrants because of perceived dissimilarity in language and educational skills. In contrast to predictions from statistical discrimination, they found that first- and second-generation immigrants had similar probabilities of being invited to a job interview, albeit lower than native candidates. |
| Information | Discrimination moderated by an information condition related to employee productivity (e.g. personality, language skills, criminal history, academic skills and job qualifications). | Kaas and Manger (2012) assessed the relationship between ethnicity, employer call-back and the inclusion of additional information about the candidates. The findings suggest that the inclusion of a reference letter that stated favourable information about minority candidates' personality positively moderates the negative relationship between ethnicity and employer call-back, which is evidence in favour of statistical discrimination. |
| Selective attention | Differences in discrimination due to a lack of attention or selective attention. | Bartoš, Bauer, Chytilová, and Matějka (2016) found that employers paid less attention to applications from minorities than majorities in the Czech and German labour market, which they labelled 'attention discrimination'. The uncovered discrimination is in line with statistical discrimination theory that puts forward information asymmetry, which the authors explained through selective attention to particular information. |
| Screening error | Differences in discrimination due to variation in screening error. | Aeberhardt, Coudin, and Rathelot (2017) found heterogeneity in terms of hiring and exit rates on the basis of ethnicity. The ethnic disparity in exit rates presumably occurred due to the differing variance of the screening error across ethnic groups. The authors attributed the latter to the mechanism of statistical discrimination. |
| Statistical learning | Discrimination moderated by acquiring additional | Altonji and Pierret (2001) found that work experience is related to racial differences in wages. |

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| | information about employee work experience, skills and competencies. | As employers learn about the productivity of their employees, the wage gap rises. However, the rate of increase falls when skill measures are controlled for. Therefore, they concluded that, at best, employers only partially statistically discriminate on the basis of race, which is interpreted as evidence against statistical discrimination. |
| Stereotyping | Differences in discrimination due to stereotypical views. | Glover, Pallais, and Pariente (2017) found that implicitly biased managers had certain stereotypes related to (the confidence in) the abilities of ethnic minorities, which fostered ethnic discrimination. They interpreted this as evidence in favour of statistical discrimination. |

*Notes*. The third column 'Illustration' reflects the classification with regard to the empirical evidence on taste-based and statistical discrimination made by the respective authors on the grounds of their research findings.

Table 3. Overview of the literature evaluating the empirical evidence of taste-based and statistical labour market discrimination on the basis of ethnicity (*N* = 48)

| (1)<br>Author(s) (year) | (2)<br>Region (country) | (3)<br>Minority (majority) | (4)<br>Research design | (5)<br>Main findings related to the mechanisms |
|---|---|---|---|---|
| **A. Employment** | | | | |
| Aeberhardt et al. (2017) | Western Europe (France) | 3,626 French males with parents of North African descent (79,055 native French males) | Correlational (cross-sectional) | The results indicate that hiring rates rise with observed worker qualifications (employability) and decrease upon reaching a certain threshold, which matches the predictions of a static model of statistical discrimination. In addition, exit rates increase with employability and vary on the basis of ethnicity. This ethnic disparity in exit rates presumably occurs if the variance of the screening error (i.e. a 'noisier' signal) differs across ethnic groups. Both findings provide evidence in favour of **statistical discrimination (+)**. |
| Agan and Starr (2018) | North America (United States of America) | 7,320 fictitious black applicants (7,320 white applicants) | Experimental (field) | The results show that ban-the-box measures in the USA substantially decrease employer call-back for black applicants vis-à-vis white applicants. Because employers no longer possess information about the applicants' criminal history, they are forced to rely on (minority) group-level information, which is detrimental for black applicants. This is evidence in line with **statistical discrimination (+)**.[m] |
| Asali et al. (2018) | Eastern Europe (Georgia) | 1,100 fictitious Azerbaijani and Armenian applicants (1,100 Georgian applicants) | Experimental (field) | Georgian applicants are more than twice as likely to be called back for a job interview than equally skilled Azerbaijani or Armenian applicants. Furthermore, the results indicate that this discrimination tends to increase during economic busts as labour demand decreases. This is in line with predictions from **taste-based discrimination (+)**.[n] |
| Åslund and Rooth (2005) | Northern Europe (Sweden) | Middle Eastern immigrants (other immigrants with an ethnic background different from the minority group and native Swedes)[a] | Correlational (panel) | Due to the 9/11 terrorist attacks that took place in the USA, the authors expected a deterioration of employment perspectives for immigrants as a consequence of increased negative attitudes towards them. Although the results indicate that there is evidence of a change in attitudes, they do not show said effect exists and thus contradict **taste-based discrimination (–)** as a possible explanation for discrimination. |
| Baert and De Pauw (2014) | Western Europe (Belgium) | 139 fictitious applicants with a Turkish-sounding name (139 applicants with a Flemish-sounding name) | Experimental (lab, incl. survey data) | The findings indicate that views related to the mechanism of taste-based discrimination mediate the relationship between the applicant being of non-native origin and an invitation to a job interview. The overall mediation effect is negative, which provides evidence for the presence of **taste-based discrimination (+)**. This does not hold true for attitudes related to the |

