

Formatting Instructions for INFORMS Author Styles, 2016/02/22

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The abstract is limited to one paragraph and should contain no references and no equations. Following the abstract, please enter the following items (depending on the requirements of the particular INFORMS journal): (1) key words (**KEYWORDS**), (2) MSC subject classification identifying primary and secondary codes (see <http://www.ams.org/msc>) (**MSCCLASS**), (3) OR/MS classification, also identifying primary and secondary (see <http://or.pubs.informs.org/Media/ORSsubject.pdf>) (**ORMSCCLASS**), (4) subject classifications (**SUBJECTCLASS**), and (5) area of review (**AREAOFFREVIEW**). In later stages of manuscript processing, the history line (**HISTORY**) will be added.

Key words: INFORMS journals; LaTeX styles; author templates; instructions to authors

1. Templates and LaTeX Style

INFORMS currently publishes 11 print journals and three more that are online only (print on demand available). This document gives a brief description of the LaTeX author style `informs3.cls`. A LaTeX template is provided for each of the journals, giving further guidance on the order and format of entering information, particularly article metadata. For every journal there is a mandatory option when invoking the style, which consists of the official abbreviation of the journal. This option will load particular details not necessarily shared by all journals. For example,

```
\documentclass[mnsc]{informs3}
```

Following is a list of all INFORMS journal abbreviations.

deca	Decision Analysis
ijoc	INFORMS Journal on Computing
inte	Interfaces
isre	Information Systems Research
ited	INFORMS Transactions on Education
mnsc	Management Science
mksc	Marketing Science
moor	Mathematics of Operations Research
msom	Manufacturing & Service Operations Management
opre	Operations Research
orsc	Organization Science
serv	Service Science
stsc	Strategy Science
trsc	Transportation Science

Other important options that should be combined with the journal abbreviation are `blindrev` and `nonblindrev`. Options `blindrev` and `nonblindrev` are to be used when preparing a LaTeX-keyed manuscript for review. For blind review journals, option `blindrev` hides authors' names, the history line, and acknowledgments (and visibly announces that fact). In both `blindrev` and `nonblindrev` cases, the printout clearly indicates that the manuscript is submitted to "X" journal; the message is repeated in all running heads to avoid the possibly incorrect impression that the article is already accepted for publication.

The line spread in the manuscript differs from journal to journal to accommodate various editorial requirements. Follow the template (do not edit the LaTeX preamble!) and instructions on the covers of the respective journal. Standard LaTeX penalties that prevent inappropriate page breaks are also removed. For tables no spread is applied because a larger table, as one solid piece, could extend past the bottom edge of the page.

Templates are provided one per journal to reflect particular relevant details not shared by all INFORMS journals. For journals that allow electronic companions (ECs) (*Management Science*, *Operations Research*), additional instructions can be found in the template of respective journals.

2. LaTeX Packages/Tools Available

The `informs3.cls` house style will automatically load `amsmath`, `amssymb`, `ifthen`, `url`, `graphicx`, `array`, and `theorem` styles/tools. Package `dcolumn` is also loaded to help align numbers in tables on decimals. Please refer to respective LaTeX documentation sources for further explanation of how these packages work. By loading `amsmath`, the whole range of enhanced math typesetting commands is available in addition to the standard LaTeX constructions. Art (figures) should be included by using the syntax of the standard `graphicx` package.

For reference processing, we use `natbib` because of its versatility to handle the author-year system used by all INFORMS journals except `moor`. Of course, it handles the numeric style used by `moor` equally well. For handling internal (and external) links, an option to use the `hyperref` package is offered within templates. `natbib` and `hyperref` are loaded and configured only in individual journal templates due to the high sensitivity of the order of their actions (they redefine many internal LaTeX commands).

3. Author and Title Information

Please enter author and title information per template. Besides the obvious `TITLE`, there are `RUNAUTHOR` and `RUNTITLE`—shortened versions to be used in running heads (page headers).

In the general case of multiple authors, the style provides a block `ARTICLEAUTHORS`, used as

```
\ARTICLEAUTHORS{%
\AUTHOR{<first author or first group of authors sharing the same affiliation>
\AFF{<first affiliation>,
  \EMAIL{<email of the first author>}}
\AUTHOR{<second author or second group sharing the same affiliation>
\AFF{<second affiliation>,
  \EMAIL{<email of the first person in the group>},
  \EMAIL{<email of the second person in the group>},
  ...}
...}
```

Enter all authors names. If `hyperref` is used, the syntax for URLs and e-mail addresses should be

```
\href{http://www.informs.org}{INFORMS}
\href{mailto:pubtech@informs.org}{pubtech@informs.org}
```

where the second argument is printable/visible, while the first one indicates the action browser will perform if pointed to the visible part of the hyperlink. For details, please see the `hyperref` manual.

4. Internal Links

To use the full potential of LaTeX and enable smooth revisions and updates of the article and its references, all heads and subheads (`section`, `subsection`, `subsection`), equations that will be referenced (not all equations!), theorem-like environments, and especially citations (references) should be input properly, using symbolic links via `\label{}`, `\ref{}`, and `\cite{}` (and similar commands). This is important regardless of whether you use `hyperref`.

5. Mathematical Formulas

Please see LaTeX documentation. We will only point out some details not regularly available or often overlooked by LaTeX users.

