



Department for  
Business & Trade

# **Nudging the Minimum Wage**

BEIS/DBT Research Paper Series Number 2023/002

April 2023

## Contents

|  |           |
|--|-----------|
| <b>Contents</b>  | <b>2</b>  |
| <b>Executive summary</b>   | <b>3</b>  |
| <b>1. Introduction: a first foray into behavioural science for minimum wage compliance</b> | <b>4</b>  |
| <b>2. HMRC's previous trials</b>   | <b>6</b>  |
| <b>3. Our approach</b>   | <b>11</b> |
| 3.1 Pre-trial preparatory work   | 11        |
| 3.2 Final emails and study design  | 14        |
| 3.3 Data linking   | 16        |
| <b>4. Implementation and analysis</b>  | <b>17</b> |
| 4.1 Email delivery and reporting   | 17        |
| 4.2 Analysis conducted   | 17        |
| <b>5. Findings</b>   | <b>18</b> |
| <b>6. Discussion</b>   | <b>20</b> |
| 6.1 Initial conclusions  | 20        |
| 6.2 Practical significance and value for HMRC's compliance campaigns                       | 20        |
| 6.3 Further support for the 'curiosity' frame  | 20        |
| 6.4 Adding to the evidence base about what works to prompt firms                           | 21        |
| <b>7. Conclusion</b>   | <b>22</b> |
| <b>Annex 1: E-mails from HMRC's original study</b>   | <b>23</b> |
| <b>Annex 2: Pre-trial preparatory work</b>   | <b>24</b> |
| <b>Annex 3: Trial emails</b>   | <b>26</b> |
| <b>Annex 4: Implementation and analysis files</b>  | <b>34</b> |

## Executive summary

His Majesty's Revenue and Customs (HMRC) is responsible for enforcing Minimum Wage (MW) legislation among UK employers. Part of this enforcement activity involves promoting compliance through information and guidance in mass email campaigns. However, it is not always clear how email campaigns can maximise engagement with the relevant information, and how their impact may vary among employer groups.

This report summarises the results of a randomised controlled trial designed to explore this issue run by HMRC, the Department for Business, Energy and Industrial Strategy (BEIS)<sup>1</sup>, the Behavioural Insights Team (BIT) and Harvard Business School (HBS). The trial built on the earlier findings of several 2016-17 email trials run by HMRC. A short literature review and employer interviews informed the design of eight messages (7 messages and 1 control message) tested in the trial. Over 450,000 UK employers were randomly assigned to receive an email signposting to the government's updated employer guidance which included one of these messages.

All seven messages saw statistically significant effects on our primary outcome measure (the proportion of unique click throughs to the government's MW employer guidance page). Treatment effects ranged from -3.0 to 3.5 percentage points relative to a control.

The top three performing emails included a norm tailored to the recipient's industry. Although the trial is not designed to explain why this happened, we hypothesise this result may have come about from recipients believing that the email was more relevant to their business than otherwise would have been the case. An email containing a 'curiosity frame' used in HMRC's earlier trials also outperformed a control. This may be further evidence that this frame is an effective one for employer communications about minimum wage compliance. In contrast, three messages that included a reference to mistakes employers make around salaried workers; information about employer benefits from compliance; and data about increased identification of non-compliance from 2014-19 each underperformed the control. One hypothesised factor for this finding is that the control email had a markedly lower word count and higher readability compared to these three emails.

This study contributes to the existing evidence on how behavioural science may enhance the effectiveness of government campaigns to promote compliance with MW. The findings demonstrate that differences between messages containing the same informational content can produce large aggregate effects at near-zero marginal cost. Further analysis following this report's publication will be the first in the UK to link firm-level data to unique click throughs in the context of MW compliance.

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<sup>1</sup> Following a Machinery of Government change in February 2023, the policy responsibility for the NMW and NLW, previously under the Department for Business, Energy and Industrial Strategy, now sits under the Department for Business and Trade (DBT).

## 1. Introduction: a first foray into behavioural science for minimum wage compliance

The National Minimum Wage and the National Living Wage — collectively, the Minimum Wage (MW) — entitle nearly all workers in the United Kingdom to a foundational level of pay that is enshrined in legislation. However, the broad coverage of this policy means that ensuring compliance with the relevant legislation is a challenge for enforcement.

In April 2022, the Low Pay Commission estimated that up to one third (~507,000) of workers entitled to MW did not receive it.<sup>2</sup> However, methodological issues associated with the data source for this estimate, the Annual Survey of Hours and Earnings (ASHE), mean this is not a direct measure of minimum wage non-compliance. These issues include the proximity of ASHE the survey to the annual minimum wage uprating; the fact that the survey only measures underpayment in the formal economy; and there being legitimate reasons for underpayment.

To further enhance compliance, the budget for the MW enforcement body, His Majesty's Revenue and Customs' (HMRC), has more than doubled from £13.2 million (2015/16), to £27.5 million (2021/22).<sup>3</sup> This budget funds a range of enforcement activities across HMRC's three-arm strategy: promoting compliance, preventing underpayment and responding to violations.

Within their promoting compliance arm, HMRC administers regular mass email campaigns to share MW information and guidance. As a form of information-based enforcement, the aim is for compliance to increase when employers have read and understood the relevant MW guidance. In turn, the email campaigns aim to close the information gaps employers can experience — akin to the gaps we know individuals encounter in other business contexts.<sup>4</sup> These email campaigns are one the most efficient ways to share information and guidance with many employers. As such, strengthening their effectiveness is of high priority to HMRC's future enforcement strategy.

However, it is not always clear how email campaigns can maximise engagement with the relevant information, and how their impact may vary among employer groups. To learn more, HMRC ran a series of email trials between 2016 and 2017, where they tested a variety of behaviourally-informed messages. Among the messages tested, they found a curiosity-inclusion message (with text saying 'You may be surprised to learn that even if you pay above the minimum wage you could still be liable for underpayment') was the most effective variant studied.

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<sup>2</sup> Low Pay Commission (2023) *National Minimum Wage: Low Pay Commission Report 2022*. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1129930/Low\\_Pay\\_Commission\\_Report\\_2022.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1129930/Low_Pay_Commission_Report_2022.pdf). N.B. some caution must be taken with the accuracy of these estimations, as they do not capture the grey economy and the timings of the surveys could distort readings.

<sup>3</sup> DBT (2023) *National Living Wage and National Minimum Wage: Government evidence on compliance and enforcement 2021/22*. <https://www.gov.uk/government/publications/national-living-wage-and-national-minimum-wage-government-evidence-on-enforcement-and-compliance-2022>.

<sup>4</sup> See for example, BIT (2019) *Boosting businesses: applying behavioural insights to business policy*. <https://www.bi.team/publications/boosting-businesses-applying-behavioural-insights-to-business-policy/>.