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| | | | | mechanism of **statistical discrimination (–)**, for which no effect is found. |
| Baert et al. (2017) | Western Europe (Belgium) | 384 fictitious applicants with a Turkish, Moroccan, Slovakian or Ghanaian name (384 applicants with a Flemish-sounding name) | Experimental (field) | The results show that work experience lowers hiring discrimination against immigrants. Because more information about the actual productivity of a job candidate increases with work experience (i.e. decreased information asymmetry) negatively relates to the uncovered discrimination, these results are in line with **statistical discrimination (+)**. |
| Baert et al. (2018) | Western Europe (Belgium) | 337 fictitious applicants with a Turkish, Moroccan, Slovakian or Ghanaian name (337 applicants with a Flemish-sounding name) | Experimental (field, incl. administrative data) | The findings provide evidence against **statistical discrimination (–)** and **taste-based discrimination (–)**. On the one hand, from the perspective of statistical discrimination, larger firms potentially discriminate less than smaller firms, as they have a dedicated, formalised human resources department, greater capacity to process applications, and hence possess more accurate information of job applicants. On the other hand, taste-based discrimination suggests that unequal treatment based on prejudice should yield worse firm financial health. The results show no significant relationship between firm size or financial health and hiring discrimination. |
| Bartoš et al. (2016) | Central Europe (Czech Republic, Germany) | 653 fictitious candidates with an Asian or Roma name (640 candidates with a native-sounding name) | Experimental (field) | The results indicate that employers discriminate due to a lack of attention to certain information or 'willingness to process information', and hence choose to pay less attention to applications from minorities (i.e. attention discrimination). This, in turn, relates to statistical discrimination as information asymmetry is detrimental to the hiring chances of minorities. The authors argue that the evidence is in line with **statistical discrimination (+)** but that the mechanism cannot fully explain the lack of attention. |
| Bertrand and Mullainathan (2004) | North America (United States of America) | 2,435 fictitious black applicants (2,435 white applicants) | Experimental (field) | The results indicate that there is no evidence that discrimination is higher for jobs requiring greater communication skills vis-à-vis customers and co-workers, which contradicts **taste-based discrimination (–)**. Discrimination levels also do not increase when credentials become more apparent, hence **statistical discrimination (–)** is unlikely to explain the call-back rate differentials. The authors argue that alternative models may better explain their findings. |
| Blommaert et al. (2014) | Western Europe (Netherlands) | 318 fictitious Arabic-named applicants (318 Dutch-named applicants) | Experimental (field) | On the one hand, the results show that Arabic-named applicants experience substantial discrimination in the first 'view' phase of selection, in which employers decide on which candidates' full resumés to view. On the other hand, controlling for the number of views, discrimination decreases in the second 'call-back' phase. However, the degree of discrimination does not vary across occupational levels and sectors, and ethnic minorities do not receive lower returns to informative, observable, productivity-related characteristics |

