

JULY 2017



An Roinn Airgeadais
Department of Finance

IMPLICATIONS OF BEHAVIOURAL ECONOMICS FOR TAX POLICY

Department of Finance

July 2017

Department of Finance
Government Buildings, Upper Merrion Street
Dublin 2, Ireland
Website: www.finance.gov.ie



An Roinn Airgeadais
Department of Finance



The authors, **Jean Acheson** (jean.acheson@finance.gov.ie) and **Donal Lynch** (donal.lynch@finance.gov.ie), are economists in the Department of Finance and members of the Irish Government Economic and Evaluation Service (IGEES). They would like to thank Departmental colleagues in the Economics and Tax Policy Divisions for their assistance and insights, which provided the basis for much of the discussion on the application of behavioural economics to the Irish tax system. An earlier version of this paper was presented at two workshops and the Policy Committee in the Department, and the feedback from attendees at those events is much appreciated. The authors would also like to extend their gratitude to colleagues in the Revenue Commissioners for data assistance and to Professor Liam Delaney for his comments on an earlier draft. The analysis and views set out in this paper are those of the authors only and do not necessarily reflect the views of the Department of Finance or the Minister for Finance. All errors are those of the authors.

Summary

A commonly quoted definition of behavioural economics is the combination of psychology and economics that investigates what happens in markets in which some of the agents display human limitations and complications (Mullainathan and Thaler, 2000). In other words, behavioural economics applies another layer of insight to standard economic theory, most particularly when such theory fails to predict or explain “human limitations and complications”.

Standard economic theory provides a number of general, well-established, rules of thumb for tax policy. Behavioural economics does not so much change these, or provide its own alternatives, but instead provides an additional level of depth to the existing rules of thumb. This richness is supplied by emphasising, firstly, the importance of context in tax policy design and, secondly, the extent to which it is the perception rather than the substance of taxes which determine behavioural responses.

Arguably, behavioural economics has most to say about taxes which seek to change behaviour (which are a form of corrective taxation). All else equal, by using its concepts in the design and application of such taxes, their effectiveness in achieving behaviour change could potentially be improved. Nevertheless, behavioural economics is also of relevance for taxes which explicitly do not seek to change behaviour (taxes designed to raise revenue efficiently i.e. without distorting economic decisions). This is due to its offering of alternative plausible explanations for behaviour that the standard theory fails to predict and for nuancing the overall welfare implications of tax policy.

Much work has been conducted internationally in the field of tax and behavioural economics. In an Irish context, Walsh (2013) makes an important contribution on tax administration and compliance issues in the context of behavioural economics. This paper seeks to focus instead on the implications of behavioural economics and tax policy.

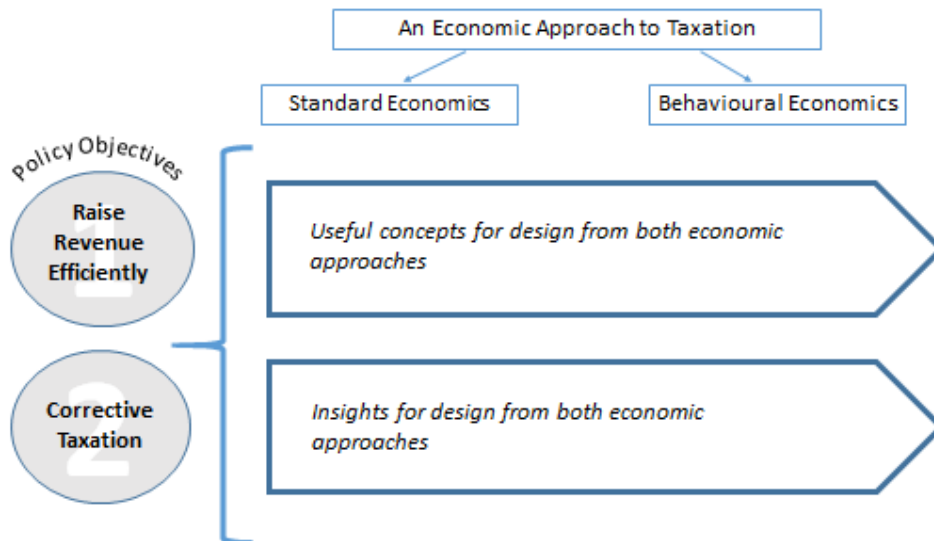
The paper is divided into three sections. Section A proceeds as follows: Chapter 1 provides the context for the paper, providing a brief introduction to behavioural economics and two basic objectives of taxation, raising revenue efficiently and corrective taxation. Chapter 2 reminds readers about the main insights arising from standard economic analysis with regard to these two objectives of tax policy.

Section B takes four behavioural economics concepts and, in separate chapters, explains each concept, discusses the literature with a particular focus on the two chosen objectives of tax policy, and explores the potential application of the concept in the Irish tax system. Section C then summarises the main tax policy insights coming from behavioural economics and concludes on its value addition in Irish tax policy design. The four concepts this paper considers most relevant for the chosen objectives of taxation are:

- *salience;*
- *bounded rationality;*
- *reference dependence and loss aversion; and*
- *time inconsistency.*

Figure 1 below outlines, in a schematic way, the structure of the paper. As there is no organising framework in the behavioural economics literature that specifically applies to tax policy, we choose to use the objectives of tax policy as the entry-point into a discussion on both concepts and insights for tax policy design from the different approaches to economics.

Figure 1: a schema of the paper



Contents

Section A: Context and the Standard Economics Approach in Tax Policy	1
1. Introduction	1
1.1. Behavioural Economics	1
1.2. Objectives of Tax Policy	2
2. Insights for Tax Policy from the Standard Economics Approach	3
2.1. Objective 1: Raising Revenue Efficiently	3
2.2. Objective 2: Corrective Taxation.....	5
Section B: Behavioural Economics and its Implications for the Objectives of Tax Policy.....	6
1. Salience and Objective 1: Raising Revenue Efficiently.....	7
1.1. Definition and Introduction	7
1.2. Salience and Tax Policy	8
1.3. Conclusion.....	10
2. Bounded Rationality and Objective 1: Raising Revenue Efficiently	11
2.1. Definition and Introduction	11
2.2. Bounded Rationality and Tax Policy.....	11
2.3. Conclusion.....	13
3. Reference Dependence and Loss Aversion and Objective 2: Corrective Taxation	14
3.1. Definitions and Introduction.....	14
3.2. Reference Dependence, Loss Aversion and Tax Policy	16
3.3. Conclusion.....	17
4. Time Inconsistency and Objective 2: Corrective Taxation	18
4.1. Definition and Introduction	18
4.2. Time Inconsistency and Tax Policy.....	19
4.3. Conclusion.....	21
Section C: Insights for Tax Policy from the Behavioural Economics Approach	22
1. Objective 1: Raising Revenue Efficiently	22
2. Objective 2: Corrective Taxation.....	23
3. Behavioural Economics Emphasis on Perception	24
4. Behavioural Economics Emphasis on Context	25
5. Conclusion.....	25
References.....	27

Section A: Context and the Standard Economics Approach in Tax Policy

1. Introduction

1.1. Behavioural Economics

Given the complexity of economic decision-making, the discipline of economics has long incorporated a range of generalising and simplifying assumptions into its basic frameworks. These assumptions allow models to be developed as to the general behaviour of individuals, households and firms. Models can then be tested empirically to determine how reflective they are of observed behaviour. In part, the relative success of economics as a discipline reflects the explanatory power and insight these models have offered in describing and understanding economic phenomena (Stiglitz, 2002). However, there are many examples of cases where agents (individuals, households, firms etc.) do not strictly behave in accordance with these assumptions or the models' predictions. Part of the story of behavioural economics (BE) is the documenting of these "anomalies" (Thaler, 2015).

BE uses insights from psychology and behavioural science to analyse behaviours where the normal assumptions have led to standard economic models being unable to adequately explain economic decision-making. In some cases this involves complementing the existing theories with behavioural insights while in others it involves completely new theories typically based on observed behaviour (collected through traditional data sources or increasingly through the use of laboratory experiments). In both cases some of the normal assumptions are relaxed and complemented or replaced by different, more nuanced, assumptions reflecting findings from psychology (Leicester *et al.*, 2012).

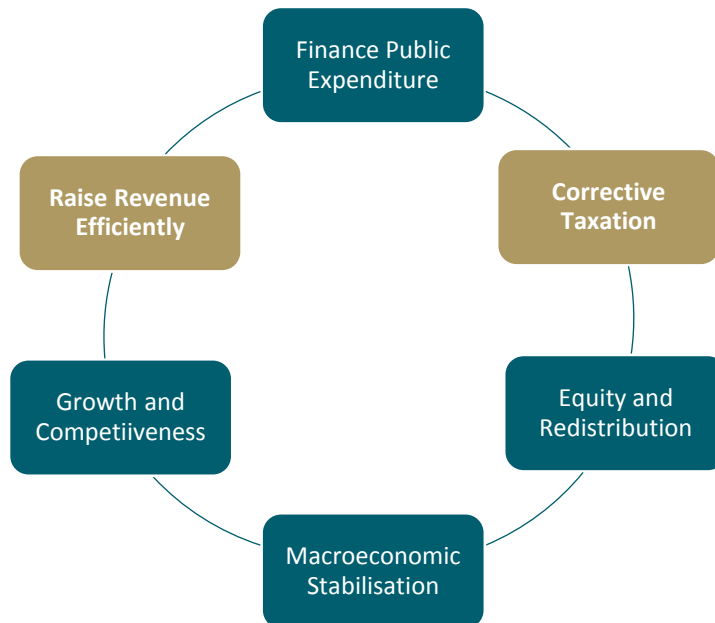
The application of BE to various areas of public policy has been actively promoted by the Irish Government Economic and Evaluation Service (IGEES). Watts (2014) set out the potential of BE to deliver public service reform in Ireland through improved policy design and implementation. A broad range of work is currently being conducted in Government departments in this area and is further described in Purcell (2016). Specifically in tax administration, the Revenue Commissioners recently published a summary of the lessons it has learned from conducting randomised control trials over the last six years (Kennedy *et al.*, 2017).