5.1. Special Characters

To help prevent incorrect coding for calligraphic and openface (blackboard bold) letters, this style automatically loads `amsmath` and `amssymb`, so \mathbb{R} and \mathbb{N} are available and coded, respectively, `\mathbb{R}` and `\mathbb{N}`. Standard calligraphic letters like \mathcal{A} , \mathcal{D} , \mathcal{U} , and \mathcal{X} should be coded as `\mathcal{A}`, `\mathcal{D}`, `\mathcal{U}`, and `\mathcal{X}`. With standard fonts, only uppercase letters are available in both cases.

5.2. Bold Mathematical Symbols

Following the style guidelines of the American Mathematical Society, INFORMS does not set math in bold, even if the environment is bold (as for example a section title). However, bold symbols (roman and greek letters, and occasionally digits) are in wide use for variety of reasons. We added macros to facilitate their use in regular math without resorting to overarching packages like `\bm` or using the clumsy `\mbox{\boldmath}` construction.

This style provides the following sequence of bold symbols: **A** to **Z**; **a** to **z**; **0**, **1**, to **9**; **α** to **Ω** ; **\mathcal{A}** to **\mathcal{Z}** ; as well as symbols **ι** , **\jmath** , **ℓ** , **\wp** , and **∇** . This list is keyed as

```
\BFA$ to \BFZ$; \BFa$ to \BFz$; \BFzero$, \BFone$, to \BFnine$;  
\BFalpha$ to \BFOmega$; \BFcalA$ to \BFcalZ$; as well as symbols  
\BFimath$, \BFjmath$, \BFell$, \BFwp$, and \BFnabla$.
```

5.3. Equation Counter

Whenever possible, equation numbering should be consecutive through the article (1, 2, ...). This setting is achieved by outcommenting the command

```
\EquationNumbersThrough
```

in the journal template. If the complexity of the article really requires it, equation numbering can be done by section. The template line

```
%\EquationNumbersBySection
```

should be outcommented in this case. Whichever equation numbering system you choose, please number only the equations that will be referenced. Supply those equations with labels so that the referencing can be done by `\ref{}` in the standard LaTeX process. Should you use `eqnarray`, make sure that the last line does *not* end with `\`, because that will set another blank line with an equation number assigned to a formula that does not exist, and the numbering will go awry.

5.4. Some Other Math Details

We mention a couple of random but useful points.

- For more convenient setting of matrices and matrix-like structures we supplied four environments that fine-tune math spacing around large delimiters. These are `Matrix`, `vMatrix`, `bMatrix`, and `pMatrix`. For example, the Vandermonde determinant can be set as

$$\begin{vmatrix} 1 & 1 & \dots & 1 \\ x_1 & x_2 & \dots & x_n \\ \vdots & \vdots & \ddots & \vdots \\ x_1^{n-1} & x_2^{n-1} & \dots & x_n^{n-1} \end{vmatrix}$$

by using the code

```
\begin{vMatrix}{cccc}1&1&\hdots&1\\ x_1&x_2&\hdots&x_n\\ \vdots&\vdots&\ddots&\vdots\\ x_1^{n-1}&x_2^{n-1}&\dots&x_n^{n-1}\end{vMatrix}
```

The delimiters in the four constructs are, respectively, none, vertical bars, brackets, and parentheses (no prefix, `v`, `b`, and `p`).

- Besides the usual math operators like `\sin`, `\max`, etc., we introduced `\argmin` and `\argmax` to achieve the proper spacing and position of their limits in the display—centered under the whole operator, not only under “max” or “min.”

- In math display constructions where the ubiquitous `array` is used, its elements are set in `\textstyle`. Most notably, fractions will be set small and lines will appear cramped. Limits that are supposed to go under operators will appear as subscripts. It is a matter of good mathematical exposition, rather than of any rigid rules, that the `\displaystyle` be used when a formula is considered too small and tight. To save keystrokes in such cases, we supplied `\DS`, `\TS`, and `\mcr`, for, respectively, `\displaystyle`, `\textstyle`, and the code that should end any line instead of `\` to allow more generous spacing. Compare

$$\left[\begin{array}{cc} 1 & \frac{1}{a^2+b^2} \\ \frac{1}{c^2+d^2} & \frac{1}{a^2+b^2} \frac{1}{c^2+d^2} \end{array} \right], \quad \left[\begin{array}{cc} 1 & \frac{1}{a^2+b^2} \\ \frac{1}{c^2+d^2} & \frac{1}{a^2+b^2} \frac{1}{c^2+d^2} \end{array} \right], \quad \text{and} \quad \left[\begin{array}{cc} 1 & \frac{1}{a^2+b^2} \\ \frac{1}{c^2+d^2} & \frac{1}{a^2+b^2} \frac{1}{c^2+d^2} \end{array} \right].$$

In the middle, the `bMatrix` end of line is keyed as the standard `\`, instead of the enhanced `\mcr` that is used in the last matrix.

6. Lists

INFORMS has a special style for lists to accommodate journal column width. Typically lists are set as standard paragraphs, starting with the identifier (number, bullet, etc.). To reflect this in an automated way, we turned the standard settings for LaTeX lists “upside down.”

The style supplies `enumerate`, `itemize`, and description lists `descr` in the above-mentioned paragraph style, whereas the standard hanging lists, if absolutely necessary, can be entered using list environments with names that are tentatively preceded by “h” (for “hang”): `henumerate`, `hitemize`, and `hdescr`. From time to time, our authors use a bulleted list within a numbered list. To get proper settings for this—`itemize` within `enumerate`—we also introduced an `enumitemize` list.

Following is a sample of `enumerate` based on text that appears on the inside cover of *Marketing Science*. In the first item there is also an `enumitemize` sublist to illustrate its use.