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| | | | | than majority group members. This is evidence against **statistical discrimination (–)**. |
| Boyd-Swan and Herbst (2019) | North America (United States of America) | Fictitious applicants with black- and Hispanic-sounding names (applicants with white-sounding names)[b] | Experimental (field) | The results indicate that neighbourhood racial and ethnic shares (i.e. proxy for customer discrimination) correlate with teacher hiring decisions in child care centres, benefitting applicant-teachers in neighbourhoods where their own ethnicity is more strongly represented (i.e. ethnic homophily). This is evidence in favour of **taste-based discrimination (+)**. |
| Bryson and Chevalier (2015) | Western Europe (United Kingdom) | 642 non-white Fantasy Football players (1,125 white Fantasy Football players) | Quasi-experimental (field) | The results provide little evidence for racial discrimination in the virtual labour market of Fantasy Football. The virtual labour market setting rules out **taste-based discrimination (–)** since the players do not physically play together (there is no interaction), the employers have no customers and most endogenous and exogenous factors are identical by design. Furthermore, employers have perfect knowledge of the Fantasy Football players' labour productivity. However, the results do show discrimination in hiring and firing of new players for whom, exceptionally, no productivity information is available at the start of the football season, hinting that **statistical discrimination (+)** might be at play. |
| Busetta et al. (2018) | Southern Europe (Italy) | 20,000 fictitious first- and second-generation immigrants with an ethnic background (2,000 native Italians) | Experimental (field) | First-generation immigrants are presumed to be less integrated in society than second-generation immigrants due to being viewed as less proficient in Italian and less educated. Notwithstanding the hypothesised language proficiency differences, the results show that there is no significant difference in the hiring chances of first- and second-generation immigrants in Italy. These findings contradict **statistical discrimination (–)**. Alternatively, the authors suggest that the most valid explanation for the uncovered discrimination is **taste-based discrimination (+)**. |
| Carlsson (2010) | Northern Europe (Sweden) | 1,295 fictitious first-generation and 1,337 second-generation Middle Eastern immigrant applicants (1,329 native Swedes) | Experimental (field) | The results indicate that first- and second-generation immigrants have essentially the same probability of being invited to a job interview. This suggests that minority applicants with a Middle Eastern background are discriminated against because of their ethnicity. This is evidence in line with **taste-based discrimination (+)** and contradicts **statistical discrimination (–)**. Yet, the results also indicate that employment agencies are more likely to invite minority candidates than other firms, potentially because of better assessment procedures and/or compliance with anti-discrimination legislation. This is evidence in favour of **statistical discrimination (+)**. |
| Carlsson and Rooth (2012) | Northern Europe (Sweden) | 2,820 fictitious applicants with a typical Middle Eastern name | Experimental (field, incl. | The results show that applicants with a Middle Eastern name are discriminated against to a larger extent than applicants with a typically |