There are a large number of wide-ranging concepts in the behavioural economics literature and this paper only provides an introduction to a small number of the ones most relevant for the objectives of tax policy. The variety of concepts available for analysis is further explored at the beginning of Section B.

1.2. Objectives of Tax Policy

The government levies taxes primarily in order to finance public expenditure while, in combination, taxation and public spending contribute to public policy objectives such as economic growth, equity and macroeconomic stability (see Figure 2).

Figure 2: objectives of tax policy



However, taxes can distort behaviour by changing the relative prices of different economic choices. For example, a tax on labour income can reduce work incentives and therefore lead to decreased work intensity. Nevertheless, raising revenue is necessary for the functioning and policy objectives of the Government, so a first objective in tax policy design is to raise this revenue in a way that minimises the distortions to economic choices. This is known as **raising tax revenue efficiently**.

However, there are often circumstances when the economic choices of households and firms leads to an under or over-production of a good (from the point of view of maximising the welfare of society as a whole). This is known as a market failure. For example, firms under-invest in R&D from a social point of view, so Ireland, along with many other countries, offers a tax credit and other fiscal supports to stimulate additional R&D. A second objective of tax policy design, in sharp contrast to the first, is to correct market failure by encouraging behavioural change. Taxes that are designed to correct market failure by distorting behaviour in a desired direction are known as **corrective taxes**. While corrective taxes may not always succeed in changing behaviour, as certain individuals or companies can be insensitive to price, they do at least account for the impact of the taxed activity on third parties.

A third objective of tax policy design relates to **equity**, typically captured in analysis concerning the progressivity of the tax system or individual tax heads. The first and third objective are regularly considered in trade-offs in policy design as the efficiency of a tax is

weighed against its distributional implications. Other objectives, as mentioned above, relate to how the public finances can influence **the macroeconomic environment** as a whole.

However, it is the first two objectives which are the focus of this paper. These are deliberately chosen as they are the two objectives of taxation most closely linked to the decisions taxpayers make with regard to economic choices such as working, saving, investment, production and consumption. In other words, they are the two objectives of taxation which can most clearly be fulfilled or frustrated by the economic decision-making of taxpayers. As a result, the insights of behavioural economics are more relevant for these objectives of taxation than in the case of the others. Nonetheless, whenever there are notable implications for equity, they are noted but not examined in detail in order to maintain the emphasis and focus on economic decision-making. Equity issues, while of considerable importance, refer more to political economy decision-making than economic decision-making (Congdon *et al.*, 2011).

2. Insights for Tax Policy from the Standard Economics Approach

Before considering the implications of behavioural economics for tax policy in Section B it is useful to recap on the main insights that have been drawn from standard economics generally for the formation and design of tax policy. The standard microeconomic foundation for tax policy design rests on a general framework that characterises consumers and producers as making decisions that use all the information they have available to them and which will best serve their self-interest. Their decisions are assumed to reflect their preferences or an underlying cost-benefit calculation.

2.1. Objective 1: Raising Revenue Efficiently

Economists define efficiency as a situation where no one can be made better off without making someone else worse off. Competitive markets are generally considered to deliver an efficient allocation of society's economic resources. Therefore, the introduction of a tax into such a market reduces economic efficiency.¹ It distorts behaviour by reducing total resources such as labour or capital, and this in turn reduces total welfare.

With this in mind, policymakers typically try to design taxes that limit the distortions to economic choices (while also giving due consideration to equity issues). The economic theories which underpin this approach are called the theories of optimal taxation. These have a long history, dating back to Ramsey (1927) for commodity taxes and include an influential contribution on labour taxes by Mirlees (1971).

Whenever market outcomes are inefficient, economists refer to the efficiency cost or deadweight loss involved (the two terms are synonymous). Specifically in relation to the area

¹ The exceptions are lump-sum taxes and taxation of economic rents (income in excess of the minimum needed to bring a factor of production into use – it excludes profits as commonly understood, as a minimum level of profit would be needed to induce capital investment).

of taxation, the deadweight loss is usually referred to as the excess burden of taxation. There can be confusion as to what the “excess burden” of taxation is. People may think it refers to the payments the taxpayer must pay to the revenue authority. However, taxes are simply a way of transferring resources from private to public use and are not in and of themselves a cost in economic terms. They only become an excess burden when they lead to inefficiency in resource allocation.

As a result of the tax, supply or demand outcomes typically change compared to a situation of competitive markets without taxes. The change can impose an excess burden on the individual or firm (as they consume or produce less than they otherwise would) and this can result in lower welfare at the aggregated social level. A well-designed tax system aims to minimise the excess burden of taxation (Stiglitz, 1988).

Although the efficiency losses arising from taxation are real, they are not directly visible. The excess burden of taxation occurs because something does not happen, for example someone does not take up full-time work. In practice the rules of thumb for a tax system which minimises these (visible or invisible) distortions include:

- The tax burden should be inversely proportional to the price sensitivity of supply and demand (the inverse elasticity rule):
 - The burden of taxes should fall predominantly on goods/services whose consumers are less sensitive to price (as their demand is less likely to change as a result of the tax);
 - The tax burden on the factors of production (land, labour, capital) should fall on those resources whose supply is less sensitive to price (e.g. the supply of land is the least responsive to price - as more cannot be created if price increases);
 - In the absence of evidence characterising the supply or demand as being particularly responsive (or the capacity to make these distinctions in the tax system), this points towards taxing good and services (and supply factors) on the same basis;
- A broad tax base and low tax rates are preferable to a narrow tax base and high rates. This derives from the insight from theories of optimal taxation that the excess burden of a tax rises approximately with the square of the tax rate;
- Simplicity is desirable in tax system design. Simplicity will help to keep administration and compliance costs to a minimum and contribute towards transparency, promoting political accountability towards citizens by indicating more clearly where the incidence of taxation falls;
- Pursue stability in tax system design. Stability in tax rules and procedures allows for predictability and certainty in the decision-making of individuals and firms. Similar to simplicity, stability can reduce compliance and administrative burdens;

- Design taxes with a whole-of-system approach (for example, labour taxation design should be attentive to the impact that the social welfare system and public services have on the incentive to work).

It should be noted that these are general rules of thumb rather than absolute specifications for the tax system. These considerations have to be weighed against other considerations such as costs of administration and equity.

2.2. Objective 2: Corrective Taxation

Besides raising revenue, part of the tax system involves encouraging behaviour change on the part of individuals, households and firms in pursuit of economic and social policy goals. These are typically motivated by market failures where the market, left to its own devices, does not maximise economic efficiency and the welfare of society. Economists recommend taxation as a solution to market failures caused by externalities. Externalities are generated by activity which has spill over effects on a third party, and the spill over effects are not reflected in the price of the activity. For instance, taxes on environmentally harmful emissions attempt to address the negative effects associated with these by ensuring the tax-inclusive price faced by the private producer more accurately reflects the full damage being done to the environment. Corrective taxes is the term used for either discouraging or encouraging particular behaviours through the tax system. While they may not always succeed in changing behaviour – for example a factory may still produce the same emissions even in the presence of a carbon tax – corrective taxation at least ensures that the effect on third parties is accounted for (and can, in theory, be compensated for).

The rules of thumb for corrective taxes include:

- The higher the sensitivity of demand to price, the greater the impact a tax will have in reducing consumption. It follows that taxes on goods whose demand is insensitive to price will be relatively ineffective at reducing consumption;
- The higher the sensitivity of supply to price, the greater the impact a tax will have in reducing production. It follows that taxes on goods whose supply is insensitive to price will be relatively ineffective at reducing production;
- The tax should target the externality generating practice as directly as possible;
- When correcting an externality, the tax should be set according to the size of the marginal impact on affected third parties;
- If the targeted activity is particularly harmful, the appropriate corrective taxes may well be above the revenue maximising rate;
- Similar to Objective 1, simplicity and stability should be pursued in tax design. A whole-of-system approach is also advisable (for example, R&D tax credit design should be attentive to the impact that other forms of innovation public policy supports have on the incentive to invest).

Section B: Behavioural Economics and its Implications for the Objectives of Tax Policy

This section examines four behavioural economics concepts in detail in terms of their implications for the objectives of tax policy. Raising revenue efficiently is considered first (objective 1), followed by corrective taxes (objective 2). The aims for each concept are: to explain the concept; to discuss the tax policy-relevant literature on the concept; to explore the application of the concept in the Irish tax system; and to identify policy implications. The four concepts considered most relevant for the chosen tax policy objectives are:

- salience;
- bounded rationality;
- reference dependence and loss aversion; and
- time inconsistency.

A number of other behavioural concepts were considered for inclusion, for example social norms such as fairness and reciprocity. However, these are of more relevance for tax compliance than for tax policy *per se* and so are not considered in the current paper.