1. Although our primary focus is on articles that answer important research questions in marketing using mathematical modeling, we also consider publishing many other different types of manuscripts. These manuscripts include

- empirical papers reporting significant findings (but without any specific contribution to modeling),
- papers describing applications (emphasizing implementation issues), and
- scholarly papers reporting developments (in fundamental disciplines) of interest to marketing.

2. Manuscripts should report the results of studies that make significant contributions. Contributions can include significant substantive findings, improvements in modeling methods, meaningful theoretical developments, important methodological advances, tests of existing theories, comparisons of methods and empirical investigations.

3. *Marketing Science* promises to provide constructive, fair, and timely reviews with the goal of identifying the best submissions for ultimate publication in the Journal.

Compare it to **henumerate** (the bulleted list from the previous example is run into the first item here):

1. Although our primary focus is on articles that answer important research questions in marketing using mathematical modeling, we also consider publishing many other different types of manuscripts. These manuscripts include empirical papers reporting significant findings (but without any specific contribution to modeling), papers describing applications (emphasizing implementation issues), and scholarly papers reporting developments (in fundamental disciplines) of interest to marketing.
2. Manuscripts should report the results of studies that make significant contributions. Contributions can include significant substantive findings, improvements in modeling methods, meaningful theoretical developments, important methodological advances, tests of existing theories, comparisons of methods and empirical investigations.
3. *Marketing Science* promises to provide constructive, fair, and timely reviews with the goal of identifying the best submissions for ultimate publication in the Journal.

Following is the same text formatted as a bulleted list per INFORMS style.

- Although our primary focus is on articles that answer important research questions in marketing using mathematical modeling, we also consider publishing many other different types of manuscripts. These manuscripts include empirical papers reporting significant findings (but without any specific contribution to modeling), papers describing applications (emphasizing implementation issues), and scholarly papers reporting developments (in fundamental disciplines) of interest to marketing.

- Manuscripts should report the results of studies that make significant contributions. Contributions can include significant substantive findings, improvements in modeling methods, meaningful theoretical developments, important methodological advances, tests of existing theories, comparisons of methods and empirical investigations.

- *Marketing Science* promises to provide constructive, fair, and timely reviews with the goal of identifying the best submissions for ultimate publication in the Journal.

Description list (as in glossaries, for example) will be set per this sample.

Originality: By submitting any manuscript, the author certifies that the manuscript is not copyrighted and is not currently under review for any journal or conference proceedings. If the manuscript (or any part of it) has appeared, or will appear, in another publication of any kind, all details must be provided to the editor in chief at the time of submission. . .

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Subscription Services: *Marketing Science* (ISSN 0732-2399) is a quarterly journal published by the Institute for Operations Research and the Management Sciences at 7240 Parkway Drive, Suite 310, Hanover, MD 21076.

7. Theorems and Theorem-Like Environments

Theorems and other theorem-like environments come in two main styles. Theorems, lemmas, propositions, and corollaries are traditionally set in italic type, and environments like examples and remarks are set in roman.

To achieve automated distinction between these two main theorem styles (and substyles that are, to some extent, journal dependent), we defined several new theorem styles, most notably TH and EX. INFORMS house style prefers that all theorems (say) are numbered consecutively throughout. However, for longer papers with a more complex structure, numbering by section is also provided. The choice must be made in the template, because various counters defined in this way need to be declared *after* `hyperref`.

The preferred version, `\TheoremsNumberedThrough`, is shown here

```
\def\TheoremsNumberedThrough{%
\theoremstyle{TH}%
\newtheorem{theorem}{Theorem}
\newtheorem{lemma}{Lemma}
\newtheorem{proposition}{Proposition}
\newtheorem{corollary}{Corollary}
\newtheorem{claim}{Claim}
\newtheorem{conjecture}{Conjecture}
\newtheorem{hypothesis}{Hypothesis}
\newtheorem{assumption}{Assumption}
\theoremstyle{EX}
\newtheorem{remark}{Remark}
\newtheorem{example}{Example}
\newtheorem{problem}{Problem}
\newtheorem{definition}{Definition}
\newtheorem{question}{Question}
\newtheorem{answer}{Answer}
\newtheorem{exercise}{Exercise}
}
```

The other, two-tier numbering scheme, is defined via

```
\def\TheoremsNumberedBySection{%
\theoremstyle{TH}%
\newtheorem{theorem}{Theorem}[section]
\newtheorem{lemma}{Lemma}[section]
\newtheorem{proposition}{Proposition}[section]
\newtheorem{corollary}{Corollary}[section]
\newtheorem{claim}{Claim}[section]
\newtheorem{conjecture}{Conjecture}[section]
\newtheorem{hypothesis}{Hypothesis}[section]
\newtheorem{assumption}{Assumption}[section]
\theoremstyle{EX}
\newtheorem{remark}{Remark}[section]
```

```
\newtheorem{example}{Example}[section]
\newtheorem{problem}{Problem}[section]
\newtheorem{definition}{Definition}[section]
\newtheorem{question}{Question}[section]
\newtheorem{answer}{Answer}[section]
\newtheorem{exercise}{Exercise}[section]
}
```

Changing these numbering patterns by setting several different enunciations on the same counter is strongly discouraged. The house style does not allow Theorem 1 to be followed by Lemma 2 and then by Corollary 3.