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|---|---|---|---|---|
| | | (2,837 applicants with a typical Swedish name) | administrative data) | Swedish name in municipalities where people, on average, have more negative attitudes towards immigrants—this effect is greater for low-skilled occupations. These results are evidence in favour of **taste-based discrimination (+)**. |
| Combes et al. (2016) | Western Europe (France) | 137,801 African immigrants (3,169,975 French natives) | Correlational (cross-sectional) | The results show that African immigrants are underrepresented in jobs that require a substantial amount of customer contact in the French labour market, and that this discrimination is linked with customer behaviour. This evidence is in line with **taste-based discrimination (+)**, and more specifically customer discrimination. |
| Edo et al. (2019) | Western Europe (France) | 2,012 fictitious applicants with North African- and other foreign-sounding names (1,006 applicants with French-sounding names) | Experimental (field) | The results suggest that hiring discrimination against ethnic minorities as well as ethnic homophily (by natives and females) in hiring practices exists in the French labour market. The latter is evidence in favour of **taste-based discrimination (+)**. The results also show that differences in call-back become statistically insignificant for non-French females when additional information (i.e. inclusion signals) is provided, yet this does not affect discrimination against non-French males. Given the intersectionality with gender, the results thus provide partial evidence with regard to **statistical discrimination (+)**. |
| Horvath and Huber (2019) | European Union (various EU countries) | 388,820 recent immigrants in the EU and 719,388 established immigrants in the EU (N/A) | Correlational (cross-sectional) | The results support the premise that regional ethnic diversity positively impacts the employment perspectives of immigrants. This effect is stronger for high-skilled immigrants than low-skilled immigrants as well as for recent immigrants than for established immigrants. This is evidence in favour of **statistical discrimination (+)** because information asymmetry presumably decreases in ethnically diverse regions, positively impacting employment rates. |
| Kaas and Manger (2012) | Central Europe (Germany) | 528 fictitious internship candidates with Turkish-sounding name (528 fictitious internship candidates with German-sounding name) | Experimental (field) | The findings of a correspondence test suggest that an employer's call-back is significantly lower for applicants with a Turkish-sounding name than for applicants with a German-sounding name. The call-back rate increases (and the difference becomes insignificant) when applications of candidates with a Turkish-sounding name are accompanied by a reference letter stating additional favourable information about the candidate's personality. Overall, these results provide evidence for **statistical discrimination (+)**. |
| Koopmans et al. (2019) | Central Europe (Germany) | 5,819 fictitious German ethnic minority candidates of Turkish, Bosnian, Polish, Russian or Italian descent, amongst others (5,819 | Experimental (field) | On the one hand, the results indicate that the greater the cultural value distance (from the majority culture), the higher the rate of hiring discrimination against ethnic minorities. On the other hand, the results fail to confirm that average group levels of education explain the group differences in call-back ratios: when value distance patterns are controlled for, |

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| | | German natives) | | discrimination is no longer statistically significant. This evidence is in favour of **taste-based discrimination (+)** but against **statistical discrimination (–)**. |
| Laouénan (2017) | North America (United States of America) | African-Americans (white natives)[c] | Correlational (cross-sectional) | The results indicate that African-Americans are discriminated against in the USA labour market in terms of overall employment opportunities and opportunities to attain jobs with high customer contact. This is evidence in favour of **taste-based discrimination (+)** and, more specifically, customer discrimination. |
| Longley (2003) | North America (United States of America, Canada) | French Canadians (English Canadians and Americans)[d] | Correlational (panel) | The results show that French Canadians are less likely to be employed by an NHL team based in English Canada than an NHL team based in the United States. The author argues that the difference in team location (English Canada vs. USA) is a proxy for fan prejudice, and that its relation to the representation of French Canadians on a team is evidence for customer discrimination. The results support the customer discrimination hypothesis; hence, they provide evidence in favour of **taste-based discrimination (+)**. |
| McGinnity and Lunn (2011) | Western Europe (Ireland) | 240 fictitious candidates with African, Asian or German names (240 candidates with Irish names) | Experimental (field) | Candidates with Irish-sounding names are over twice as likely to be called back for an interview vis-à-vis candidates with an African-, Asian- or German-sounding name. The authors argue that, because discrimination does not increase in sales jobs where levels of customer contact are higher than in other jobs (implying customer discrimination) or lower in accountancy jobs for which formal qualifications are presumably more important than for other jobs (implying statistical discrimination), neither **taste-based discrimination (–)** nor **statistical discrimination (–)** provide an explanation for the discriminatory conduct. |
| Nunley et al. (2016) | North America (United States of America) | 4,698 fictitious black applicants (4,698 fictitious white applicants) | Experimental (field) | The results indicate that black-named applicants are less likely than white-named applicants to receive interview requests from employers. Moreover, the results show that the racial gap in employment opportunities widens with perceived productivity characteristics (business degree, internship, in-field experience) and that the differential treatment by race is greater for jobs that require customer interaction. The former contradicts **statistical discrimination (–)**; the latter is evidence in favour of **taste-based discrimination (+)** and, more specifically, customer discrimination. |
| Oreopoulos (2011) | North America (Canada) | 9,884 fictitious candidates with Indian, Pakistani, Chinese or Greek names (3,026 candidates with English names) | Experimental (field) | The author argues that, under the model of statistical discrimination, the impact of listing language fluency is greater for applicants with an ethnic background than for natives. However, the findings suggest that recruiters do not behave consistently, which is evidence against **statistical discrimination (–)**, because they attribute their discriminatory behaviour to language skill |