Box 1: other organising frameworks for behavioural insights

The chosen method in this paper of taking the concepts individually is useful for considering the specific implications of each in relation to tax policy. It does not, however, provide a broader grouping of these concepts which can locate how the various concepts relate to each other. There are a variety of ways in which sub-categories of behavioural effects have been grouped and applied in practice to help in organising the available insights from behavioural economics in particular domains. These include MINDSPACE (British Cabinet Office and Institute for Government, 2010), which is described as a general guide to using behavioural insights to implement public policy. Another potential organising scheme is Huck *et al.* (2011), who examine consumer behavioural biases in competition from a consumer decision-making perspective. Erta *et al.* (2013) identify these two as useful approaches for identifying problems and designing remedies but, in their own work, focus on the main lessons from behavioural economics for retail financial markets and its appropriate regulation. They use DellaVigna's (2009) division of biases into those that affect preferences, beliefs and decision-making respectively. We note that the use of the word "bias" in these frameworks is only in reference to deviations from standard economic modelling and predictions.

As there is no definitive organising framework for behavioural economics and tax policy, we proceed by examining individual concepts in relation to the tax system. In other words, it is the objectives of taxation that organise the paper rather than a particular behavioural framework.

1. Salience and Objective 1: Raising Revenue Efficiently

1.1. Definition and Introduction

Salience in this paper is addressed mainly towards the concept of **market salience** which “refers to how tax presentation affects market decisions (e.g. consumer purchasing) and economic activity” (Gamage and Shanske, 2011). This differs from concepts such as **political salience** which “refers to how tax presentation affects voting behaviour and political outcomes” (ibid). More specifically, tax salience “refers to the extent to which taxpayers account for the costs imposed by taxation when the taxpayers make decisions or judgments” and is separate to preferences regarding taxes (ibid).² As such, it contrasts with the standard economic assumption that people respond to the substance of a cost irrespective of its presentation, arguing instead that variations in salience can cause different responses to identical costs. It is also distinct from, but related to, basic awareness of the costs of taxation, as salience depends on an understanding of tax costs but is not fully determined by them (i.e. tax costs are interpreted through and accounted for by the taxpayers’ psychological processes).

Market Salience: how tax presentation affects economic decisions.

Political Salience: how tax presentation affects voting and political outcomes.

Perhaps the strongest evidence that the salience of prices (and hence taxes) affects market decisions can be inferred from the widespread adoption of marketing methods involving the presentation of prices in less salient ways in private markets (e.g. prices ending in .99, incitements to pay by direct debit).

The implications of tax salience may be applied to both raising revenue efficiently and corrective taxation (Leicester *et al.*, 2012), but this paper restricts itself to examining the former.³ Putting aside other, not uncontroversial, implications of low salience taxes - such as their potentially differing impact across the income distribution - the most recent literature advocates for a reduction in tax salience in order to increase the efficiency of taxes primarily designed to raise revenue (Gamage and Shanske, 2011; Goldin, 2012; Perkins, 2014).⁴

Salience can be considered at different levels, the lowest denominator being the individual and the largest being all of society. Whether decisions are made at the individual or household level may be a factor in determining the salience of a tax. Also, firms, more so than individuals,

² A relevant element of the distinction between salience and preferences is the preference often displayed by consumers to avoid taxes over equivalent and equally obvious price reductions (Sussman and Olivola, 2011).

³ Salience is not considered in relation to corrective taxes in this paper, but relevant examples include the salience of the carbon tax and the salience of tax expenditures relating to, amongst other things, health expenditures and property refurbishments.

⁴ Though this marks a change from the previous tendency in the literature towards questioning whether it can be determined that the disadvantages of low tax salience outweigh its benefits (Gamage and Shanske, 2011).

would be expected to act rationally as profit-maximising agents and not to be as affected by biases in their behaviour, and to respond more fully to tax costs irrespective of how they are presented.

On the other hand, salience can be considered at different levels of the tax, e.g. the tax taken as a whole or particular provisions of the tax (Schenk, 2010). The same tax may also have different saliences for different decisions. For instance a fuel tax may not be particularly salient when each individual fuel purchase decision is being made but may be much more salient at the point of vehicle purchase. As salience can vary across people, taxes and decisions, this implies that it can have a varied distributional impact.

The excess burden caused when a tax is imposed assumes that the actors respond fully to the imposition of the tax. If actors do not alter their behaviour in response to the tax there is no excess burden (caused by substituting away from the taxed activity or good). Lower salience taxes tend to reduce the excess burden.⁵

1.2. Salience and Tax Policy

Beyond tax policy, the broad literature on salience addresses two major elements: attention and memory (Min Kim and Kachersky, 2006). Attention is related to the dictionary definition of salience as conspicuousness, while memory captures the idea of salience as information that readily comes to mind.

Intuitively, certain aspects of the income tax system are more salient than others. For instance, taxpayers in general seem to give more attention to tax rates rather than bands or thresholds. Pay Related Social Insurance (PRSI), particularly employers' PRSI, is another example. Depending on the perceived incidence of employers' PRSI, it might be expected to either be completely salient (if the incidence falls on employers who include it in their calculations) or virtually ignored (if the incidence falls on employees, the low level of awareness and consideration given to PRSI may lead to it having a minimal impact on behaviour, which would identify PRSI as an efficient method of raising revenue).

When the Universal Social Charge (USC) was introduced in 2011, it replaced the income levy and the health levy. While some low income earners were brought into the tax net for the first time when USC was introduced, most taxpayers earning over €26,000 per annum would have been better off, in terms of disposable income, with USC than the two levies. However, both of the previous levies had previously been rolled into people's pay-slips under income tax and PRSI respectively whereas USC was introduced as a separate line on the pay-slip. As such, the conspicuousness of USC upon its introduction was very high. At the same time, there were other tax changes including a reduction in both the personal and PAYE tax credits which increased income tax liabilities. It is possible that many taxpayers either did not notice that the PRSI liability on their pay-slips reduced or that other tax changes accounted for the increased tax burden. Additionally the political salience of USC is quite high – it formed a key

⁵ This discussion assumes the counterfactual is an untaxed competitive market, where individuals make decisions that maximise their welfare. For corrective taxation, the tax literature argues for increased tax salience. The greater the tax salience, the greater the behavioural change that will be achieved with the same tax costs.

part of all political party manifestoes for the 2016 general election. This is a plausible example of political salience influencing market salience as greater public focus on USC could lead to more account of USC being taken in labour supply decisions.

A complementary interpretation of the impact of USC salience notes that despite the word Social appearing in Universal Social Charge, the USC may be perceived more as a tax and less associated with benefits than PRSI.⁶ For example the health levy was overtly linked with funding of health services and there are other benefit entitlements earned with PRSI. In this case, any observed larger behavioural response to the USC relative to PRSI could be change intensified by the higher salience.

The most cited experimental example of market salience is a US experiment comparing the salience of sales tax inclusive prices with those showing the price excluding sales taxes (Chetty *et al.*, 2009). Sales taxes are not typically included in the marked prices in the United States. After additional tax-inclusive price tags were posted adjacent to the pre-existing price tags, demand for goods with the additional tags fell 8%. While consumers were, in general, aware of the existence and rate of the sales tax, if they had already taken it into account, there would have been no change in demand.

From another perspective, it would seem that the more salient the tax-inclusive price is, the less salient the tax element of that price is likely to be and inversely the more salient the tax-exclusive price is, the more salient the tax element of the price would be. As taxpayers focus more on the full price costs, focus on the tax costs would likely be reduced. Thus it is possible that in EU member states such as Ireland, where tax inclusive pricing is required for many consumption goods, that the tax element of the price, while incorporated in purchasing decisions, is individually less salient compared to other jurisdictions.

Broadly consistent with Chetty *et al.*, Finkelstein (2009) finds that after switching to electronic collection methods, road tolls settle at a level 20 to 40% higher than would be the case for traditional cash collection of the toll. This is explained in terms of the lower price sensitivity which drivers display when paying road tolls electronically compared to more salient cash payments. The resulting implication is that reducing the salience of a tax (toll) may facilitate higher tax rates and hence revenues.

Property taxes are broadly regarded as a notably politically salient tax, which may be intensified in Ireland due to its relatively recent introduction. By influencing individuals' decisions of how and where land and property is used, a property tax aims to encourage more efficient land use and a more salient property tax would enhance this effect. This demonstrates the trade-off which can exist in reducing salience generally, as in this case reducing the political salience of a property tax must be weighed against reducing the efficiency-inducing effect (market salience). It is interesting that the payment method for the property tax can be more or less salient by the taxpayer's own choice (as it can be paid out of

⁶ The importance that can attach to the labelling or description of a tax paid or payment received was examined by Beatty *et al.* (2014). They found that recipients of the UK Winter Fuel Payment, a labelled cash transfer to older households, spend on average 47% of it on fuel whereas if the payment were treated as cash, the figure would be 3%.

pocket in a lump sum, by direct debit or withheld at source from salaries, social welfare contributions or occupational pensions). As a once-a-year tax, note should also be taken of the separation between the purchase decision and tax assessment, which is highlighted as a frequent feature of salience (Gamage and Shanske, 2011; Min Kim and Kachersky, 2006).

1.3. Conclusion

Given that presentation can alter the impact of tax policy, some judgement must be made “about how to set or accept the salience of taxes” (Congdon *et al.*, 2011). In his discussion of salience and taxation, Chetty (2011) highlights a number of general economic principles pertinent to many tax policies. With regard to efficiently raising revenue, the most pertinent of these is the principle of reducing the salience of negative incentives.⁷ While governments should never hide taxes, less salient taxes can minimise the distortions that taxes create (relative to the counterfactual of an untaxed competitive market).

From another perspective, in order to facilitate accurate decision-making, taxes, prices and incomes should be equally salient (as successfully reducing the salience of one individual tax may only result in increased salience of the remaining taxes or prices). In this way, consumers and producers would take each cost or benefit into account equivalently and respond on the same basis.