To build on HMRC's earlier findings, a collaborative email trial was established in 2020 between HMRC, the Department for Business, Energy and Industrial Strategy (BEIS), The Behavioural Insights Team (BIT) and Harvard Business School (HBS).

This report describes the new study and its results. Namely:

- **Section 2** provides background on HMRC's previous study
- **Section 3** describes the present trial, including preparatory work
- **Section 4** outlines the implementation and analysis protocol
- **Section 5** discusses the trial's findings
- **Section 6** discusses lessons for policymakers and opportunities for future research
- **Section 7** concludes.

To complement this report, HBS and BIT are co-publishing a separate academic journal article about the new study's results. This article will contain further analysis on the study's data and is forthcoming at the time of writing.

## 2. HMRC's previous trials

To learn more about how behavioural science can improve the effectiveness of engagement with email campaigns promoting compliance with the MW, between October 2016 and December 2017, HMRC conducted a sequence of email experiments signposting employers to further information about MW policy updates and guidance.

The experiments featured a large ( $n > 600,000$ ) employer sample, an iterative approach to message development, and a study design that randomised employers to the emails they received in order to identify the differences between engagement statistics attributable to the differences between them. To maximise employer engagement — particularly among wary employers — the tested emails also adopted insights from the field of behavioural science.

The behavioural interventions tested in the first two trials did not show conclusive evidence of their effectiveness against the control. The first trial, conducted in October 2016 to coincide with a rate increase, saw each of the five 'treatment' emails underperform a 'control' (that is, a fixed comparison) email by between 2 to 8.5 percentage points in terms of click-through rates conditional on opening the email.

**Table 2.1: Summary of emails from HMRC's October 2016 trial (iteration 1 of 3)**

| Email name            | Key excerpts  |
|-----------------------|---|
| <b>Control</b>        | "On the 1 October 2016 the National Minimum Wage rates for the different age bands and for apprentices will increase." -- this text was present in all variants   |
| <b>Cost/Naming</b>    | "Employers who don't pay National Minimum Wage rates are liable to a 200% penalty of the arrears amount. HMRC has investigated more than 70,000 employers and last year identified £10.3 million in arrears for workers." |
| <b>Norm</b>           | "95% of employers pay workers at or above National Minimum Wage rates, don't fall into the small minority that underpay."   |
| <b>Cost/Penalties</b> | "Employers who don't pay National Minimum Wage rates are liable to a 200% penalty of the arrears amount."   |
| <b>Affect</b>         | The text excerpt was the same as the control, with an additional stock photo of a smiling woman embedded in email.  |
| <b>Incentive</b>      | "HMRC has investigated more than 70,000 employers and has the right to carry out checks at any time and ask to see payment records."  |

Source: HMRC

**Table 2.2: Results of HMRC's October 2016 trial (iteration 1 of 3)**

| Email name            | Delivered | Emails opened | Opening rate | Links clicked | Click-through rate | Effect size* |
|-----------------------|-----------|---------------|--------------|---------------|--------------------|--------------|
| <b>Control</b>        | 101,344   | 29,783        | 29.4%        | 18,637        | 62.6%              | N/A          |
| <b>Cost/Naming</b>    | 102,942   | 31,169        | 30.3%        | 18,771        | 60.2%              | -2.4%        |
| <b>Norm</b>           | 102,888   | 31,283        | 30.4%        | 18,331        | 58.6%              | -4.0%        |
| <b>Cost/Penalties</b> | 102,713   | 31,151        | 30.3%        | 17,628        | 56.6%              | -6.0%        |
| <b>Affect</b>         | 102,947   | 31,780        | 30.9%        | 17,613        | 55.4%              | -7.2%        |
| <b>Incentive</b>      | 102,801   | 32,078        | 31.2%        | 17,356        | 54.1%              | -8.5%        |

Source: HMRC. \*'Effect size' is the difference in the click-through rate between the control email and the treatment in a given row.

In April 2017, a new set of treatment emails that used different ideas from behavioural science also underperformed a control, although this time by a smaller size than in 2016 (c. 1.5-2.5. ppts).

**Table 2.3: Summary of emails from HMRC's April 2017 trial (iteration 2 of 3)**

| Email name          | Key excerpts   |
|---------------------|--|
| <b>Control</b>      | "On 1 April 2017, the National Minimum Wage and National Living Wage rates for all age bands and for apprentices will increase." |
| <b>Mistake #1</b>   | "Failure to implement rates increases is a common mistake employers make that puts them at risk of underpaying a minimum wage."  |
| <b>Mistake #2</b>   | "Mistakes can be costly, avoid this one and don't fall foul of underpaying minimum wage."  |
| <b>Accidental</b>   | "Very few employers set out to underpay the minimum wage, don't get caught out by these rate increases."                         |
| <b>Inclusion #1</b> | "The new higher rates will impact more employers than ever, are you one of them?"  |

|                     |   |
|---------------------|---|
| <b>Inclusion #2</b> | “Even if you currently pay above the minimum wage these new higher rates may impact your business.” |
|---------------------|---|

Source: HMRC

**Table 2.4: Results of HMRC’s April 2017 trial (iteration 2 of 3)**

| Email name          | Delivered | Emails opened | Opening rate | Unique clicks | Click-through rate | Effect size |
|---------------------|-----------|---------------|--------------|---------------|--------------------|-------------|
| <b>Control</b>      | 104,080   | 29,577        | 28.4%        | 10,136        | 34.8%              | N/A         |
| <b>Mistake #1</b>   | 103,844   | 29,318        | 28.2%        | 9,587         | 32.7%              | -1.6%       |
| <b>Mistake #2</b>   | 103,872   | 29,690        | 28.6%        | 9,488         | 32.0%              | -2.3%       |
| <b>Accidental</b>   | 103,939   | 29,693        | 28.6%        | 9,459         | 31.9%              | -2.4%       |
| <b>Inclusion #1</b> | 103,742   | 29,305        | 28.3%        | 9,557         | 32.6%              | -1.7%       |
| <b>Inclusion #2</b> | 103,814   | 29,392        | 28.3%        | 9,658         | 32.9%              | -1.4%       |

Source: HMRC

After this, HMRC consulted a behavioural scientist about the design of new emails and the result of the first two waves. HMRC then ran a third study in December 2017 that coincided with HM Government’s naming of several non-compliant employers. Unlike the first two waves, the third study saw each of the tested emails outperform the control.