For those who require an exception to the rule, there are theorem styles `THkey` and `EXkey`. These follow the general style of `TH` and `EX` but if used with an optional argument, allow for keying any text as a theorem title—numbering and embellishments are taken away in this case. For example,

```
{\theoremstyle{THkey}\newtheorem{mytheorem}{XXXXX}}
```

should be used *only* with the optional argument to get something like

```
MY DEAREST MOST IMPORTANT THEOREM.  $a = a$ .
```

by keying

```
\begin{mytheorem}[My Dearest Most Important Theorem.]$a=a$.
\end{mytheorem}
```

For proofs, there is `\proof{<proof name>}` ... `\endproof`. Here `<proof name>` may be “Proof.”, or for example, “Proof of Theorem `\label{mytheor1}`.” In general, the end of proof should be marked with the open box, aka `\Halmos` (\square). The proof can end after a normal sentence or after displayed math. `\Halmos` should be entered manually (or not at all for the non-QED-oriented authors).

8. Footnotes and Endnotes

Use of footnotes varies among the INFORMS journals. Most journals allow regular footnotes. However, `inte` does not allow footnotes, whereas `opre` and `orsc` use endnotes instead of footnotes. Details of how to use endnotes are explained in the comments of the respective journals; template files. In the `opre` and `orsc` cases, package `endnotes.sty` is invoked to automatically do the job.

9. Figures and Tables

`graphicx` package should be used for inclusion of graphic files (it is automatically loaded). Please see LaTeX documentation for details.

Here we will concentrate on our macros for handling the whole trio: caption, figure (art file), and figure note, as well as the counterpart trio for tables. To enable proper style, all elements have to be captured at once, so that the macro can analyze components for presence or absence of the caption text, for presence or absence of a note, as well as for the tentative size of a figure or a table, etc.

9.1. Figures

A typical setting for figures is

```
\begin{figure}
\FIGURE
{\includegraphics{figure-filename.pdf}}
```

Figure 1 Text of the Figure Caption

Note. Text of the notes.

```
{Text of the Figure Caption.\label{fig1}}
{Text of the notes.}
\end{figure}
```

The result may look as shown in Figure 1 (just a rectangle to simplify this document). The typographical style and position of the caption (above or below the figure) will be automatically set depending on the selected journal option. To summarize, within `\FIGURE`, the order of entries is *art—caption (with label)—notes*. Even if notes are not included, the third argument to `\FIGURE` must be present as an empty group `{}`, otherwise a syntax error will occur.

Regarding the figure itself (“art”), the preferred formats are PDF or EPS, whenever they can guarantee the vector format (drawing, not image). A common problem is caused by transferring graphs in MS Office products via the clipboard. In many cases the transfer creates a bitmap/image instead of the original vector-based graph, which typically degrades the quality of art to an unacceptably low level. Such images are also (almost) ineditable.

If the art is a real image (photograph), JPEG and TIFF file formats are the way to go. JPEG should be used with best quality in mind, not with the smallest file size. The latter typically renders it useless for publishing. TIFF is not “lossy,” so it is preferred in such cases. Make sure the resolution is high enough: For photographs, resolution should be at least 300 dpi in both black and white and color cases. If there is a need to reproduce a piece of line art from an old source, where an electronic file is not available and the only option is to scan, resolution should not be lower than 900 dpi.

9.2. Tables

For inclusion of tables, a typical setting is

```
\begin{table}
\TABLE
{Text of the Table Caption.\label{tab1}}
{\begin{tabular}{<table format>}
entries
\end{tabular}}
{Text of the notes.}
\end{table}
```

The order of entries in `\TABLE` is *caption (with label)—table body—notes*, because the table caption is always set above the table body. Within the table, INFORMS house style requires only three rules: above the table column heads, between the table column heads and the table body, and after the table body. Of course, straddle rules are acceptable if necessary (the “`\cline{3--5}` stuff”). In extreme cases, a table may be so complex that it needs to be set as a piece of artwork, in which case, a properly formatted vector-based figure may be included instead of a keyed table.

To enhance the appearance of tables regarding vertical spacing, macros `\up` and `\down` should be used. `\up` should be used in rows following a rule (increasing the space below the rule). `\down`

should be used in rows before a rule (increasing the space before the rule). The following LaTeX detail shows how to use `\up` and `\down`.

```
\hline
\up\down System & Benchmark\\
\hline
\up First entry...\\
...
\down Last row\\
\hline
```

9.3. Rotated Figures and Tables

In cases where a figure, or more often a table, is so large that it cannot reasonably fit in the portrait position, landscape setting is also available. The whole environment (`figure` or `table`) should be surrounded by

```
\begin{rotate}
<table or figure>
\end{rotate}
```

Before resorting to this extreme measure, please try smaller type size for the table body or even some reworking/restructuring to make it fit.

10. About Appendices

There are a variety of ways authors set their appendices. We tried to standardize those options to make them work well with the internal linking system. Two basic styles are available.

1. Appendix started by a general title “Appendix,” possibly followed by two or more sections. It should be keyed as

```
\begin{APPENDIX}{}
...
\end{APPENDIX}
```

Subsections and subsubsections are also allowed. There are two subtypes of such an appendix.

- If the empty braces after `{APPENDIX}` are left empty, the title of the whole section will be “Appendix.”

- If a specific title is entered, say “Proofs of Lemmas and Theorems,” the appendix title will appear as “Appendix. Proofs of Lemmas and Theorems.”

```
\begin{APPENDIX}{Proofs of Lemmas and Theorems}
```

will start that appendix type.