Chetty (2011) also notes tax salience can affect the income distribution and that it also affects how tax burdens are shared between consumers and businesses (for example, low income households may not have the necessary resources to understand all features of the tax code). This would have to be considered when weighing up the potential efficiency benefits of low salience taxes. Although economic distortions overall may be reduced, there are welfare implications for particular taxpayer categories which would need to be considered if either low (or high) salience taxes result in decisions which leave certain individuals worse off than they would be in the benchmark case of perfectly neutral tax presentation.

More generally, market salience will depend on a multitude of factors including: the tax collection process; tax size (relative to price); labeling and other presentation; its economic effects; the tax base; complexity and interactions; the tax incidence; price salience; tax partitioning; and taxpayer experience and education. The Irish experience also highlights that there may be feedback effects between political salience and market salience. Many of these factors could potentially be adjusted. It is more difficult to say to what extent that may be appropriate.

⁷ For corrective taxes, a reverse principle would apply (while being aware that when there is a profusion of tax incentives, the focus a taxpayer can give to each one is reduced).

2. Bounded Rationality and Objective 1: Raising Revenue Efficiently

2.1. Definition and Introduction

In contrast to many behavioural economics concepts which originated with psychologists, the concept of **bounded rationality** originates with an economist called Herbert Simon (1916-2001). In standard economic theory, “rationality” is understood as meaning that individuals make choices that maximise their welfare. However, Simon argued that having sufficient information to make the welfare-maximising decision can be costly to the individual in terms of time, effort, cognitive ability and money. Instead, when making a choice, in particular a complex one, they restrict themselves to a subset of all possible options (Simon, 1956). Many choices are not considered, including ones which could make them better off. Simon called this “satisficing” – a combination of “satisfy” and “suffice” – but it is better known today as bounded rationality. This diverges from standard economics, which assumes that individuals use all available information when making decisions.

Bounded rationality: individuals do not consider all information when making complex choices, as it can be costly for them to do so.

Schmeduling: workers do not accurately perceive their tax schedule.

Ironing: a form of schmeduling where workers facing a multi-rate tax schedule use their average tax rate as the basis for decision-making rather than their marginal tax rate.

2.2. Bounded Rationality and Tax Policy

It is not difficult to believe that, when making complex choices, people may rely on simplified rules of thumb to take a decision they consider “good enough” (even when it results in a worse outcome for them, from a welfare perspective). In relation to tax policy, bounded rationality can apply to taxpayers, tax policymakers, tax policy lobby groups and the legislature (with responsibility to scrutinise tax policy).

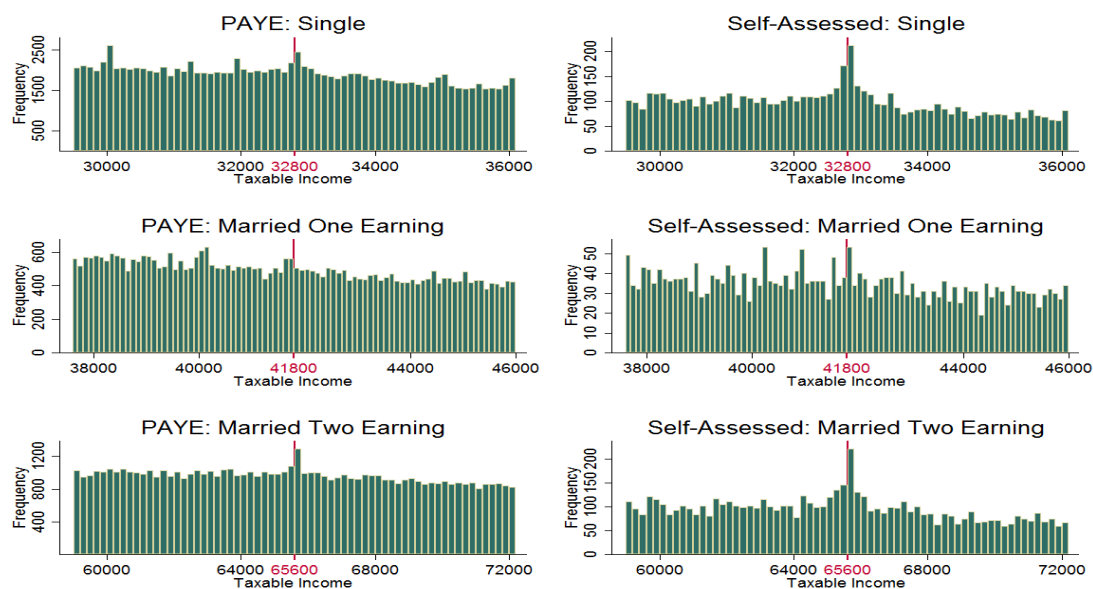
Liebman and Zeckhauser (2004) conducted research in the US on “**schmeduling**” which argued that due to complicated tax schedules, taxpayers misperceive the taxes they face. A form of schmeduling they call “**ironing**” is particularly relevant from an income tax policy perspective. This is when an individual decides their labour supply as if facing their average tax rate rather than their marginal tax rate, with the latter rate how standard economic theory describes their decision-making behaviour (in other words they iron all the marginal tax rates faced at different income points into a single average tax rate). They argue that individuals find it difficult in reality to identify their exact location point on the tax schedule, so instead they smooth the rate over the full schedule. The authors argue that this behaviour is more likely when there are many marginal rates (i.e. a non-proportional income tax), when the tax code gets revised frequently and when a taxpayer faces more than one schedule simultaneously (e.g. income tax, USC and PRSI). It is less likely at higher incomes (where people can employ tax consultants to optimise their income on their behalf). Evidence from

Italy, the US and the UK supports the argument that individuals get confused between their marginal and average tax rates.⁸

One way of empirically investigating this issue (without proving that the response is definitively due to complexity) is by checking for bunching at kinks in the tax schedule. For example, if taxpayers are rational rather than ironers, they should bunch at incomes just below a change in the marginal tax rate from 20% to 40% (or from 0% to 20% when their tax credits are exhausted). If they are ironers, bunching will not arise as the average tax rate in Ireland rises smoothly as income rises (due to the strong progressivity of the Irish income tax system).

Figure 3 contains the 2014 income distribution for various taxpayers. For PAYE employees, minor spikes likely indicate the propensity to set wage contracts in round numbers (e.g. €33,000). For both PAYE and self-assessed dual-earning couples, and self-assessed singles, there is evidence of bunching at their standard rate thresholds. This suggests that taxpayers do respond rationally (i.e. correctly identify that it is their marginal tax rate that determines their last euro of income and adjust their work intensity accordingly). The stronger visual evidence of bunching for the self-assessed may relate to the fact that they only pay income tax once a year, and so it is more salient for them.⁹ This type of taxpayer can also more easily adjust their taxable income than a PAYE taxpayer.

Figure 3: 2014 taxable income distribution and evidence of bunching



Source: Statistics and Economic Research Branch, Revenue Commissioners

Note: data are for the full population of taxable entities within these income bands.

⁸ Although notably this evidence spans the 1960-1990s, when OECD tax schedules typically had more marginal rates than today. On the other hand, more recent work on the Child Tax Credit in the US backs up the scheduling hypothesis (Feldman and Katuscak (2006)).

⁹ Bounded rationality could be viewed in part as a sub-category of salience, where individuals use or process only the most salient information.

As can be seen from the vertical axes, PAYE Singles make up the majority of income taxpayers. It must be noted that the lack of strong evidence for bunching by this group does not necessarily prove they are boundedly rational and ironing in response to the tax schedule. For example, it may be the case that employees near this income level are unable to readily adjust their hours worked (see Hargaden (2015) for a discussion of this with reference to Ireland).

2.3. Conclusion

There are important efficiency implications associated with ironing. If taxpayers do not react as strongly to marginal tax rates as standard economic theory suggests, then the excess burden due to high marginal tax rates are lower than would otherwise be predicted by standard economic theory. Ironers will perceive a tax rate that is lower than the true marginal tax rate. Hence, they will earn more income (work harder), and the tax system will impose a smaller excess burden and smaller distortions to economic activity. Figure 1 does not provide enough evidence to prove that bounded rationality is a behaviour induced by the Irish income tax system. Future work could look at the income distribution in the income range where USC, income tax credits and PRSI all interact together (which is lower down the income distribution) and which arguably creates more complexity for taxpayers.

Unlike standard economics, behavioural economics does not assume that decisions reflect preferences. Therefore while the presence of bounded rationality amongst taxpayers may improve economic efficiency, it cannot be concluded that efficiency gains are perfectly correlated with welfare gains (i.e. some individuals' 'satisficing' may leave them very far from their optimum outcome). In common with salience, distributional considerations are important as different categories of taxpayer may be more or less likely to be boundedly rational.

It is also worth noting that while complexity can result in taxpayers reacting less to the tax system than standard economic theory would suggest (and so improve economic efficiency), one of the risks with complexity, for example frequent revisions to a particular tax code, is that law-abiding taxpayers accidentally under-report income and thus in this instance less revenue is raised than would otherwise be the case.

3. Reference Dependence and Loss Aversion and Objective 2: Corrective Taxation

3.1. Definitions and Introduction

The basic intuition behind **reference dependence** is that individuals evaluate their welfare not solely on the basis of (potential) outcome values (i.e. the standard economic assumption of reference independence) but also by how those outcome values compare to some reference point. For example, two individuals who have the exact same personal circumstances, e.g. wealth and health, can differ in the satisfaction they draw from those circumstances on the basis of differing comparators or benchmarks against which they assess their individual positions. Typical reference points for comparison include past circumstances, expectations, and the circumstances of other people. Changing these comparators or adding new (even irrelevant) alternative benchmarks can change an individual's assessment of an unchanged outcome, or more confusingly when outcome values change the reference point may simultaneously change. In this way reference dependence can both influence decision making among alternative choices and impact the experienced welfare from an outcome.