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| | | | | concerns but fail to fully account for offsetting features when listed. |
| Ritter and Taylor (2011) | North America (United States of America) | Black and Hispanic workers (white workers)[e] | Correlational (panel) | The results, presented in an agency-based model of unemployment, show that black and, to a lesser extent, Hispanic workers experience higher lifetime unemployment than white workers with similar (pre-market) skills. The authors suggest that day-to-day work-related miscommunication might explain the higher unemployment for minority workers, for which they provide some direct evidence. Following Lang (1986), the results hint at workplace segregation, which can be viewed as evidence for **taste-based discrimination (+)**. |
| Uggen et al. (2014) | North America (United States of America) | 153 fictitious African-American applicants (147 white applicants) | Experimental (field) | The results show that African-Americans are called back less frequently by employers, especially when reporting a misdemeanour arrest during the hiring process. Furthermore, the results indicate that personal contact with applicants has a strong positive effect on call-back rates. The authors suggest that, in the absence of contact, employers erroneously attribute a lower productivity to minority applicants, while the additional information they receive when interacting with them decreases discriminatory conduct. The results are interpreted as evidence for **statistical discrimination (+)**. |
| Vernby and Dancygier (2019) | Northern Europe (Sweden) | 1,492 fictitious Polish, Iraqi and Somalian candidates (1,492 Swedish candidates) | Experimental (field) | The authors make use of ethno-cultural distance vis-à-vis Swedish nationals as a proxy for racial prejudice. The findings indicate that call-back rates for candidates with an ethnic background decline with increased distance across minority groups, especially if the candidates are male. This is evidence in favour of **taste-based discrimination (+)**. Adopting citizenship, acquiring work experience or signalling religious practice have little effect on employment chances, which is evidence against **statistical discrimination (–)**. |
| Vuolo et al. (2017) | North America (United States of America) | 605 fictitious black applicants (605 white applicants) | Experimental (field) | Call-back rates for black applicants are compared across those receiving a question about their criminal record and answer it negatively (i.e. having no criminal record) and those who did not receive a question. The results suggest that there exists a difference between both groups, whereby applicants who receive and answer the question witness a higher call-back rate. The authors suggest that **statistical discrimination (+)** might play a role in the likelihood of a call-back for black minorities. |
| Weichselbaumer (2017) | Central Europe (Austria) | 1,237 fictitious Serbian, Turkish, Chinese and Nigerian applicants (905 Austrian applicants) | Experimental (field) | The results indicate that there is discrimination against applicants of different origins. The author argues that the discrimination is unlikely due to **statistical discrimination (–)** because minority applicants are at par with majority candidates with regard to schooling and language proficiency and have provide extensive personal information on their resumés. Moreover, |