2. When you have two or more appendices that should logically be independent, we provide the environment `APPENDICES`:

```
\begin{APPENDICES}
...
\end{APPENDICES}
```

This environment has no arguments. It is supposed to have at least two sections. Their titles will be set as “Appendix A. <Title of Appendix A>,” “Appendix B. <Title of Appendix B>,” etc. Subsections and subsubsections are also allowed.

The type size and relative position of the appendix with respect to the acknowledgments is regulated by the style of the particular journal and reflected in the journal template.

11. Citations and References

INFORMS journals use the author-year style of references, with the exception of `moor` that uses the numeric style. In addition to the text here, a comprehensive (mixed) sample of references is added to this main text.

To set references in the INFORMS house style, it is best to use BibTeX coupled with our `.bst` (BibTeX) style `informs2014.bst` (`informs2014trsc.bst` in the case of *Transportation Science*). For example, if your file is named `mypaper.tex` and your BibTeX database is `myrefs.bib`, enter

```
\bibliographystyle{informs2014}
\bibliography{myrefs}
```

in the place where references should be set. After the first LaTeX run, apply BibTeX

```
bibtex mypaper
```

That will produce the `mypaper.bbl` file, as well as the `mypaper.blg` log file. Please read the `mypaper.blg` text file to make sure your database is not missing a required field. Please keep and submit the `.bbl` file along with your `.bib` file. Even with best care, the database may have some inconsistencies, typos, and inadequate journal abbreviations to adhere to the INFORMS style. The BibTeX style cannot automatically rectify such problems, so we need your `.bbl` as an editable file for those minor corrections.

11.1. Author-Year Style Labels

In case you do not use BibTeX, your references are keyed (manually) in the style found in INFORMS journals. Journal templates set the `natbib` configuration (in the preamble) to reflect the particular journal style. To have `\cite{}` work properly also for the manually keyed references, you should follow the proper syntax as explained in the following example.

Consider the following five `\bibitem` lines.

```
\bibitem[Psaraftis(1988)]{Psaraftis:1998}
\bibitem[Psaraftis(1995)]{Psaraftis:1995}
\bibitem[Regan et al.(1998{\natexlab{a}})]{Regan, Mahmassani, and Jaillet}{Regan:1998a}
\bibitem[Regan et al.(1998{\natexlab{b}})]{Regan, Mahmassani, and Jaillet}{Regan:1998b}
\bibitem[Rego and Roucairol(1995)]{Rego}
```

Symbolic labels used in `\cite{}` entries is what is shown in the last set of braces: `Psaraftis:1998` through `Rego`. For `natbib` to access names and years separately, it is very important to strictly adhere to the syntax of the optional argument to `\bibitem` as shown. It is in the form `\bibitem[string1]`, where `string1` is composed as

```
<short-name>(year<possible-alpha-label>)<long-name>
```

Note that there are *no space* before and after (and). The `<long-name>` part can be omitted in journal styles so that `string1` simplifies to

```
<short-name>(year<possible-alpha-label>)
```

The `<possible-alpha-label>` part is only used when the `<short-name>` and `year` are identical, in which case we append lowercase letters a, b, c, and so on. For a citation with one author, follow examples from lines 1 and 2. For citations with two authors, see the last line (Rego and Roucairol). Lines 3 and 4 show a sample where `<short-name>` and `year` are identical. Citations with three or more authors abbreviate into “first-author et al.”

Note. In *Transportation Science* (`trsc`), the “first-author et al.” rule applies to *four* authors or more; three-authors citations are set with their full last names. Hence, lines 3 and 4 should be altered (again, we need the `.bbl` file) to read

```
\bibitem[Regan, Mahmassani, and Jaillet(1998{\natexlab{a}})]{Regan:1998a}
\bibitem[Regan, Mahmassani, and Jaillet(1998{\natexlab{b}})]{Regan:1998b}
```

Details of usage for `\cite` are available from the `natbib` documentation. Following is a brief excerpt.

```
\citet{key}           ==>> Jones et al. (1990)
\citep{key}          ==>> (Jones et al., 1990)
\citep[chap. 2]{key} ==>> (Jones et al., 1990, chap. 2)
\citep[e.g. ]{key}   ==>> (e.g. Jones et al., 1990)
\citep[e.g.][p. 32]{key} ==>> (e.g. Jones et al., p. 32)
\citeauthor{key}     ==>> Jones et al.
\citeyear{key}       ==>> 1990
\citealt{key}        ==>> Jones et al.\ 1990
\citealp{key}        ==>> Jones et al., 1990
\citealp{key,key2}   ==>> Jones et al., 1990; James et al., 1991
\citealp[p.~32]{key} ==>> Jones et al., 1990, p.~32
\citetext{priv.\ comm.} ==>> (priv.\ comm.)
```

11.2. Numeric Style Labels

The same five `\bibitem` lines

```
\bibitem[Psaraftis(1988)]{Psaraftis:1998}
\bibitem[Psaraftis(1995)]{Psaraftis:1995}
\bibitem[Regan et al.(1998{\natexlab{a}})]{Regan:1998a}
\bibitem[Regan et al.(1998{\natexlab{b}})]{Regan:1998b}
\bibitem[Rego and Roucairol(1995)]{Rego}
```

in the numeric style will be fine. The only change is the removal of the now unnecessary labels “a” and “b” (where applicable), because the reference counter is what will distinguish such cases. The above-described command `\cite` and its derivations `\citet`, `\citep`, etc. for `natbib` will behave differently in the numeric style. A brief overview follows.

```
\citet{jon90}           ==>> Jones et al. [21]
\citet[chap.~2]{jon90} ==>> Jones et al. [21, chap.~2]
\citep{jon90}          ==>> [21]
\citep[chap.~2]{jon90} ==>> [21, chap.~2]
\citep[see][jon90]     ==>> [see 21]
\citep[see][chap.~2]{jon90} ==>> [see 21, chap.~2]
\citep{jon90a,jon90b} ==>> [21, 32]
```

Sample INFORMS References, 2016/02/23

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This is a compilation of references of several INFORMS articles to serve as a sample for those who do not use BiBTeX but key their references directly.