**Table 2.5: Summary of emails from HMRC’s December 2017 trial (iteration 3 of 3)**

| Email name                   | Key excerpts  |
|------------------------------|---|
| <b>Control</b>               | ‘Avoid making the same mistakes, [...]’   |
| <b>Curiosity</b>             | ‘You may be surprised at the errors employers make’   |
| <b>Curiosity + Inclusion</b> | ‘You may be surprised to learn that even if you pay above the minimum wage you could still be liable for underpayment.’ |
| <b>Inclusion</b>             | ‘Even if you pay above the minimum wage you could still be liable for underpayment, [...]’                              |



|                 |   |
|-----------------|---|
| <b>Saliency</b> | 'Lots of companies don't realise they have workers who are underpaid. Don't get caught out, [...] |
|-----------------|---|

Source: HMRC

**Table 2.6: Results of HMRC's December 2017 trial (iteration 3 of 3)**

| Email name                   | Delivered | Emails opened | Opening rate | Links clicked | Click-through rate | Effect size |
|------------------------------|-----------|---------------|--------------|---------------|--------------------|-------------|
| <b>Control</b>               | 125,188   | 28,599        | 22.8%        | 3,501         | 12.2%              | N/A         |
| <b>Curiosity</b>             | 125,125   | 28,867        | 23.1%        | 4,242         | 14.7%              | 2.5%        |
| <b>Curiosity + Inclusion</b> | 125,121   | 28,634        | 22.9%        | 5,027         | 17.6%              | 5.3%        |
| <b>Inclusion</b>             | 125,233   | 28,928        | 23.1%        | 4,767         | 16.5%              | 4.2%        |
| <b>Salience</b>              | 125,449   | 28,906        | 23.0%        | 3,651         | 12.6%              | 0.4%        |

Source: HMRC

The second curiosity message ('Curiosity+Inclusion') was the most effective of the tested variants, showing a 5.3 percentage point higher click-through rate compared to the control. Table 2.1 below summarises the tested copy. Copies of all tested messages are in **Annex 1**.

It is worth noting HMRC acknowledges the drop in click-through rates across the three waves — potentially due to the differences in trial timing and/ or the novelty of the URLs included — nevertheless, this difference is redundant when deducing treatment effects against their relative control.

HMRC's study was an original, valuable, and well-executed study about applying behavioural science to the area of promoting compliance with the MW. This work laid the foundation for several extensions to their original findings.

However, further analysis of the data HMRC's original study was precluded by several features of the trial's setup. The trial was conducted without taking administrative data about participating employers into account, so it was not possible to understand impacts among employer groups. Additionally, due to the data protection issues, individual trial data were later destroyed, preventing any retrospective data linking and analysis. Third, although the 'Curiosity and Inclusion' variant performed well in the final wave, it is unclear whether this result generalises to other contexts given differences between the study's third iteration and its previous two. For example, the emails in the third wave related to an event where the government named-and-shamed non-compliant employers, rather than a rate increase.

Given the limitations described, it was deemed valuable to perform a new email trial to address these limitations. Such a study would build upon HMRC's original findings and generate a new dataset that could be linked to administrative microdata, enabling messaging impacts among specific employer groups to be analysed in a manner not achieved before.

## 3. Our approach

### 3.1 Pre-trial preparatory work

The study extended HMRC's previous email trial to learn more about how HMRC's existing communications encourage compliance with the Minimum Wage. These extensions involved:

1. applying behavioural science to design a new set of emails to improve their efficacy. Here, improved efficacy directly translates as an increase in the proportion of recipients engaging with MW guidance, so to reduce MW violations caused by possible information gaps
2. linking outcome data to a firm-level HMRC administrative dataset to conduct subgroup analyses for each trial arm and the study as a whole

The first step involved conducting a short literature review of stylised facts about minimum wage compliance and factors affecting this; conducting a pair of employer interviews; and drafting messages once armed with the findings of these activities.

#### 3.1.1 Literature review

The literature review was conducted in March-April 2020 by BIT and covered three areas:

- stylised facts and firm characteristics related to compliance with the Minimum Wage in the UK,
- theories about compliance in the academic and policy literature and
- interventions that may promote compliance.

The review included the following findings and recommendations:

- **Compliance with the MW is correlated with many observable firm-level characteristics.** These include: size; the proportion of salary workers a company employs; sector; the prevalence of apprentices in a workforce and industry; location; informal working practices; financial difficulties; and age of firm.
- **Compared with 'non-behavioural' determinants of compliance, 'behavioural factors' affecting compliance are generally more numerous, context-specific, and sometimes have multidirectional or ambiguous effects.**
- **Emails should adhere to existing best practice about what is known to work in prompting businesses using email.** For example, consideration should be paid to factors such as the recipient of a message, the message's timing, and framing.

These and other findings are detailed within the literature review which is in **Annex 2**.

### 3.1.2 Employer interviews

After the literature review, BIT conducted two employer interviews. These interviews aimed to learn about how the MW is viewed and operationalised by employers. The interviews aimed to build upon existing qualitative research.

The first interviewee was the owner of a home care company in London. The second was the managing director of a nursery / childcare provider in the West Midlands. Both interviewees were selected due to their companies being in sectors with historically low compliance with the MW (as identified in the literature review). We originally planned to conduct more than two interviews, but encountered difficulties recruiting interviewees in mid-2020, partly due to the pandemic.

BIT spoke with each interviewee for approximately an hour. These discussions were semi-structured and covered the following topics:

1. the interviewees' understanding of the minimum wage
2. the wage setting process in the interviewee's firm and barriers to compliance
3. the interviewees' beliefs about enforcement

Findings from these interviews included:

- Both interviewees had little knowledge about the likelihood of detection or the size of the penalties for non-compliance
- Non-compliance may often result from misunderstanding what compliance entails (e.g. in relation to paying for travel time, classifying workers as contractors, etc.)
- Existing government guidance about minimum wage obligations is well-drafted and clearly communicated relative to other business compliance areas

The interview's topic guide along with summary notes from each interview are in **Annex 2**.

### 3.1.3 Intervention design process

With the findings of the previous HMRC study, literature review and employer interviews in hand, the project team (BIT/HBS/HMRC/BEIS) applied a four-step process to develop the draft emails to test in the study. This process is described and accompanied with an example from an early stage in the project in **Box 3.1**.