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| | | | | discriminatory levels do not vary by characteristics that relate to customer or co-worker interactions, which contradicts **taste-based discrimination (–)**. Alternatively, the author argues that employer preferences are most probably at the root of the uncovered discrimination, which hints at **taste-based discrimination (+)** as the underlying mechanism. |
| **B. Remuneration** | | | | |
| Altonji and Pierret (2001) | North America (United States of America) | 863 young black US men (2,113 young white US men) | Correlational (panel) | The results show that the unexplained race gap is small at low experience levels and that the gap rises with experience. In addition, the results indicate that the rate of increase is reduced when interactions between experience and skill measures, which are both hard to observe and negatively correlated with race, are also controlled for. This pattern and other results are more consistent with the conclusion that employers only make partial use of race as information when assessing workers, which is interpreted as evidence against **statistical discrimination (–)**. The authors cannot rule out, however, that firms might partially statistically discriminate on the basis of race. |
| Barr and Oduro (2002) | West Africa (Ghana) | 1,045 Ghanaian workers with various ethnic backgrounds (N/A) | Correlational (cross-sectional) | The results suggest that Ghanaian production workers are remunerated differently depending on their ethnic background. Although Northern Ghanaians are remunerated less than workers of other ethnic groups as they gain experience, this increasing wage gap is inconsistent with **statistical discrimination (–)**. According to the authors, this result is more in line with the idea that Northerners face language barriers and/or that their lower educational attainment hinders their chances at promotion. Contrarily, inexperienced workers of the same ethnic group receive a positive wage premium that declines with increasing work experience, which provides some evidence for **statistical discrimination (+)**. |
| Bitzan (2009) | North America (United States of America) | 11,791 black males (167,306 white males) | Correlational (cross-sectional) | The results indicate that the significant differences in earnings between white and black males can be partially explained by **statistical discrimination (+)**, as white males receive higher rewards (wage) for lower-level productivity signals concerning educational attainment, while black males receive higher rewards for higher-level signals. |
| Bjerk (2007) | North America (United States of America) | Black workers (white workers)[f] | Correlational (panel) | The results show that racial wage inequality in the white-collar job sector can be fully explained by controlling for academic skill level while this is only partially true for the blue-collar job sector. Both taste-based and statistical discrimination are consistent with the findings. Regarding **statistical discrimination (+)**, it is theorised that the information mismatch in the white-collar job sector is offset by the strong dependency of productivity on |

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| | | | | academic skill, requiring employers to spend more resources on assessing the applicants' skill levels. Regarding **taste-based discrimination (+)**, it is theorised that academic skill is more important in the white-collar job sector, driving firm competition and thus mitigating discrimination in that sector. |
| Bodvarsson and Partridge (2001) | North America (United States of America) | 127 white NBA players (362 black NBA players) | Correlational (cross-sectional) | The authors developed a model through which they were able to distinguish between employer (proxy: team manager race), co-worker (proxy: team racial composition) and customer discrimination (proxy: willingness to pay to see a team play) in the context of the NBA basketball competition. The results show that white players demand wage premiums for playing alongside black workers (i.e. employee discrimination) and black fans prefer to see teams play that, on average, line up a higher number of black players (i.e. customer discrimination). This is interpreted as evidence in favour of **taste-based discrimination (+)**. |
| Charles and Guryan (2008) | North America (United States of America) | Black workers (white workers)[g] | Correlational (panel) | The results provide support for several predictions of **taste-based discrimination (+)** with regard to racial animus. They suggest that, at the US state level, relative black wages vary negatively with the prejudice of the marginal person in the distribution, with the prejudice in the lower (left) tail of the prejudice distribution and with the fraction of the workforce that is black. |
| Epstein et al. (2016) | Middle East (Israel) | 7,746 female Arab university graduates (115,424 female Jewish university graduates) | Correlational (panel) | The study suggests that Arab women are discriminated against vis-à-vis Jewish women in terms of wage when starting their career. This wage gap is non-existent for their male counterparts. As time progresses, employees gain experience, the information on productivity-related characteristics increases and the existing wage gap for Arab women gradually disappears. This is evidence in favour of **statistical discrimination (+)**. |
| Fadlon (2015) | North America (United States of America) | 925 black workers (1,584 white workers) | Correlational (panel) | The results suggest that racial minorities are discriminated against in the US labour market. Moreover, the wage of minority employees is more strongly correlated with productivity, measured by AFQT test scores, when they match the race of their employer than when they do not. Based on the assumption that matched employers are better informed about same-race employees than non-matched employers, the findings provide support for **statistical discrimination (+)**. |
| Fryer et al. (2013) | North America (United States of America) | 839 black individuals (3,566 white individuals) | Correlational (panel) | The authors employ a search-matching model of labour market discrimination. The results indicate that the within-firm racial wage gap narrows with tenure by a return-to-tenure rate that is 1.1%-points higher for blacks than whites, providing evidence for the statistical learning hypothesis that stems from **statistical discrimination (+)** theory. |