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References

- Agency for Healthcare Research and Quality (2011a) Medical expenditure panel survey. Accessed November 7, 2011, <http://www.meps.ahrq.gov/>.
- Agency for Healthcare Research and Quality (2011b) Total health services—Mean and median expenses per person with expense and distribution of expenses by source of payment: United States, 2008. Medical Expenditure Panel Survey, Household Component data. Generated interactively. Accessed November 7, 2011, http://meps.ahrq.gov/mepsweb/data_stats/quick_tables.jsp.
- Appleby J, Carty SS (2005) Ailing GM looks to scale back generous health benefits. *USA Today* (June 23), http://usatoday30.usatoday.com/money/autos/2005-06-22-gm-healthcare-usat_x.htm.
- Barnett RC (2006) Relationship of the number and distribution of work hours to health and quality-of-life (QOL) outcomes. *Research in Occupational Stress and Well-Being*, Vol. 5 (Emerald Group Publishing, New York), 99–138.
- Boole G (1854) *An Investigation of the Laws of Thought: On Which Are Founded the Mathematical Theories of Logic and Probabilities*, Vol. 2 (Walton and Maberly, London).
- Broadhead WE, Kaplan BH, James SA, Wagner EH, Schoenbach VJ, Grimson R, Heyden S, Tibblin G, Gehlbach SH (1983) The epidemiologic evidence for a relationship between social support and health. *Amer. J. Epidemiology* 117(5):521–537.
- Burton WN, Conti DJ, Chen CY, Schultz AB, Edington DW (1999) The role of health risk factors and disease on worker productivity. *J. Occupational Environ. Med.* 41(10):863–877.
- Burton WN, Chen CY, Conti DJ, Schultz AB, Pransky G, Edington DW (2005) The association of health risks with on-the-job productivity. *J. Occup. Environ. Med.* 47(8):769–777.
- Cardarelli KM, Low MD, Vernon SW, Preacely N, Baumler ER, Tortolero S (2009) Critical review of the evidence for the connection between education and health: A guide for exploration of the causal pathways. *Research in the Sociology of Health Care* (Emerald Group Publishing, New York), 137–159.
- Centers for Disease Control and Prevention (2011) National diabetes fact sheet: National estimates and general information on diabetes and prediabetes in the United States, 2011. Accessed November 28, 2011, http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2011.pdf.
- Centers for Medicare and Medicaid Services (2011) NHE web tables. Accessed November 21, 2011, <https://www.cms.gov/NationalHealthExpendData/downloads/tables.pdf>.
- Chandola T, Britton A, Brunner E, Hemingway H, Malik M, Kumari M, Badrick E, Kivimaki M, Marmot M (2008) Work stress and coronary heart disease: What are the mechanisms? *Eur. Heart J.* 29(5):640–648.
- Cohen S, Wills TA (1985) Stress, social support, and the buffering hypothesis. *Psychol. Bull.* 98(2):310–357.
- Deaton AS, Paxson CH (1998) Aging and inequality in income and health. *Amer. Econom. Rev.* 88(2):248–253.
- Dooley D, Catalano R, Wilson G (1994) Depression and unemployment: Panel findings from the Epidemiologic Catchment Area study. *Amer. J. Commun. Psychol.* 22(6):745–765.
- Eliason M, Storrie D (2009) Does job loss shorten life? *J. Human Resources* 44(2):277–302.
- Fleiss JL, Berlin JA (2009) Effect sizes for dichotomous data. *The Handbook of Research Synthesis*, 2nd ed. (Russell Sage Foundation, New York), 237–253.
- Franks P, Clancy CM, Gold MR (1993) Health insurance and mortality: Evidence from a national cohort. *J. Amer. Med. Assoc.* 270(6):737–741.
- Frone MR (2000) Work–family conflict and employee psychiatric disorders: The National Comorbidity Survey. *J. Appl. Psychol.* 85(6):888–895.
- Frone MR, Russell M, Barnes GM (1996) Work–family conflict, gender, and health-related outcomes: A study of employed parents in two community samples. *J. Occup. Health Psychol.* 1(1):57–69.
- Frone MR, Russell M, Cooper ML (1997) Relation of work–family conflict to health outcomes: A four-year longitudinal study of employed parents. *J. Occup. Organ. Psychol.* 70(4):325–335.
- Galinsky EJ, Bond T, Kim SS, Backon L, Brownfield E, Sakai K (2005) *Overwork in America: When the Way We Work Becomes Too Much* (Families and Work Institute, New York).
- Garrett AB, Clemans-Cope L, Masi P, Bovbjerg RR (2008) The Urban Institute’s microsimulation model for reinsurance: Model construction and state-specific application. Technical report, Urban Institute, Washington, DC.
- Geronimus AT, Bound J, Waidmann TA, Colen CG, Steffick D (2001) Inequality in life expectancy, functional status, and active life expectancy across selected black and white populations in the United States. *Demography* 38(2):227–251.
- Goh J, Pfeffer J, Zenios SA (2015) Workplace stressors and health outcomes: Health policy for the workplace. *Behavioral Sci. Policy* 1(1):43–52.
- Graham H (1987) Women’s smoking and family health. *Soc. Sci. Medicine* 25(1):47–56.
- Greenhaus JH, Beutell NJ (1985) Sources of conflict between work and family roles. *Acad. Management Rev.* 10(1):76–88.
- Harris MM, Fennell ML (1988) A multivariate model of job stress and alcohol consumption. *Soc. Quart.* 29(3):391–406.
- Higgins JPT, Green S (2011) *Cochrane Handbook for Systematic Reviews of Interventions*, version 5.1.0 (The Cochrane Collaboration, London).
- Himmelstein DU, Thorne D, Warren E, Woolhandler S (2009) Medical bankruptcy in the United States, 2007: Results of a national study. *Amer. J. Med.* 122(8):741–746.
- Hutton DW, Tan DW, So SK, Brandeau ML (2007) Cost-effectiveness of screening and vaccinating Asian and Pacific Islander adults for Hepatitis B. *Ann. Internal Medicine* 147(7):460–469.