In addition, the same comparator can generate multiple contrasting reference points, depending on how the comparison is presented. To illustrate, the following table presents a variety of potential methods for comparing the income and tax liabilities for gross incomes of €25,000 and €100,000 respectively. The top half of the table presents absolute amounts (euro terms), for instance the tax payable at each income level is €3,240 and €39,129. Equivalently, this can be expressed as average tax rates of 13% and 39.1%. A third way of presenting the same information is to take the ratio of the different incomes or tax liabilities. Thus, while a gross income of €100,000 is four times €25,000, the tax payable at €100,000 is over twelve times that at €25,000.

Table 1: Alternative Presentations of Equivalent Information

	Salary 1	Salary 2
Gross Salary	€25,000	€100,000
Net Salary	€21,760	€60,871
Absolute Tax Amount	€3,240	€39,129
Average Tax Rate	13%	39.1%
Gross Salary Multiple	1	4
Net Salary Multiple	1	2.8
Tax Multiple	1	12.1

Note: the data in both columns refer to a single individual, private sector PAYE employee, paying the full rate of PRSI in 2017.

As can be readily understood, an observer's perception of the difference in treatment at the two income levels, could be influenced by which of these (or other) reference points is used. More generally, there is a possibly infinite range of reference points given that, for instance, past circumstances could potentially refer to any point in time or the variety of people/firms that could act as a comparator. Thus, the key challenge with reference dependence is the lack of clarity on what the reference point is, as there are a variety of possible reference points

which taxpayers can use for assessing their satisfaction with their current position and basing their preferences over different policy options. Different reference points will change the impact of a particular tax policy.

Loss aversion refers to the idea that “losses loom larger than gains” (Kahneman and Tversky, 1979). When making a decision, people prefer avoiding losses, even small losses, to a greater extent than acquiring equivalent gains. It can be seen that in order to arrive at a calculation of losses or gains, some reference point is necessary, and in turn, loss aversion catalyses the impact of reference dependence on decision making. From the reference points identified previously, loss aversion can most readily be applied to differences from past circumstances (Tversky and Kahneman, 1992) or past expectations (Kőszegi and Rabin, 2006).

Reference Dependence: individuals evaluate their welfare not solely on the basis of (potential) outcome values but also by how those outcome values compare to some reference point.

Loss Aversion: when making a decision, people prefer avoiding losses, even small losses, to a greater extent than acquiring equivalent gains.

Kahneman (2011) demonstrates one measure of loss aversion which can be ascertained from answers to the question: “What is the smallest gain that I need to balance an equal chance to lose €100?” Kahneman indicates that the average stated answer is often in the range €150 to €250 i.e. the point at which individuals will accept an even coin toss with a 50% chance of losing €100 is typically where the 50% chance approaches and exceeds €200. This is equivalent to a “loss aversion ratio” in the range of 1.5 to 2.5, though there can be considerable variation in loss aversion within population groups. Thus the influencing power of losses is roughly twice as powerful as gains of the same magnitude.

While the psychological mechanics underpinning loss aversion are as yet unclear, it has been used to explain widespread risk aversion, risk-seeking to avoid losses, the endowment effect (the tendency for people to value an object more highly when they possess it than they would value the same object if they did not possess it) and the status quo bias (Rick, 2010).¹⁰

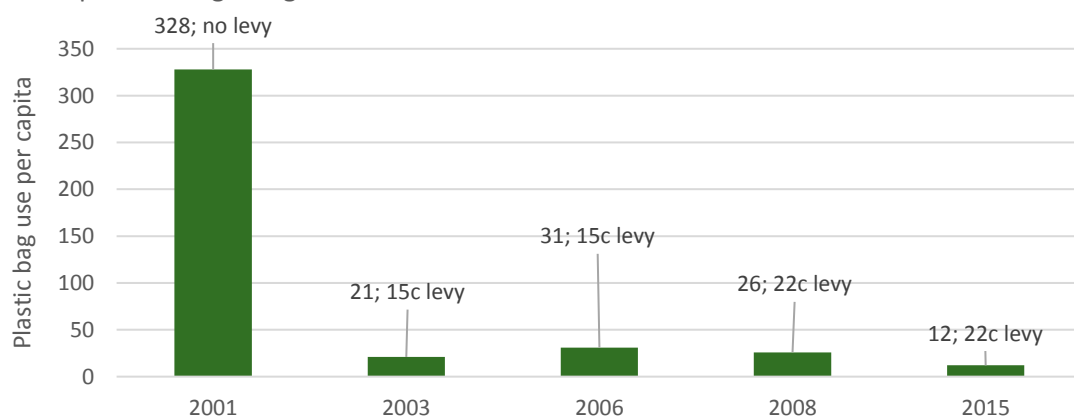
The established approach in standard economics has been to measure welfare on the basis of outcome values, such that if for instance an individual’s income increases, then that person is unambiguously better off. However, under reference dependence and loss aversion that conclusion can change, for instance if others experienced a greater increase in income (or there was an expectation of a greater increase in income).

¹⁰ Reference dependence and loss aversion are the two core components of a behavioural economic theory called prospect theory, which is increasingly the predominant model used for evaluating choices involving risk. The other elements of prospect theory are diminishing sensitivity to gains/losses and probability weighting (assigning subjective decision weights to outcomes which may differ from objective probabilities).

3.2. Reference Dependence, Loss Aversion and Tax Policy

Tax aversion and penalty aversion can be attributable to loss aversion (McCaffery, 2014). Whilst tax aversion itself is predictably common in Ireland, there also exist examples of loss aversion and reference dependence in the Irish tax system. One example which arguably encompasses both concepts in the area of corrective taxes is the plastic bag levy which was introduced in March 2002. Disposable plastic bag use reduced substantially upon the introduction of the levy (although this can also be explained by standard economic theory whereby consumers reduce consumption in response to a price increase). However, bag usage then rose from 21 to 31 bags per capita between 2003 and 2006 (Figure 4). In part, this increased use could be attributable to consumers desensitising to the levy as the 15c charge became incorporated into a new reference point for them i.e. it was no longer considered a loss to the same extent as previously. On the same logic, the effect of the subsequent increase in the levy to 22c in reducing bag use by 2008 would reflect the sense of loss compared to the 15c levy rate. The reduction in plastic bag use to 2015 indicates, though, that there are other factors than loss aversion and reference dependence at work here (for example increased consumer price sensitivity during the recession years).

Figure 4: plastic bag usage over time



Source: Department of Housing, Planning, Community and Local Government

As regards tax policy design, it is easy to question how successful the plastic bag levy would have been in reducing plastic bag pollution if it had been presented as a bag-free bonus rather than a tax. If we just consider those who would be using one plastic bag, a bag-free bonus presents a choice between saving 22c on the full value of the transaction and the use of a plastic bag (i.e. “a negligible gain” of 22 cent on the whole transaction vs. losing out on the plastic bag). A tax frame (which was what was implemented) presents a choice between paying 22 cent and the use of the plastic bag (i.e. loss of 22 cent vs not gaining the plastic bag). A further element of the levy was the way it initiated a requirement for an active decision to choose a plastic bag which was not previously present, and is unlikely to have arisen under a bonus framing. Overall, this narrative parallels Homonoff (2014), who found that the tax framing of a plastic bag levy around Washington D.C. was many times more effective at reducing bag use than the previous re-usable bag bonus. Thus it is clear that loss aversion can create powerful behavioural effects which corrective taxes in particular can benefit from.

As indicated by McCaffery (1993), “one of the strongest general lessons from loss aversion is that people are strongly wedded to the status quo, and may over-emphasize the detriments of change”. The status quo bias can be seen in the difficulty in achieving change in the tax system. It presents difficulty in tax shifting where it becomes clear at the point of transition that those who the tax burden will be removed from are not as vocal as the new cohort who will pay the tax. Similarly loss aversion is likely reflected in the tendency of tax expenditures, which are typically initiated in order to encourage a particular form of behaviour, to persist beyond their useful life. Thus there is perhaps a tax reform insight from loss aversion that proposals for changes which are likely to be slightly beneficial may not be pursued. When this happens across multiple proposals significant welfare gains may be sacrificed.

Loss aversion can also be seen as one reason why tax expenditures are relatively attractive to policymakers as a corrective tool in the first instance as they are perceived as revenue forgone, rather than a form of public expenditure. The implication here is that subjecting tax expenditures to the same scrutiny processes as public expenditures would reduce this perception and hence the inclination towards tax expenditures as a policy tool (unless strictly necessary). Similarly, loss aversion contributes towards explaining why the self-employed are more likely to claim tax expenditures (in addition to other reasons such as salience and filling out forms anyway) as PAYE workers may perceive such reliefs as a gain whereas self-employed may perceive tax reliefs as avoiding a loss.

3.3. Conclusion

The most generalisable implication of loss aversion for corrective taxation is that “loss-averse consumers would respond more to a tax (a loss) than an equivalent subsidy (a gain)” (Leicester *et al.*, 2012); in other words, taxes intended to change behaviour should focus on applying penalties rather than bonuses. This would suggest, for instance, the use of environmental interventions more similar to a plastic bag tax than the probably more familiar incentives for purchasing “green” products. It appears that loss framing also has the potential to initiate more active decision making which can be an important part of behaviour change.

Nevertheless, questions over the ongoing effectiveness of loss aversion based measures remain (Leicester *et al.*, 2012). Can reference points be changed without changing taxes in order to elicit greater behaviour change (e.g. emphasise the 23% VAT rate on unhealthy goods rather than introduce a form of sugar taxation)? Do consumers adapt to policies over time and incorporate taxes into their reference point, therefore becoming less responsive to a tax? Does providing corrective subsidies (e.g. tax incentives) to encourage one behaviour lead to a similar expectation for incentives for other behaviour changes?