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| Kreisman and Rangel (2015) | North America (United States of America) | 546 black male individuals (1,148 white male individuals) | Correlational (panel) | In contrast with predictions from **statistical discrimination (–)**, the results suggest that black-white and dark-light wage gaps diverge over time as employees accumulate experience. On the other hand, the accumulation of experience has different effects for lighter- vis-à-vis darker-skinned blacks, in line with the dynamic model of **statistical discrimination (+)** postulated by Oettinger (1996). More specifically, the results suggest that the accumulation of experience produces smaller wage gains for darker-skinned blacks than lighter-skinned blacks. |
| Schaeffer et al. (2015) | Central Europe (Germany) | Workers of Turkish origin and repatriates (native Germans)[h] | Correlational (cross-sectional) | The authors put forward a signalling model of statistical discrimination in which they argue that if minorities' educational qualifications carry less signalling power, poorly qualified members of the minority group will experience positive discrimination. The results indicate, in line with the authors' model, that poorly qualified persons of Turkish origin appear to enjoy wage advantages in the labour market, which highly qualified peers do not. These findings are in line with **statistical discrimination (+)**. |
| C. Employment and Remuneration *(Combined)* | | | | |
| Åslund et al. (2014) | Northern Europe (Sweden) | Immigrant workers (native Swedish workers)[i] | Correlational (panel) | The results indicate that managers with an immigration background hire significantly more immigrant workers than native managers. Furthermore, the results show that employee–employer similarity is positively correlated with wages and negatively with exit rates. The biases found are generally more pronounced in the for-profit sector and highly competitive product markets, indicating that profit-maximizing concerns might explain the behaviour of employers better than **taste-based discrimination (–)**. |
| Borowczyk-Martins et al. (2017) | North America (United States of America) | 1,516 black male workers in manufacturing (13,184 white male workers in manufacturing) | Correlational (cross-sectional)[l] | The authors constructed a search and matching model of the labour market in which taste-based mechanisms, search frictions and skill complementarities were embedded. The findings suggest that the model, applied to data from the United States manufacturing industry, confirms predictions that employment rates and wages are lower for black workers vis-à-vis white workers, yet that the variance in wage and employment opportunities is smaller with regard to high-skilled employment. Their findings are in line with **taste-based discrimination (+)**. |
| Drydakis (2012) | Southern Europe (Greece) | 946 fictitious female applicants of Albanian descent (946 fictitious female applicants of Greek (native) descent) | Experimental (field) | The results indicate that women of Albanian descent face lower chances of occupational access and lower wages vis-à-vis their Greek counterparts. There is no variation with job type as discrimination is not stronger for client-facing jobs (i.e. absence of customer discrimination), which is evidence against **taste-based discrimination (–)**. When women of Albanian descent disclose additional |