- Idler EL, Benyamini Y (1997) Self-rated health and mortality: A review of twenty-seven community studies. *J. Health Soc. Behav.* 38(1):21–37.
- Johnson JV, Lipscomb J (2006) Long working hours, occupational health and the changing nature of work organization. *Amer. J. Industrial Medicine* 49(11):921–929.
- Kaiser Family Foundation (2011) Employer health benefits: 2011 annual survey. Kaiser Family Foundation, Menlo Park, CA, and Health Research and Educational Trust, Chicago. Last accessed March 5, 2015, <https://kaiserfamilyfoundation.files.wordpress.com/2013/04/8225.pdf>.
- Karasek R, Baker D, Marxer F, Ahlbom A, Theorell T (1981) Job decision latitude, job demands, and cardiovascular disease: A prospective study of Swedish men. *Amer. J. Public Health* 71(7):694–705.
- Karasek RA, Theorell T, Schwartz JE, Schnall PL, Pieper CF, Michela JL (1988) Job characteristics in relation to the prevalence of myocardial infarction in the US Health Examination Survey (HES) and the Health and Nutrition Examination Survey (HANES). *Amer. J. Public Health* 78(8):910–918.
- Keeney R (2008) Personal decisions are the leading cause of death. *Oper. Res.* 56(6):1335–1347.
- Kivimäki M, Vahtera J, Pentti J, Ferrie JE (2000) Factors underlying the effect of organisational downsizing on health of employees: Longitudinal cohort study. *British Medical J.* 320(7240):971–975.
- Kochanek KD, Xu J, Murphy SL, Miniño AM, Kung H-C (2011) Deaths: Preliminary data for 2009. Technical report, National Center for Health Statistics, Hyattsville, MD.
- Kouvonen A, Kivimäki M, Virtanen M, Pentti J, Vahtera J (2005) Work stress, smoking status, and smoking intensity: An observational study of 46 190 employees. *J. Epidemiology and Community Health* 59(1):63–69.
- Ladabaum U, Chopra CL, Huang G, Scheiman JM, Chernen ME, Fendrick AM (2001) Aspirin as an adjunct to screening for prevention of sporadic colorectal cancer. A cost-effectiveness analysis. *Ann. Internal Medicine* 135(9):769–781.
- Lee S, Colditz GA, Berkman LF, Kawachi I (2004) Prospective study of job insecurity and coronary heart disease in us women. *Ann. Epidemiology* 14(1):24–30.
- Levine DP (1992) G.M. orders staff to pay part of health-care cost. *New York Times* (August 26), <http://www.nytimes.com/1992/08/26/business/company-news-gm-orders-staff-to-pay-part-of-health-care-cost.html>.
- Marmot M (2004) *The Status Syndrome: How Social Standing Affects Our Health and Longevity* (Times Books, New York).
- Marmot MG, Rose G, Shipley M, Hamilton PJ (1978) Employment grade and coronary heart disease in British civil servants. *J. Epidemiology Community Health* 32(4):244–249.
- Marmot M, Feeney A, Shipley M, North F, Syme SL (1995) Sickness absence as a measure of health status and functioning: From the UK Whitehall II study. *J. Epidemiology Community Health* 49(2):124–130.
- Marmot MG, Bosma H, Hemingway H, Brunner E, Stansfeld S (1997) Contribution of job control and other risk factors to social variations in coronary heart disease incidence. *Lancet* 350(9073):235–239.
- Mikulak A (2011) What keeps adults well? Using biopsychosocial surveys to understand well-being. *Observer* 24(8), <http://www.psychologicalscience.org/index.php/publications/observer/2011/october-11/what-keeps-adults-well.html>.
- Musich S, Napier D, Edington DW (2001) The association of health risks with workers' compensation costs. *J. Occup. Environ. Med.* 43(6):534–541.
- National Opinion Research Center (2011) General Social Survey. Accessed November 7, 2011, <http://www3.norc.org/GSS+Website/>.
- OECD (Organization for Economic Cooperation and Development) (2011) Health at a glance 2011: OECD indicators (OECD Publishing, Paris).
- Ozcan YA, Luke RD (1993) A national study of the efficiency of hospitals in urban markets. *Health Services Res.* 27(6):719–739.
- Piazza PV, Le Moal M (1998) The role of stress in drug self-administration. *Trends Pharmacol. Sci.* 19(2):67–74.
- Robbins JM, Ford MT, Tetrack LE (2012) Perceived unfairness and employee health: A meta-analytic integration. *J. Appl. Psych.* 97(2):235–272.
- Selden TM, Sing M (2008) Aligning the Medical Expenditure Panel Survey to aggregate U.S. benchmarks. Working paper, Agency for Healthcare Research and Quality, Rockville, MD.