In the sense that reference dependence primarily impacts on people’s preferences (Dellavigna, 2009), it is also difficult to say what the most appropriate reference point (or absence of reference points) should be. A general takeaway is that care should be taken in the use of particular reference points and that greater consideration should be given to the implications of using various alternative reference points in the tax system, as economic decision-making is plainly influenced by them.

4. Time Inconsistency and Objective 2: Corrective Taxation

4.1. Definition and Introduction

Standard economic theory specifies individuals' decisions as being time consistent. This means that the incentive to keep a commitment is the same as the incentive to make a commitment (Kling, 2009); in this way, individuals are able to maximise overall lifetime welfare. For example, if an individual decides for health reasons to eat less cake starting tomorrow, it is time consistent if they do actually refrain from eating cake on the following day. But if the decision is taken with the knowledge that they are attending a birthday party tomorrow, there may be a **time inconsistency** problem as they could easily be tempted by the cake, despite knowing it is unhealthy. Time inconsistency occurs or can risk occurring when the incentive to keep a commitment is significantly less than the incentive to make the commitment. Under time consistency, by contrast, plans that are optimal today are optimal in the future (provided nothing changes but time e.g. no income windfall which allows the employment of a personal trainer as a substitute for eating less cake).

Time Inconsistency: the incentive to *keep* a commitment is substantially different to the incentive to *make* a commitment, and a person's preferences change accordingly.

Discounting: this is a technique used by economists to model individuals' preferences for current consumption relative to future consumption. In both standard and behavioural economics models, discounting ensures that the present is valued more than the future.

Present bias: the intuitive notion that individuals prefer immediate gratification and are happy to postpone more distant rewards.

Projection bias: the notion that people exaggerate the extent to which their future preferences will resemble their current preferences.

Internality: a cost imposed on oneself by oneself.

A large evidence base indicates that people are not time consistent in the sense given by standard economic models of decision-making, for example they often display a lack of self-control in consumption decisions. Some standard models have reacted to this by changing the way individuals weigh up current and future consumption choices (for example the idea that people are impatient can easily be incorporated into standard models, using the assumption of exponential **discounting**).

However, it appears that people are impatient in an inconsistent manner; it is not only the length of a delay that matters, but when the delay occurs. People avoid waiting more as the wait nears the present time. To illustrate, many people prefer €100 now to €110 in a day, but very few people prefer €100 in 30 days to €110 in 31 days. Behavioural economists therefore often use an alternative form of discounting called hyperbolic discounting to account for the fact that people are **present-biased** i.e. both prefer immediate gratification and are happy to postpone more distant rewards (Laibson, 1997). Hyperbolic discounting has been applied to

issues such as self-control, health outcomes, personal finance decisions and other consumption choices over time.

Procrastination is often a symptom of present-biased preferences. A recent paper uses a model which includes procrastination as a behavioural channel to motivate results from a large field experiment in the UK which found that late payments of taxes can be corrected through sending letters to taxpayers highlighting social norms (Hallsworth *et al.*, 2017). Although concerned with tax compliance rather than tax policy, the paper highlights the power of a behavioural economics model relative to a standard economic model in improving fiscal outcomes.

People also make long-term choices assuming their preferences will not change in the future; this is known as **projection bias**. They inaccurately forecast their future preferences (mostly based on today's desires). For example, gym memberships are often purchased in January with diminishing use subsequently observed throughout the rest of the year. Future tastes can easily differ from current tastes due to habit formation, mood fluctuation and social and environmental influences (Loewenstein *et al.*, 2003).

While time inconsistency is more likely to be a feature of individuals' preferences rather than firms' preferences, it is worth exploring what it implies for investment decisions. Recent advances in the corporate finance literature have incorporated behavioural insights (see Baker and Wurgler (2012) for a survey). Time inconsistency has been more closely analysed for entrepreneurial rather than corporate finance, as larger firms are assumed to be better able to keep to their investment commitments. For "naïve" entrepreneurial firms, in particular, time inconsistency could result in favouring current profit margins over investment (which would reduce profit margins in the present period but increase them in a later period), and continued delay in investment in future time periods.¹¹ For "sophisticated" entrepreneurial firms, who recognise their own time inconsistency, their commitment to overcoming the inconsistency may result in excessive investment (Brocas and Carillo, 2004).

4.2. Time Inconsistency and Tax Policy

When time inconsistency is observed at the level of macroeconomic policy, economists usually suggest countering this by creating credible rules to replace discretionary policy. For example, a government which promises large expenditures in the short-term without raising taxes will accrue larger deficits over time which will ultimately have to be paid for by raised taxation levels in the long-run. Therefore rules such as the Stability and Growth Pact were created to rectify this time inconsistency. Similarly in the realm of (more microeconomic) tax policy, certain taxes can be viewed as commitment devices that attempt to solve market failures caused by time inconsistency.

Economists recommend taxation as a solution to market failures caused by externalities. Behavioural economists have developed this idea further by characterising the long-run

¹¹ Note it is "consistent" to prefer current profit over current investment, whilst intending to increase investment in a future period. However, the "inconsistency" arises if the firm does not follow through on its intention to increase investment when the future period arrives.

impacts to the individual associated with their own decisions as “internalities”; in other words, internalities are externalities that individuals impose on themselves (Alcott and Sunstein, 2016). This is not a traditional market failure but the source of inefficiency/welfare loss can be made clear through an example: a smoker may derive short-term benefit from cigarettes but the long-run cost they are imposing on themselves can be considerable. Corrective taxation can play a role as a commitment device in addressing internalities and in “correcting” the present bias which is strongly associated with addictive goods.¹²

Most of the empirical work on time inconsistency and taxation has related to the taxation of addictive goods. Gruber and Koszegi (2004) provide evidence from the US that smokers are made relatively better-off when cigarette taxes rise, as they value the excise duty as a self-control device to help them quit. The impact is greatest for the lowest income groups who have the highest sensitivity to cigarette prices. This reverses the typical conclusion on excise taxes as highly regressive. They reach their conclusion by deviating from the standard way of analysing incidence of taxation (using prices and quantities) and instead focus on consumer utility, which in their model contains a term for the value a consumer attaches to a self-control tool provided by a higher price. They argue that the standard focus is incomplete for addictive goods in the presence of time inconsistency. Their work has implications for excise duty in an Irish context, as it suggests that – from the point of view of correcting internalities caused by present bias – excise duty on cigarettes and other addictive goods could be substantially higher than is currently the case. Nevertheless, one of the most general lessons of behavioural economics is that context is crucial, so employing the insights from one setting (the US) in another (Ireland) must be done with great care.

Present bias is also apparent in the area of savings, an economic decision with long-term benefits but high up-front costs. There is a tax expenditure at the marginal rate of income tax for pension contributions in Ireland which is justified on the basis of the market failure of under-saving by households for their retirement needs. The behavioural economics concept of time inconsistency does not contradict the standard economic prognosis or solution, but enhances understanding on the behavioural mechanisms that cause under-savings.

Similarly, time inconsistency provides an alternative justification for the tax expenditure on health expenses (income taxpayers can claim a tax refund on health expenses at the standard rate of income tax). Projection bias prevents the formation of “good” habits, such as regular check-ups at the doctor. Being in good health today may cause people to under-estimate the probability of ill health in future and therefore refrain from taking precautionary action today. The tax expenditure encourages alternative behaviour which can overcome such projection bias. The introduction of the Lifetime Community Rating (LCR) in the private health insurance market in 2015, which imposed a penalty on people when they took out health insurance for the first time and were aged over 35, is another policy tool example in this area. This latter tool is framed as a loss rather than a gain so, keeping the behavioural insights from loss

¹² Government intervention in the area of internalities is a lively debate. While those that subscribe to a libertarian paternalistic philosophy consider it acceptable in order to increase welfare (see, for example, Thaler and Sunstein (2003)), others argue that such intervention creates more problems than it solves (Glaeser, 2006).

aversion in mind, is arguably more effective at overcoming projection bias than a tax expenditure.¹³

The corporation tax system, through the existence of capital allowances, allows companies to use a portion of their capital expenditure costs to reduce the profits which are subject to tax. In this way, it incentivises investment in the present period (which can increase the overall productive capacity of the firm and ultimately the economy). This is consistent with standard economic modelling of firm decision-making whereby lowering the cost of capital increases investment. The existence of time inconsistency amongst certain categories of firms does not negate this approach and in fact – if proven – may further encourage the use of capital allowances in the corporation tax system. However, the still-emerging research in this area suggests that there are myriad factors determining firms' decisions, such as whether investment is financed through debt or equity, or whether firms recognise their own time inconsistent behaviour (Tian, 2016).

4.3. Conclusion

In some instances, such as the example of tax expenditures on health expenditures, time inconsistency provides an alternative explanation of behaviour but reaches the same policy conclusion as standard economic theory that a well-designed corrective tax can improve economic efficiency and welfare.

In others, however, time inconsistency creates a radically different welfare interpretation of existing tax policy, in particular in the area of addictive goods. If it is the case that Irish taxpayers view excise duty on cigarettes or alcohol as a commitment device to deter consumption, then the usual view of these taxes as regressive could be reversed. However, the evidence for this is not available for Ireland, highlighting the challenge of gathering information on people's underlying preferences (which behavioural economics does not assume to be necessarily revealed by their observed choices).

Ultimately, it would likely be a matter of judgement to decide whether the consumption of addictive goods represents underlying preferences or a failure of self-control, and if it is a failure of self-control, how to weigh the welfare of the present self against the future self (Congdon *et al.*, 2011). Giving greater weight to the future self implies increasing the tax burden to deter consumption today. A general conclusion is that the magnitude and timing of the tax burden or tax subsidy will be an important factor in attempts to correct externalities or internalities, and this magnitude may not correspond to the rules of thumb generated by standard economics, which do not typically consider issues of self-control.