**Box 3.1**

**Intervention design process: example**

**Step 1. Identify a relevant stylised behavioural fact from work to date (for example: the previous trials, the literature review, or the forthcoming interviews)**

*Stylised fact: a significant proportion of non-compliance is accidental*

**Supporting evidence (or lack thereof) to motivate testing:**

- *The ‘Curiosity’ variant in HMRC’s previous trial (Wave 3) was a successful treatment email and included the sentence to ‘You may be surprised to learn that even if you pay above the minimum wage you could still be liable for underpayment’*
- *Rates of underpayment are substantially higher in the financial quarter which immediately follows a change to the NMW and decreases thereafter (see analysis by Low Pay Commission summarised in the literature review)*

**Step 2. Generate hypotheses for the barriers underlying this fact using an appropriate theoretical framework**

*Two hypotheses for why we might see a lot of accidental non-compliance are:*

1. **Poor monitoring systems:** *some employers may lack adequate systems and processes for tracking hours and pay consistently (e.g. ad-hoc processes in the informal sector like manual record-keeping subject to human error). As a result of this, some employers may make mistakes in determining a compliant wage level (e.g. they may accidentally include a pension in a wage calculation).*
2. **Industry-specific social norms:** *businesses in certain industries may set wages based in part on what they observe their peers do without regard to specific rules in legislation or guidance published by external bodies. This may result in accidental non-compliance that comes from inadvertently copying the wage practices of a non-compliant competitor.*

*These hypotheses can be positioned within the COM-B behaviour change model<sup>5</sup> and the associated Theoretical Domain Framework (TDF) under the barriers of (1) ‘Capability: competence/ability/skill assessment, procedural knowledge, resources’ and (2) ‘Motivation: social comparisons, group conformity’ respectively.*

**Step 3. Prepare content to be inserted into emails that may alleviate the barriers underlying these hypotheses**

*Where possible, drafts should*

- *comply with HMRC’s Style Guide; and*

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<sup>5</sup> More information about the COM-B model can be found in Michie, S., Atkins, L., & West, R. (2014). *The behaviour change wheel. A guide to designing interventions*. 1st ed. Great Britain: Silverback Publishing, 1003-1010.

- refer to appropriate firm characteristics data and other micro-data that allows for personalisation and targeting of recipients, which has been shown to increase engagement compared to messages that do not feature these.<sup>6</sup>

For example, a message based on the HMRC Wave 1 email structure that relates to the second hypothesis in this example could be (contingent on data availability and quality):

Dear Customer,

On the [DATE], the National Minimum Wage and National Living Wage rates for all age bands and for apprentices will increase.

**Most people who underpay do so by accident, so don't assume your competitors or neighbours have got it right. For example, [X%] of businesses in [RECIPIENT INDUSTRY] were non-compliant in 2019 despite paying above the minimum wage.**

If you haven't already, you need to now:

1. Find out the new rates of pay [here](#).
2. Take appropriate payroll action for anybody who is eligible in your organisation.
3. You can find further information on our [National Minimum Wage](#) page.

### 3.2 Final emails and study design

The result of the study's preparatory work was an eight-arm blocked randomised-controlled trial study design involving eight emails and over 450,000 employers in the UK. Randomisation and stratification were undertaken by HBS using a linked dataset created by HMRC.

The email candidates considered for testing are summarised in **Table 3.1** below. Copies of the emails are in **Annex 3**.

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<sup>6</sup> See for example See for example, BIT (2019) *Boosting businesses: applying behavioural insights to business policy*. <https://www.bi.team/publications/boosting-businesses-applying-behavioural-insights-to-business-policy/>, p. 19.

**Table 3.1 Summary of the trial's arms (see Annex 3 for email copies)**

| Email name   | Key excerpts   | Rationale  |
|--|--|--|
| <b>Control</b>   | "Our employers' guide to the National Minimum Wage is available for you."  | Used to compare the impact of the following treatment arms.  |
| <b>Salaried workers</b>  | "You may be surprised to learn that employers who pay less than the minimum wage sometimes do so because of mistakes around salaried workers."   | Correcting potential misconceptions about the cause(s) of MW violations, by making mistake-driven MW salient.  |
| <b>Industry norms (construction/ transport/ retail) - three separate variants sent</b> | "Most employers in the [construction/ transport/ retail] sector comply with the minimum wage. Avoid running risks and being investigated."   | Individuals often use the actions of others — particularly those who share similarities with oneself — to inform their own behaviour. Highlighting a desired behaviour as commonplace can encourage others to follow. <sup>7</sup>   |
| <b>Worker benefits</b>   | "Complying with the minimum wage ensures that the labour market works for everyone, both in terms of fair pay and fair working conditions."  | How a piece of information is framed, or presented, can often determine its impact. <sup>8</sup> Here, a benefit frame is emphasising the value of MW to employees.  |
| <b>Curiosity + calculator</b>  | "You may be surprised to learn that many employers pay less than the minimum wage without realising it.<br><br>HMRC's National Minimum Wage calculator can help you to check if your business is compliant." | In HMRC's previous trials, this treatment was the most effective. The message harnesses an individual's curiosity gap, i.e. a desire to access information perceived as valuable, once made aware it is available. <sup>9</sup> The calculator URL then makes it easier to check compliance, by reducing the friction costs. <sup>10</sup> |

<sup>7</sup> Cialdini (2007). *Influence: The Psychology of Persuasion*. New York: HarperBusiness, Revised Edition.

<sup>8</sup> Tversky, A. & Kahneman, D. (1981). *The framing of decisions and the psychology of choice*. *Science*, 211(4481), 453-458.

<sup>9</sup> Loewenstein, G. (1994). The psychology of curiosity: A review and reinterpretation. *Psychological bulletin*, 116(1), 75.

<sup>10</sup> BIT (2019) *Boosting businesses: applying behavioural insights to business policy*.

<https://www.bi.team/publications/boosting-businesses-applying-behavioural-insights-to-business-policy/>.

|                            |   |  |
|----------------------------|---|--|
| <b>Dynamic enforcement</b> | “...You may be surprised to learn that, from 2014 to 2019, instances of underpayment of the minimum wage uncovered by HMRC increased by over 600%.” | Individuals have the tendency to compare the perceived risk with their target level of risk, and will often adjust their behaviour to eliminate any differences between the two. This is referred to as risk homeostasis. In instances where risk is perceived as lower than the absolute risk, making the risk salient can reduce risk-taking behaviours. <sup>11</sup> |
|----------------------------|---|--|

### 3.3 Data linking

The administrative dataset linking and subgroup analyses were planned and implemented by Sam Austin (HMRC), Fulton (Chris) Eaglin (HBS), and Gregor Schubert (HBS). This work’s output is ongoing at the time of writing and will be further detailed in the forthcoming article produced by HBS and BIT.

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<sup>11</sup> Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welch, N. (2001). Risk as feelings. *Psychological Bulletin*, 127(2), 267–286.



## 4. Implementation and analysis

### 4.1 Email delivery and reporting

The study's emails were sent by HMRC in two tranches on 24 March 2021 and 31 March 2021. This timing was a result of scheduling requirements within HMRC that precluded all eight emails from being sent simultaneously. HBS' and BIT's forthcoming article will explore to what extent this may have affected the validity of the study's results.

On 12 April 2021, headline summary reports about recipients' engagement with each email were provided to BIT by HMRC for each of the eight tested emails. These summary reports contain the aggregate data on deliveries and click-through rates for relevant URLs that form the basis of this report's analysis. Copies of each of these summary reports are in **Annex 4**.