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| | | | | information about themselves, wage offers increase, which is evidence for **statistical discrimination (+)**. However, discrimination is not fully eliminated as the wage differential remains significant, which suggests that there remains a certain level of **taste-based discrimination (+)**. |
| Hedegaard and Tyran (2018) | Northern Europe (Denmark) | 82 fictitious candidates with a Muslim-sounding name (80 candidates with a Danish-sounding name) | Experimental (field) | The findings indicate that decision makers discriminate even when their decision causes them to incur a financial penalty. However, discrimination decreases when the price of doing so increases. This is in line with **taste-based discrimination (+)**. Furthermore, in the condition where no additional information about the candidates' productivity is available, rational beliefs about expected earnings do not explain the uncovered discrimination better, which is evidence against **statistical discrimination (–)**. |
| Ramachandran and Rauh (2018) | North America (United States of America) | Black self-employed workers (white self-employed workers)[j] | Correlational (panel) | The authors developed a model incorporating taste-based discrimination and 'belief-based' discrimination. As soon as a belief-based mechanism is introduced in the regression analysis, the results indicate that not taste but a 'rational response' to beliefs that others might pursue ethnic discrimination explains the lower participation rates, lower income and reduced success in establishing interlinkages in the self-employment market for blacks. These results contradict **taste-based discrimination (–)**. |
| D. Other *(Job Performance and Firm Productivity)* | | | | |
| Glover et al. (2017) | Western Europe (France) | Participants with an ethnic background (native participants)[k] | Quasi-experimental (field, incl. administrative and survey data) | The results demonstrate that there is no evidence of negative 'animus' towards minorities: minorities do not report that biased managers seem to dislike them or assign them to unpleasant tasks. These results contradict **taste-based discrimination (–)**. In contrast, the results indicate that biased managers spend less time with minority workers (i.e. they have fewer interactions). Because of this reduced interaction, minority workers put forth less effort when working with biased managers. This, in turn, confirms the negative prior biases of the managers, which is evidence in favour of **statistical discrimination (+)**. |
| Hjort (2014) | East Africa (Kenya) | 426 Kikuyu affiliated workers (498 Luo affiliated workers) | Quasi-experimental (field) | The results suggest that production output is lower in heterogeneous teams than in homogeneous teams as Kenyan workers discriminate against their non-co-ethnic co-workers. After a period of ethnic intra-country conflict, production output further decreased, presumably because of increased interethnic rivalry. Introducing a form of team remuneration significantly increased output in (horizontally mixed) heterogeneous teams. These results are in line with **taste-based discrimination (+)**. |

*Notes*. The following abbreviations are used: N/A (not applicable), USA (United States of America), NHL (National Hockey League), NBA (National Basketball Association), AFQT (Armed Forces Qualification Test). '(+)' denotes supportive evidence while '(−)' denotes contrary evidence. Regarding the studies that rely on (field) experimental research, the number of fictitious applicants in column three 'Minority (majority)' reflects the number of resumés that were sent out, not the number of unique applicant profiles. The classifications presented in the fourth column 'Research design' are based on Leary (2012)—the terms between brackets indicate the type of data used (for correlational research) or the research design subtype (for experimental research). The fifth column 'Main findings related to the mechanisms' reflects the classification regarding the empirical evidence on taste-based and statistical discrimination made by the respective authors on the grounds of their research findings.

[a] The number of observations per ethnic group ranged from 2,091 to 18,403.

[b] The total number of observations (sent out resumés) equalled 10,986.

[c] The total number of observations ranged from 488,290 to 1,123,500 in function of the regression analyses that were performed.

[d] The total sample size was 248.

[e] Sample sizes ranged from 2,317 to 4,032.

[f] Sample sizes ranged from 259 to 2,431.

[g] Data at the US state level; the total sample size was 45.

[h] The number of observations per ethnic group ranged from 318 to 267,966.

[i] The number of observations per ethnic group ranged from 11,618 to 745,660.

[j] The total number of observations, in function of the regression analyses, ranged from 14,719 to 26,339.

[k] Sample sizes ranged from 61 to 220.

[l] The analysis of the data was based on structural estimation.

[m] We are aware that a similar research question has been addressed in previous studies which, in some cases, yielded comparable results (e.g. Decker, Ortiz, & Hedberg, 2015; Pager, 2003; Pager, Western, & Bonikowski, 2009). However, the results of these studies did not show that the absence of information on the applicant's criminal history (e.g. due to ban-the-box measures) resulted in lower hiring chances for ethnic minorities but merely showed that there is an interaction effect of ethnicity and criminal record on employer call-back—when minority candidates had committed felonies, they were penalised more severely than their majority counterparts. Moreover, the findings of these studies were not interpreted in terms of taste-based or statistical discrimination and hence not included in this review, in line with our eligibility criteria.

[n] Previous research of Asali (2010) also seems to support the premise of taste-based discrimination as the dominant mechanism in explaining discriminatory conduct, although this was not explicitly stated in the study.