¹³ The two tools do not necessarily provide an identical loss or gain in absolute terms so the loss aversion argument is a general rather than precise one here.

Section C: Insights for Tax Policy from the Behavioural Economics Approach

Behavioural economics generally agrees with the established rules of thumb for tax policy design, while in some instances adding another layer of depth and at other times complicating the rules of thumb. The complications can perhaps be best understood by recalling that the lessons from standard economics are referred to as rules of thumb rather than hard and fast rules or universal truths. The concepts discussed in this paper represent only a selection of behavioural insights which could be usefully applied to tax policy. Nevertheless, those under consideration provide a number of insights to consider.

1. Objective 1: Raising Revenue Efficiently

Behavioural economics' general concurrence with the existing rules of thumb can be seen by taking those rules of thumb and applying the behavioural economics concepts to them. Take, as an example, the inverse elasticity rule for raising tax revenue efficiently. The inverse elasticity rule states that the tax burden should be inversely proportional to the price sensitivity of supply and demand. In the case of each behavioural economics concept discussed in previous chapters, the concept either in a general sense supports the rule or does not contradict it except in specific circumstances. With regard to the inverse elasticity rule and efficient revenue raising:

- **Salience** indicates that the burden of taxes should fall on goods/services with the lowest price/tax salience. As lower salience is associated with lower price sensitivity, focusing the tax burden on goods/services with lower price/tax salience corresponds to the tax burden falling predominantly on goods/services whose consumers are less sensitive to price. In other words, the insight from standard theory is unchanged.
- **Bounded rationality** might indicate that the burden of tax should fall on goods/services where complexity causes agents to use the average rather than marginal tax rate in their decision-making (if different tax schedules existed for goods/services). This is consistent with the inverse elasticity rule. However, to complicate things, if complexity induced non-compliance or unintended underreporting it could have the opposite effect on tax revenues.
- **Loss Aversion** indicates that the burden of taxes should fall on goods/services where the tax is perceived as a forgone gain rather than a loss. As forgone gains are associated with lower price sensitivity, focusing the tax burden on goods/services framed as forgone gains (rather than losses) corresponds to the tax burden falling predominantly on goods/services whose consumers are less sensitive to price. In other words, the insight from standard theory is unchanged.

- **Time inconsistency** indicates that the burden of tax should fall on goods/services over which people exhibit the least self-control. Less self-control over consumption decisions is associated with lower price sensitivity so focusing the tax burden on these goods/services corresponds to the tax burden falling predominantly on goods/services whose consumers are less sensitive to price. Again, the insight from standard theory is unchanged.

A similar exercise can be conducted for each of the standard rules of thumb for tax policy, applying the various behavioural concepts in each case, yielding for the most part similar results.

However it should be stressed that these are implications for tax policy from a revenue-raising perspective only and do not take into account other factors. In particular, the welfare implications of individuals consuming more or less of a good/service than they would if they accurately weighed the tax and price components would need to be accounted for. There may well be welfare costs along other margins of adjustment for an individual, for example over-consumption of a particular good could lead to under-saving (Congdon *et al.*, 2011).¹⁴ The use of behavioural concepts, therefore, may not contradict the insights from standard economics but they do encourage a fuller analysis of the trade-offs between raising revenue, economic efficiency and individual welfare.

The conclusion drawn by Congdon *et al.* (2009), who look at the implications of behavioural economics for tax simplicity in particular (one of the rules of thumb for an efficient tax system), echoes that behavioural economics does not disagree with standard rules of thumb for tax policy; rather it provides additional layers of complexity/richness. “Behavioural economics does not so much suggest that tax simplicity is less or more desirable than in the standard model, so much as it changes and complicates the relationship between simplicity and welfare” (ibid).

2. Objective 2: Corrective Taxation

With regard to corrective taxation, behavioural economics also heavily weights the context and circumstances as compared to the standard cost-benefit model of taxation inducing behaviour change. In simple terms, the latter argues that raising taxes increases the costs associated with an activity thereby reducing the net benefit of partaking. The converse is that reducing taxes increases the attractiveness of the taxed activity. By contrast, behavioural economics sits within the broader behaviour change literature which argues that there are a number of conditions which need to be in place to achieve behaviour change (see for example the Behaviour Change Wheel by Michie (2011)). This perspective, emphasises that proposed tax measures aiming to change behaviour (incentives or penalties) often do not address the determining factors driving or constraining behaviour.

¹⁴ Chapter 7 in Congdon *et al.* (2011) provides an in-depth and useful discussion on the implications of behavioural economics for revenue raising.

From the consideration of behavioural concepts in this paper it is difficult to identify insights for tax policy which are common to all of the concepts. It would appear that behavioural economics does not (yet) provide the same kind of, broadly applicable, rules of thumb for tax policy as standard economic theory. This, in part, reflects that behavioural economics effects generally have yet to be aggregated into generally applicable findings and that a general theory of behavioural economics has not been developed. Some argue that such a theory with the kind of explanatory power of standard economic theory never will be developed (Thaler, 2015).

While it may be difficult to generalise behavioural economic insights for taxes into policy prescriptions of the type generated by standard economic theory, some guiding points can be identified regarding the process of tax policy making as well as the appropriateness of taxes in different contexts, with regard to taxes seeking behaviour change. Firstly, on their own, each of the behavioural concepts examined in Section B has an implication for otherwise equivalent taxes aiming to change behaviour.

- **Salience** indicates that, all else equal, a more salient tax measure will be more effective at changing behaviour;
- **Bounded rationality** indicates that, all else equal, a less complex tax will be more effective at changing behaviour;
- **Loss aversion** indicates that, all else equal, a tax perceived as a loss will be more effective at changing behaviour than one perceived as a forgone gain.
- **Time inconsistency** indicates that, all else equal, the closer the timing of the application of the tax to the activity being taxed, the more effective it will be in changing behaviour.

3. Behavioural Economics Emphasis on Perception

As a whole, behavioural economics highlights that it is the perception of a tax rather than its substance which ultimately impacts behaviour change and that this perception can be influenced (Houdek and Koblovský, 2015). Furthermore, the distribution of behavioural responses to these perceptions among individuals appears to vary more than the distribution of behavioural responses to the tax's substance.

Changing information provision about a tax can change perception, and thus influence behaviour. Chetty and Saez (2013) found that giving simple, personalised information to recipients of the Earned Income Tax Credit (EITC) in the US increased hours worked relative to recipients who were given no additional information on the credit's effect on their income (and notably this result was achieved at a much lower cost than an expansion of the EITC programme or a cut in income tax rates).

One general principle which can be drawn from behavioural economics is that tax, as a whole, is probably not the best instrument to change the behaviour of a sub-set of tax-payers, as a change in the tax burden will affect all tax-payers rather than just the subset. Given a desire

that a particular tax measure to incentivise behaviour change should be made more effective, this insight would point towards seeking to firstly change the perception of the tax measure (and hence the desired behaviour) within the targeted cohort, before considering substantive changes to the measure. Using the Chetty and Saez (2013) result above, this suggests that if, for example, policymakers wanted to increase the labour supply response of low-earners, providing information on the impact of tax credits/social transfers on net income might be more effective than a tax rate cut, which would impact all earners.

4. Behavioural Economics Emphasis on Context

Overall, behavioural economics seems to have greater potential value in regards to corrective taxation and seeking behaviour change than other areas of tax policy. Each of the behavioural economics concepts has the potential to add value to the design of corrective taxes, though not all will be applicable in a given context. In particular, an emphasis on context can allow greater behaviour change to be achieved while the substance of a tax incentive or penalty is unchanged. On the other hand, greater context combined with the application of the behavioural economics concepts also highlights that non-tax measures may be more effective in achieving a desired behaviour change.

This additional level of depth or complication which behavioural economics provides is similar to the way in which the standard rules of thumb can be applied at different levels of subdivision. For instance, at a broad level the inverse elasticity rule of thumb point towards the application of the OECD hierarchy of taxation (e.g. tax labour less than consumption) whereas at a more detailed level the implication is that second earners should be taxed at a lower rate than first earners while at a more detailed level still it follows that each individual should be taxed in respect of their own elasticity of labour supply.

5. Conclusion

This paper seeks to introduce readers to a range of concepts from behavioural economics which can be useful for tax policy analysis. By applying them to examples from the Irish tax system, it is clear that behavioural economics can play a role in explaining or enhancing the impact of tax policy both under the objectives of efficient revenue raising and of corrective taxation.

Standard economic theory provides a number of general rules of thumb for tax policy. Behavioural economics does not so much change these, or provide its own alternatives, but instead provides an additional level of depth to the existing rules of thumb. This richness is supplied by emphasising, firstly, the importance of context in tax policy design and, secondly, the extent to which it is the perception rather than the substance of taxes which determine behavioural responses.

Arguably behavioural economics has most to say about taxes which seek to change behaviour (which are a form of corrective taxation). All else equal, by using its concepts in the design and application of taxes, their effectiveness in achieving behaviour change could potentially

be improved. Nevertheless, behavioural economics is also of relevance for taxes which explicitly do not seek to change behaviour (taxes designed to raise revenue efficiently). This is due to its offering of alternative plausible explanations for behaviour that the standard theory fails to predict and for nuancing the overall welfare implications of tax policy.