### 4.2 Analysis conducted

Our primary outcome variable was the proportion of recipients who clicked on a hyperlink to the 2021 guidance about the National Minimum Wage. For all treatments except the industry norms, the study's average treatment effects (ATEs) were the difference between the mean outcomes between the control email and each of the seven treatment emails. For the industry norm treatments, the ATEs were calculated using recipients in the control group from the same industry as the relevant arm. For example, recipients in the retail sector who received a norm treatment were compared against recipients in the control group also from the retail sector. A multiple-comparison adjustment was made using the Benjamini-Hochberg procedure. This adjustment is made to account for the increased possibility a statistically significant result was observed by chance solely due to there being multiple tested emails (as compared to if there were fewer emails tested).

The dataset and code used to conduct the analysis in this report is in **Annex 4** for all treatments except for the industry norms. Data and code for the industry norm ATEs will be provided with HBS' and BIT's forthcoming article.

## 5. Findings

Figures 5.1 and 5.2 show the results of the primary analysis of the aggregate dataset. We observed significant effects on our primary outcome measure — the proportion of unique click throughs to the linked MW information — across all seven treatment groups, compared to the control. The curiosity + calculator and three industry norm emails all outperformed their respective control groups significantly. In contrast, salaried workers, worker benefits and dynamic enforcement emails all underperformed against the control.

Figure 5.1: Primary outcome for each tested email: non-industry arms

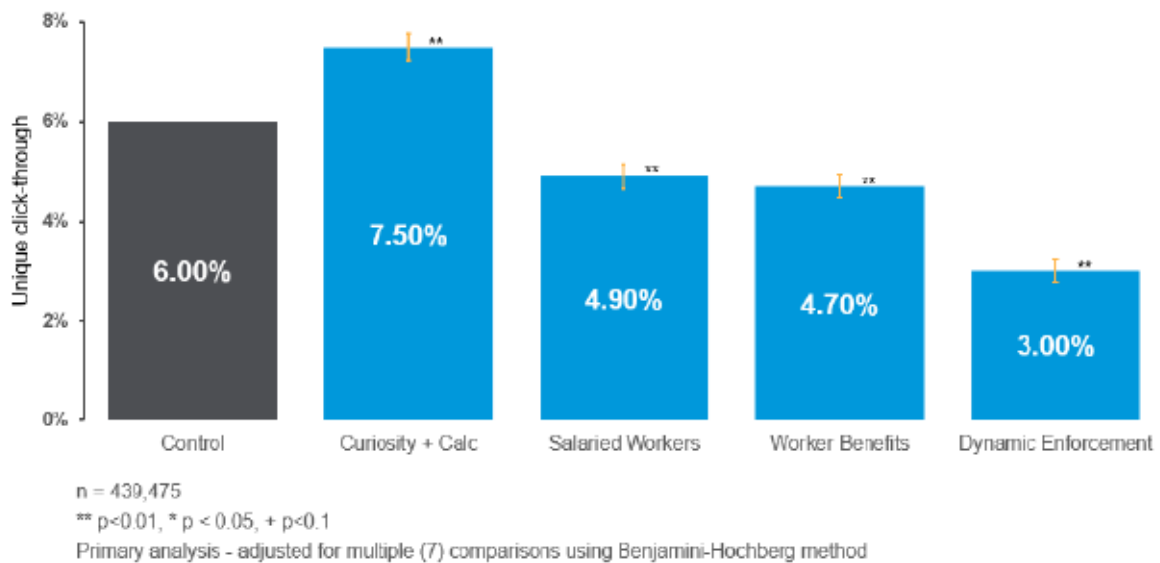
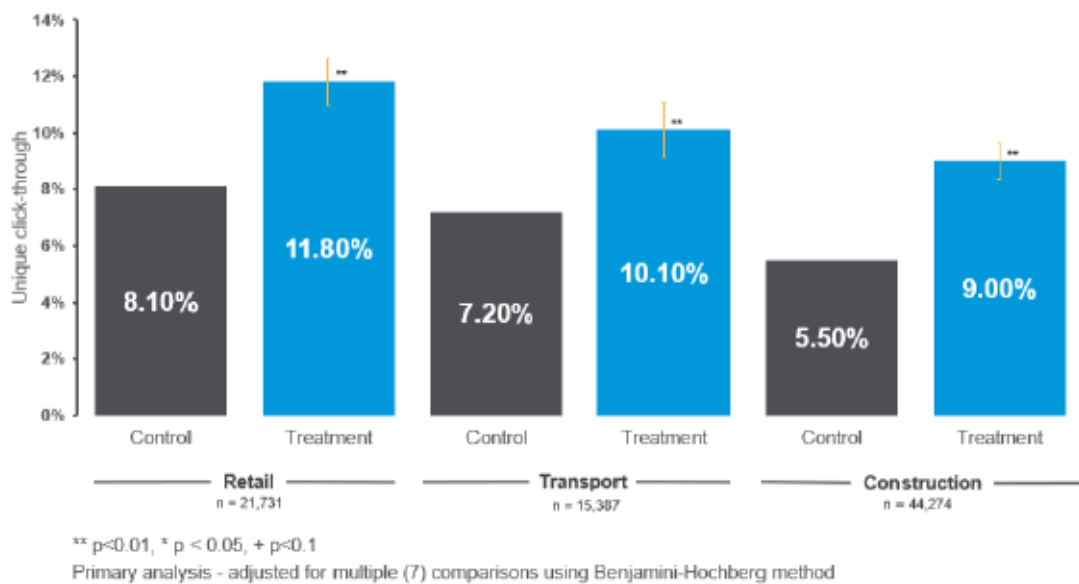


Figure 5.2 Primary outcome for each tested email: industry arms



Among the treatments that outperformed the control, the highest proportion of unique click throughs (11.8%) occurred when the email contained a norm message tailored to recipients in the retail industry. This was 3.7 percentage points higher than the 8.1% of recipients in the retail

sector who clicked on the same link in the control group. The norm message also had a positive significant effect, for recipients in the construction (an ATE of 3.5 percentage points) and transport (an ATE of 2.9 percentage points) industries. The final treatment to outperform the control contained a curiosity message and additional link to a MW calculator. Here, the unique click-through was 7.5%. However, unlike the control and all other treatment arms, this unique click-through included the combined effect of two in-text URLs: the original MW further information link, as well as the unique link to the MW calculator. When excluding unique click-throughs generated from the MW calculator, the click-through rate drops to 0.53%. This indicates most (93%) recipients only clicked on the calculator URL. This issue is discussed further below.

**Among the treatments that underperformed against the control**, the dynamic enforcement message resulted in the lowest unique click-through of 3%. Similarly, the emails that contained reference to worker benefits (4.7%) and salaried workers (4.9%) also received a significantly lower treatment effect than the control.

Across all treatments, there are at least two caveats to highlight:

- The email arms were sent in two different batches, at different times, meaning time-related factors could be driving differences in the treatment effects we obtained. However, our aggregate findings indicate no performance-related trend at the batch level. For example, batch 1 included emails that both underperformed (salaried workers, worker benefits) and outperformed (curiosity-inclusion) the control.
- The word count across emails also varies (range = 32-64), so we cannot be certain whether treatment effects are isolated to the content, as opposed to the length of each message.

## 6. Discussion

### 6.1 Initial conclusions

Although our study design does not produce reasons as to why we observed the results we saw between each of the tested emails and the control, several stylised facts emerge that can nonetheless be considered. For example,

- **The success of the control relative to Salaried Workers, Worker Benefits and Dynamic Enforcement, which** could be because of the control's low word count and higher readability compared to the emails it outperformed.
  - For example, readers may not have engaged with the 'Dynamic Enforcement email' — which under-performed the control by more than three percentage points — due to its reference to statistics.
- **The effect of the curiosity + calculator email,** which could be due to its framing triggering a non-defensive response from employers, or may reflect a higher value to the reader as a result of two support resources (the guidance and the calculator) compared to the control alone. Unfortunately the design of the study does not allow us to isolate the effect of each separate resource. This issue is discussed below.
- **The outperformance of each of the industry norm emails relative to the control,** which may have come about from, say, recipients believing that the email is more relevant to their business than otherwise would have been the case.

As well as these, the study produced several other lessons relevant to HMRC's MW compliance work, HMRC's previous trial, and the evidence about prompting firms using behavioural science.

### 6.2 Practical significance and value for HMRC's compliance campaigns

As well as being statistically significant, the treatment effects found in the study are practically significant for HMRC's MW compliance policy. The study's findings demonstrate that differences between messages containing the same informational content can produce large aggregate effects at near-zero marginal cost. For example, were the best and worst performing non-industry norm emails ('Curiosity + Calculator' and 'Dynamic Enforcement') each scaled to the entire employer sample in the trial, the former email would lead to more than an additional 22,400 employers accessing an online government employer resource about the MW (the guidance or the calculator).<sup>12</sup> Moreover, the cost-benefit ratio associated with this intervention is high given the near-negligible fixed cost of developing and sending a different email.

### 6.3 Further support for the 'curiosity' frame

As was the case for the third wave in HMRC's 2016-17 email studies, the present trial also found that a treatment email including a 'curiosity' frame outperformed a control email in terms of total

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<sup>12</sup> (0.051 percentage point difference the emails) x (439,475 employers in HMRC's sample)

clicks from those who opened it, while others underperformed it. This may be further evidence that this frame is an effective one for employer communications about minimum wage compliance.

However, due to the presence of a calculator in that same message, as mentioned earlier, we are unfortunately unable to isolate from this study alone whether the curiosity message or the calculator URL (or a combined effect) resulted in the treatment effect seen for this email. It is possible that the calculator URL received most of unique click throughs due to its novelty, and/or as a result of ordering effects,<sup>13</sup> whereby its first-place ranking was used to infer its relative importance above the information URL. Further research would be required to test the implications of ordering effects in future minimum wage communications.

### **6.4 Adding to the evidence base about what works to prompt firms**

The study's results also contribute to the evidence base about what works in behavioural science to prompt businesses (as opposed to individuals) toward a range of target behaviours.

A further finding in this area is that targeting employers on the basis of the industry they are in — as was done in the three industry norm variants — may be an effective approach for government communications in this and related contexts.

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<sup>13</sup> Murphy, J., Hofacker, C., & Mizerski, R. (2006). Primacy and recency effects on clicking behavior. *Journal of Computer-Mediated Communication*, 11(2), 522-535.

## 7. Conclusion

The email trial discussed in this report is a novel trial with a large sample that explored how behavioural science may enhance the effectiveness of government communications campaigns to promote compliance with MW. We hope this study's findings — which would not have been possible without HMRC's original project — complement and deepen that work and are also valuable to HMRC, BEIS/DBT and other interested policymakers.

This study will also be among the first in the UK to feature linked firm-level administrative data to learn more about treatment effects in the context of minimum wage compliance and campaigns associated with these. HBS' and BIT's forthcoming analysis of the employer-level dataset will enhance this report's findings and will also complement the lessons in HMRC's 2016-2017 email studies in several ways. For example, this work will:

- help us to understand more about how and whether industry norms can play a role in MW compliance and
- uncover further insights about the firm characteristics associated with engagement with the tested emails.

In addition to this, at least two areas stand out as fruitful for future work:

### **Further inquiries to understand the present study's findings**

As well as the forthcoming linked dataset analysis, future work could also explore the question of 'why did we see the results we did'? The main value of doing this is a weakness inherent to the study design. Namely, despite the rigour inherent in randomised assignment, the method is silent about why a given intervention did (or did not) work. Further work in this area could entail small-scale recipient surveys or interviews. Projects could also explore whether communication campaigns targeting businesses by sector are effective in policy contexts outside of MW compliance; and exploring whether HMRC more generally is a more effective messenger than other government bodies.

Moreover, further email trials could help distinguish between potential effects in several email treatments. For example, future trials could seek to disentangle the role of the calculator from the curiosity frame, or investigate the effect of word counts and readability levels.

### **Investigating behaviours closer to the primary outcome of interest: minimum wage compliance**

Perhaps most importantly, the outcome variable in this study — employers' click-throughs to guidance — are several steps removed from the most valuable outcome of interest of whether these employers comply with the minimum wage. Future work could explore the other steps in this chain of behaviours to investigate questions such as the effectiveness of guidance, and the effects of interventions and campaigns on observed compliance.

## **Annex 1: E-mails from HMRC's original study**

1. [Link to .eml files](#)

## Annex 2: Pre-trial preparatory work

1. [Literature review](#)
2. [Table of stylised facts for email drafting](#)
3. [Interview topic guide](#)
4. **Interview 1 contemporaneous summary notes**

We spoke to the Managing Director of a nursery / childcare provider in the West Midlands that employs ~20FTE and has been around for a decade. Highlights included:

- the business sets wages through a process of (1) finding the latest minimum wage as a baseline; (2) conducting a competitor search to benchmark against; and (3) overlaying a staff development and qualifications matrix to differentiate pay among staff.
- they consider existing materials and guidance about the minimum wage to be very good; the MD said during this part of the chat "I'm probably going to get shot by peers for saying this, but minimum wage has actually been the easiest, most well-presented, most well-communicated, area of government policy to use."
- however, they find the "Living Wage" terminology and distinguishing between the living wage and minimum wage to be very confusing and problematic
- despite the MD being a business consultant to other nurseries (who often don't have much managerial skill) they have no knowledge about the likelihood of detection or the size of the penalties for non-compliance
- although they noted minimum wage compliance in their sector was often problematic, the MD considered that the ease of complying with the NMW was likely better than other sectors given the fact that DBS checks and other safeguarding measures produces info that helps you check what wage you need to be paying someone (e.g. someone's age)

5. **Interview 2 contemporaneous summary notes**

We had our second interview last week with the owner of a home care company with around 20 staff. The interviewee has advocated for payment of both the NMW and the voluntary living wage for firms in his sector. Some highlights from the discussion included:

- The employer believes there is a long-running structural issue in the care sector that makes compliance with the minimum wage difficult. As "no one was enforcing" the minimum wage for years, the vast majority of major contracts today contain rates that are nearly untenable. This phenomenon has led to a number of large voluntary exits in the sector by major providers.
- Generally, non-compliance in the sector typically takes two forms: (1) not paying for travel time; and (2) incorrectly classifying social care workers as independent contractors.