In the end, any tax which raises revenue could be considered to serve a revenue-raising function. However, individual taxes can have multiple objectives and substantial revenue is raised from taxes that could, at least in part, be considered to have a corrective objective. At a minimum, the carbon tax can be considered to be the purest corrective tax in the Irish tax system. In 2016 revenues from the carbon tax were approximately 1% of Revenue Net Exchequer Receipts which totalled €48,000 million. Including other excise duties which can all be linked to a corrective function, 12% of Revenue Net Receipts could be broadly considered corrective. Many tax expenditures can also be considered to fall under the rubric of corrective taxation. In the Budget 2017 Tax Expenditures Report, some two-thirds of the approximate €5,300 million total revenue forgone could be considered to be primarily corrective.

The small weight of corrective taxes in total revenue receipts might suggest that devoting resources to improving their design through the insights from behavioural economics would not be a worthwhile endeavour. However, it must be remembered that such taxes are not exclusively evaluated through the revenue they raise but rather their broader impact on societal welfare (in other words their success as a policy instrument is better judged through the behaviour change channel rather than in terms of revenue).

In general, more Irish-specific research on the explanatory role of behavioural economics concepts in the area of tax policy would greatly add to the ability of policymakers to narrow the gap between what they hope to achieve with a particular tax instrument and what actually occurs as a result of implementing tax policy.

References

References for each behavioural concept

Salience

Beatty, T. K., Blow, L., Crossley, T. F., & C. O'Dea. (2014). "Cash by any other name? Evidence on labeling from the UK Winter Fuel Payment", *Journal of Public Economics*, 118, 86-96.

Chetty, R., Looney, A., & K. Kroft. (2009). "Salience and Taxation: Theory and Evidence", *American Economic Review*, 99(4), 1145-1177.

Finkelstein, A. (2009). "E-ztax: Tax salience and tax rates", *The Quarterly Journal of Economics*, 124(3), 969-1010.

Gamage, D. & D. Shanske. (2011). "Three Essays on Tax Salience: Market Salience and Political Salience", *65 Tax L. Rev.*, 19.

Goldin, J. (2012). "Sales tax not included: designing commodity taxes for inattentive consumers", *Yale Law Journal*, 122, 258-301.

Min Kim, H. & L. Kachersky. (2006). "Dimensions of price salience: a conceptual framework for perceptions of multi-dimensional prices", *Journal of Product & Brand Management*, 15(2), 139-147.

Leicester, A., Levell, P., & I. Rasul. (2012). "Tax and benefit policy: insights from behavioural economics", IFS Commentary C125, Institute for Fiscal Studies.

Perkins, R. H. (2014). "Salience and Sin: Designing Taxes in the New Sin Era", *BYU Law Review*, pp.143-184.

Sussman, A. & Olivola, C. (2011). "Axe the tax: Taxes are disliked more than equivalent costs", *Journal of Marketing Research*, 48 (November), pp. 91-101.

Bounded Rationality

Feldman, N. & P. Katuscak. (2006), "Should the average tax rate be marginalized?", Center for Economic Research and Graduate Education (Charles University) and Economics Institute (Academy of Sciences of the Czech Republic), CERGE-EI, Working Paper 304

Hargaden, E. (2015). "Taxpayer Responses over the Cycle: Evidence from Irish Notches". Unpublished paper.

Liebman, J. and R. Zeckhauser. (2004). "Schmeduling", Harvard University working paper.

Simon, H. A. (1956). "Rational Choice and the Structure of the Environment". *Psychological Review*. Vol. 63 (2): 129-138

Reference Dependence and Loss Aversion

DellaVigna, S. (2009). "Psychology and economics: Evidence from the field", *Journal of Economic Literature*, 47(2), 315-372.

Homonoff, T. (2013). "Can Small Incentives Have Large Effects? The Impact of Taxes versus Bonuses on Disposable Bag Use." Working Paper No. 575, Industrial Relations Section, Princeton University.

Kahneman, D. (2011). *Thinking, fast and slow*. New York: Farrar, Strauss, Giroux.

Kahneman, D., & A. Tversky. (1979). "Prospect theory: An analysis of decision under risk", *Econometrica*, 263-291.

Kőszegi, B., & M. Rabin. (2006). "A model of reference-dependent preferences", *The Quarterly Journal of Economics*, 121(4), 1133-1165.

Leicester, A., Levell, P., & I. Rasul. (2012). "Tax and benefit policy: insights from behavioural economics", IFS Commentary C125, Institute for Fiscal Studies.

McCaffery, E. J. (1993). "Cognitive theory and tax", *UCLA Law Review*, 41, 1861.

McCaffery, E. J. (2014). Behavioral Economics and the Law: Tax in The Oxford handbook of behavioral economics and the law. Zamir. E., & Teichman, D. (Eds.). Oxford University Press, USA.

Rick, S. (2010). "Losses, gains, and brains: Neuroeconomics can help to answer open questions about loss aversion", *Journal of Consumer Psychology*, 21 pp. 453–463

Tversky, A., & D. Kahneman. (1992). Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty*, 5(4), 297-323.

Time Inconsistency

Alcott, H. & C. Sunstein. (2016). "Regulating Internalities". NBER Working Paper No. 21187

Baker, M. & J. Wurgler. (2012). "Behavioral Corporate Finance: A Current Survey." In *Handbook of the Economics of Finance*, Vol. 2, Handbooks in Economics. New York: Elsevier.

Brocas, I. & J.D. Carrillo. (2004). "Entrepreneurial boldness and excessive investment", *Journal of Economics and Management Strategy*, Vol. 13, pp.321–350.

Glaeser, E. (2006). "Paternalism and Psychology", *University of Chicago Law Review*, No.1.

Gruber, J. & B. Koszegi (2004) "Tax incidence when individuals are time-inconsistent: the case of cigarette excise taxes", *Journal of Public Economics*, 88: 1959– 1987

Hallsworth, M, List, J.A., Metcalfe, R.D. & I. Vlaev (2017). "The behavioralist as tax collector: Using natural field experiments to enhance tax compliance", *Journal of Public Economics*, 148 (1), pp. 14–31.

Kling, A. (2009). "Time Inconsistency". Econlog, accessed in May 2017 at:
http://econlog.econlib.org/archives/2009/12/time_consistenc.html

Laibson, D. (1997). "Golden eggs and hyperbolic discounting", *Quarterly Journal of Economics*, 112(2): 443-477

Loewenstein, G., T. O'Donoghue & M. Rabin. (2003). "Projection bias in predicting future utility", *Quarterly Journal of Economics*, 118(4): 1209–48

Thaler, R.H. & C. Sunstein. (2003). "Libertarian Paternalism". *American Economic Review*, 93(2), pp.175-179.

Tian, Y. (2016). "Optimal capital structure and investment decisions under time-inconsistent preferences", *Journal of Economic Dynamics and Control*, Vol. 65, pp. 83-103.

Other references in the paper

British Cabinet Office and Institute for Government. (2010). "MINDSPACE: Influencing behaviour through public policy".

Chetty, R., & E. Saez. (2013). "Teaching the Tax Code: Earnings Responses to an Experiment with EITC Recipients", *American Economic Journal: Applied Economics* 5(1): 1–31

Congdon, W., Kling, J. R., & Mullainathan, S. (2009). "Behavioral economics and tax policy". NBER Working Paper No. 15328.

Congdon, W., Kling, J. R., & Mullainathan, S. (2011). *Policy and Choice: Public Finance through the Lens of Behavioural Economics*. Washington D.C.: Brookings Institution Press.

Erta, K., Hunt, S., Iscenko, Z., & W. Brambley. (2013). "Applying behavioural economics at the Financial Conduct Authority", Occasional Paper No.1, UK Financial Conduct Authority.

Huck, S., Zhou, J. & C. Duke. (2011). "Consumer behavioural biases in competition: a survey", UK Office of Fair Trading.

Kennedy, S., O'Carroll, R., Shirran, M. & K. Walsh. (2017). "Applying Behavioural Science in Tax Administration – A Summary of Lessons Learned". Irish Revenue Commissioners. Revenue Commissioner website, accessed in June 2017 at: <http://www.revenue.ie/en/corporate/documents/research/applying-behavioural-science.pdf>

Mirrlees, J.A. (1971). "An Exploration in the Theory of Optimal Income Taxation," *Review of Economic Studies*, 38(2): pp. 175-208

Mullainathan, S. & R.H. Thaler. (2000). "Behavioral economics", NBER Working Paper No. 7948.

Purcell, K. (2016). "Applying Behavioural Economics in Irish Policy". IGEES website, accessed in May 2017 at: <http://igees.gov.ie/wp-content/uploads/2016/10/Applying-Behavioural-Economics-in-Irish-Policy-October-2016.pdf>

Ramsey, F. P. (1927). "A contribution to the theory of taxation", *Economic Journal*, Vol. 37, No. 145, pp. 47-61.


Stiglitz, J. (1988). *Economics of the public sector*. New York: WW Norton & Company.

Stiglitz, J. (2002). "Information and the Change in the Paradigm in Economics", *American Economic Review*, 92 (3) pp. 460-501.

Thaler, R. H. (2015). *Misbehaving: The making of behavioral economics*. New York: WW Norton & Company.

Walsh, K. (2013). "Understanding taxpayer behaviour—new opportunities for tax administration", *The Economic and Social Review*, 43(3), 451-475.

Watts, L. (2014). "Behavioural Economics, Comprehensive Review of Expenditure 2014". IGEES website, accessed in May 2017 at: <http://igees.gov.ie/wp-content/uploads/2013/10/Behavioural-Economics-1.pdf>

The background is a solid teal color. A wavy line in a slightly darker shade of teal runs across the upper half of the page. A thick, curved gold line starts from the left edge near the bottom and curves upwards towards the right edge.

Government Buildings,
Upper Merrion Street,
Dublin 2,
D02 R583
Ireland.

T: 353 1 604 5626
F: 353 1 676 1951
www.finance.gov.ie