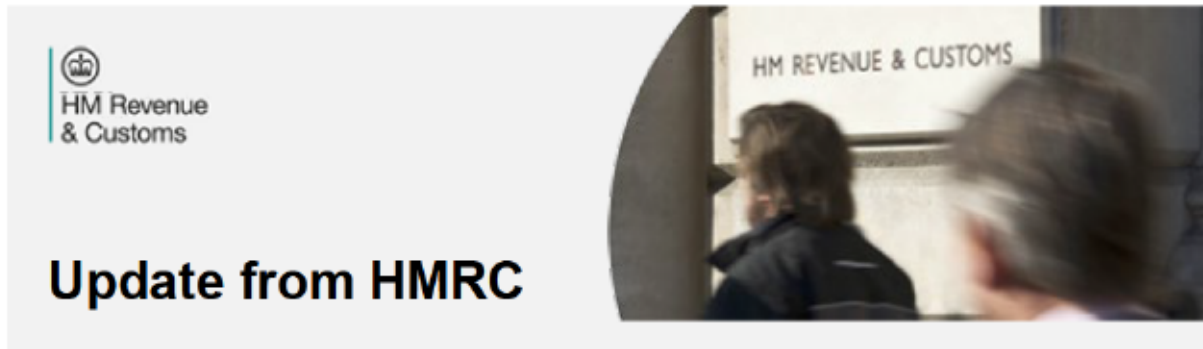
- The employer noted that a lack of effective law enforcement in the sector means that deliberate non-compliance can persist as a cultural norm in the sector, and that the ineffective enforcement of white-collar crime applies more generally to many UK industries. However, the interviewee noted that large non-compliant companies do typically get caught as a result of worker complaints; whereas the same is not necessarily true in SMEs as workers are often "just happy to have a job".
- The employer believes there are two kinds of non-compliant managers: those who are (1) ex-social workers, e.g. nurses who rise up to management, but lack the business skills or knowledge to know whether they are compliant or not; and (2) professional and sophisticated managers with no background in the industry (e.g. private equity firms) that account for the majority of quantity in the industry that rationally choose to not comply knowing the probability and consequences of getting caught are low.
- The interviewee had several recommendations for HMRC; these included:
  - Make putting time in payslips mandatory
  - Increase fines and the volume of enforcement activities

We also asked about the Living Wage/NMW nomenclature issue; the employer noted that including the word 'living' in the NMW was confusing and "rude" and weakens the marketing effectiveness of the voluntary living wage.

## Annex 3: Trial emails

### Control

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Dear customer,

Our employers' guide to the National Minimum Wage has been updated.

All employers should check whether they are compliant and take the appropriate payroll action.

You can find further information on [GOV.UK](https://www.gov.uk).

Yours sincerely

Barry Greene

National Minimum Wage team



YouTube



Twitter



Visit GOV.UK



Share



HMRC Forum

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Please feel free to use this information and pass it on.

#### Support

For more information and support from HMRC please visit our [help and support pages](#).

## Salaried workers

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Dear customer,

Our employers' guide to the National Minimum Wage has been updated.

You may be surprised to learn that employers who pay less than the minimum wage sometimes do so because of mistakes around salaried workers.

Avoid making mistakes by reading our guide for employers on [GOV.UK](#).

Yours sincerely

A handwritten signature in black ink that reads 'Barry Greene'.

Barry Greene

National Minimum Wage team



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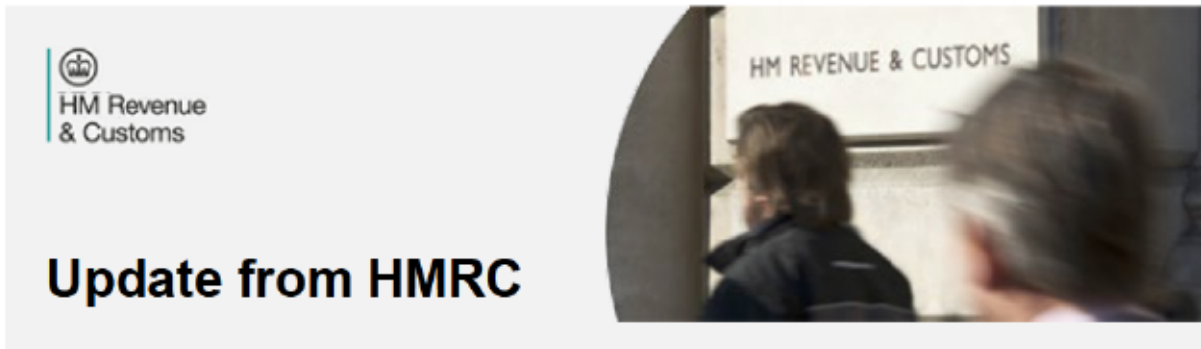
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### Support

For more information and support from HMRC please visit our help and support pages.

## Industry norms (construction, retail, and transport)

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Dear customer,

Our employers' guide to the National Minimum Wage has been updated.

Most employers in the construction sector comply with the minimum wage. Avoid running risks and being investigated.

Please read the [updated guidance](#) to ensure you comply with the current rules.

Yours sincerely

Barry Greene

National Minimum Wage team



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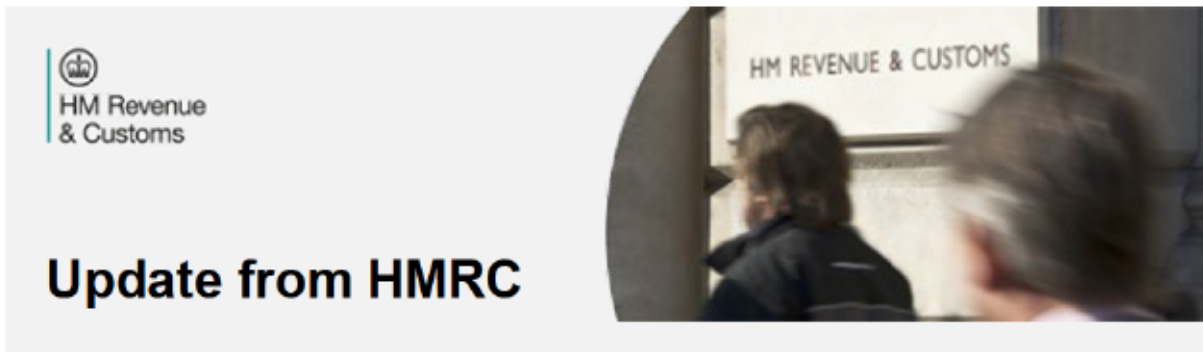
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### Support

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Dear customer,

Our employers' guide to the National Minimum Wage has been updated.

Most employers in the retail sector comply with the minimum wage. Avoid running risks and being investigated.

Please read the updated guidance to ensure you comply with the current rules.

Yours sincerely

Barry Greene

National Minimum Wage team



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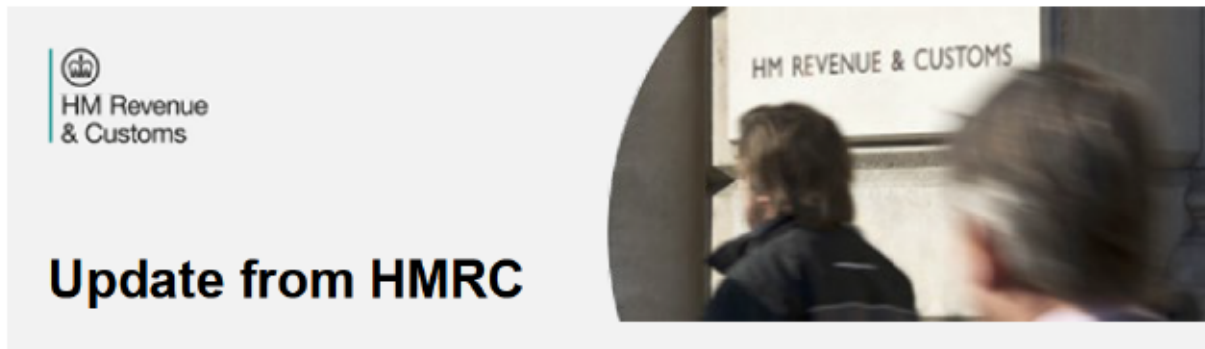
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Please feel free to use this information and pass it on.

### Support

For more information and support from HMRC please visit our help and support pages.

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Dear customer,

Our employers' guide to the National Minimum Wage has been updated.

Most employers in the transport sector comply with the minimum wage. Avoid running risks and being investigated.

Please read the [updated guidance](#) to ensure you comply with the current rules.

Yours sincerely

Barry Greene

National Minimum Wage team



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### Support

For more information and support from HMRC please visit our help and support pages.

## Benefits to workers

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Dear customer,

Our employers' guide to the National Minimum Wage has been updated.

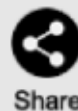
Complying with the minimum wage ensures that the labour market works for everyone, both in terms of fair pay and fair working conditions.

You can find further information on how to comply on [GOV.UK](https://www.gov.uk).

Yours sincerely

Barry Greene

National Minimum Wage team



### Stay safe online

If you think that an email is suspicious please report it to [phishing@hmrc.gov.uk](mailto:phishing@hmrc.gov.uk). For more information please visit our security pages at [GOV.UK](https://www.gov.uk) and search 'Avoid and report internet scams and phishing'.

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Please feel free to use this information and pass it on.

### Support

For more information and support from HMRC please visit our [help](#) and [support](#) pages.

## Curiosity + calculator

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Dear customer,

Our employers' guide to the National Minimum Wage guidance has been updated.

You may be surprised to learn that many employers pay less than the minimum wage without realising it.

HMRC's **National Minimum Wage calculator** can help you to check if your business is compliant.

You can find further information on how to comply on **GOV.UK**.

Yours sincerely

A handwritten signature in black ink that reads 'Barry Greene'.

Barry Greene

National Minimum Wage team



### Stay safe online

If you think that an email is suspicious please report it to [phishing@hmrc.gov.uk](mailto:phishing@hmrc.gov.uk). For more information please visit our security pages at [GOV.UK](https://www.gov.uk) and search 'Avoid and report internet scams and phishing'.

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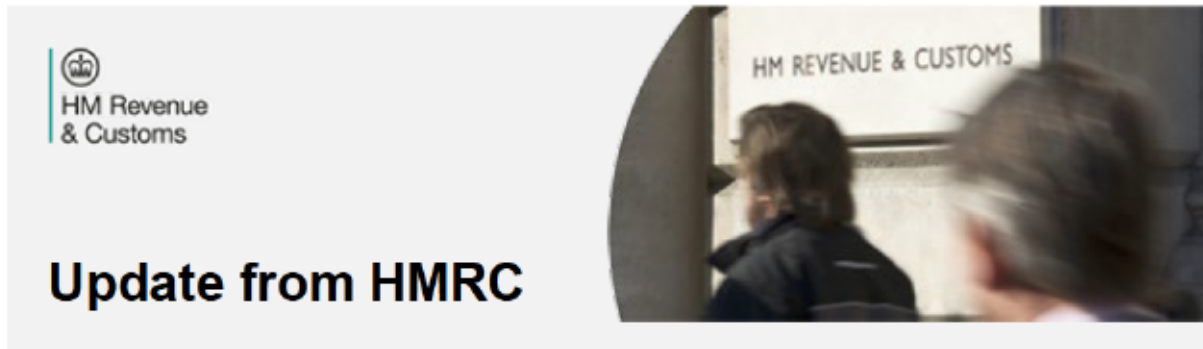
### Support

For more information and support from HMRC please visit our [help and support pages](#).



## Dynamic enforcement

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Dear customer,

Our employers' guide to the National Minimum Wage guidance has been updated.

You may be surprised to learn that, from 2014 to 2019, instances of underpayment of the minimum wage uncovered by HMRC increased by over 600%. HMRC is more likely than ever to identify employers that pay less than the minimum wage.

You can find further information on how to comply on [GOV.UK](https://www.gov.uk).

Yours sincerely

Barry Greene

National Minimum Wage team



### Stay safe online

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### Support

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## Annex 4: Implementation and analysis files

Note: the data and analysis in (2) and (3) do not cover the ATEs for the industry norm treatments. Data and code for these treatments will be provided in the forthcoming article by BIT and HBS.

1. [Summary email delivery reports from HMRC](#)
2. [Raw dataset used for analysis](#)
3. [Code used for analysis](#)

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