- Shadish WR, Haddock CK (2009) Combining estimates of effect size. *The Handbook of Research Synthesis*, 2nd ed. (Russell Sage Foundation, New York), 257–278.
- Shields M (2006) Stress and depression in the employed population. *Health Rep.* 17(4):11–29.
- Sing M, Banthin JS, Selden TM, Cowan CA, Keehan SP (2006) Reconciling medical expenditure estimates from the MEPS and NHEA, 2002. *Health Care Financing Rev.* 28(1):25–40.
- Singh GK, Siahpush M (2006) Widening socioeconomic inequalities in US life expectancy, 1980–2000. *Internat. J. Epidemiology* 35(4):969–979.
- Sparks K, Cooper C, Fried Y, Shirom A (1997) The effects of hours of work on health: A meta-analytic review. *J. Occup. Organ. Psych.* 70(4):391–408.
- Strully KW (2009) Job loss and health in the US labor market. *Demography* 46(2):221–246.
- Sudano JJ Jr, Baker DW (2003) Intermittent lack of health insurance coverage and use of preventive services. *Amer. J. Public Health* 93(1):130–137.
- Sullivan D, Von Wachter T (2009) Job displacement and mortality: An analysis using administrative data. *Quart. J. Econom.* 124(3):1265–1306.
- Sverke M, Hellgren J, Näswall K (2002) No security: A meta-analysis and review of job insecurity and its consequences. *J. Occup. Health Psych.* 7(3):242–264.
- Tsutsumi A, Kayaba K, Kario K, Ishikawa S (2009) Prospective study on occupational stress and risk of stroke. *Arch. Internat. Med.* 169(1):56–61.
- U.S. Census Bureau (2012) CPS table creator. Current Population Survey, Annual Social and Economic Supplement. Accessed January 2, 2013, <http://www.census.gov/cps/data/cpstablecreator.html>.
- Vegso S, Cantley L, Slade M, Taiwo O, Sircar K, Rabinowitz P, Fiellin M, Russi MB, Cullen MR (2007) Extended work hours and risk of acute occupational injury: A case-crossover study of workers in manufacturing. *Amer. J. Industrial Medicine* 50(8):597–603.
- Virtanen M, Nyberg ST, Batty GD, Jokela M, Heikkilä K, Fransson EI, Alfredsson L, Bjorner JB, Borritz M, Burr H, et al. (2013) Perceived job insecurity as a risk factor for incident coronary heart disease: Systematic review and meta-analysis. *British Medical J.* 347, <http://dx.doi.org/10.1136/bmj.f4746>.
- von Känel R, Mills PJ, Fainman C, Dimsdale JE (2001) Effects of psychological stress and psychiatric disorders on blood coagulation and fibrinolysis: A biobehavioral pathway to coronary artery disease? *Psychosomatic Medicine* 63(4):531–544.
- Wand GS, Mangold D, El Deiry S, McCaul ME, Hoover D (1998) Family history of alcoholism and hypothalamic opioidergic activity. *Arch. General Psychiatry* 55(12):1114–1119.
- Wennberg JE, Fisher ES, Baker L, Sharp SM, Bronner KK (2005) Evaluating the efficiency of California providers in caring for patients with chronic illness. *Health Affairs* 24(Suppl. 3): 526–543.
- Wilper AP, Woolhandler S, Lasser KE, McCormick D, Bor DH, Himmelstein DU (2009) Health insurance and mortality in US adults. *Amer. J. Public Health* 99(12):2289–2295.
- Woolhandler S, Himmelstein DU (1988) Reverse targeting of preventive care due to lack of health insurance. *J. Amer. Med. Assoc.* 259(19):2872–2874.
- Woolhandler S, Himmelstein DU (1991) The deteriorating administrative efficiency of the US health care system. *New Engl. J. Med.* 324(18):1253–1258.

- Woolhandler S, Campbell T, Himmelstein DU (2003) Costs of health care administration in the United States and Canada. *New Engl. J. Med.* 349(8):768–775.
- World Bank (2012) World bank list of economies (July 2012). Accessed January 2, 2013, <http://data.worldbank.org/about/country-classifications/country-and-lending-groups>.
- Wright DW, Beard MJ, Edington DW (2002) Association of health risks with the cost of time away from work. *J. Occup. Environ. Med.* 44(12):1126–1134.
- Yang H, Schnall PL, Jauregui M, Su TC, Baker D (2006) Work hours and self-reported hypertension among working people in California. *Hypertension* 48(4):744–750.
- Zhang J, Yu KF (1998) What's the relative risk? A method of correcting the odds ratio in cohort studies of common outcomes. *J. Amer. Med. Assoc.* 280(19):1690–1691.
- Zywicki TJ (2005) An economic analysis of the consumer bankruptcy crisis. *Northwestern University Law Rev.* 99(4):1463–1541.
- Amihud Y, Mendelson H (1986) Asset pricing and the bid-ask spread. *J. Financial Econom.* 17:223–249.
- Carhart M (1997) On persistence in mutual fund performance. *J. Finance* 52:57–82.
- Constantinides GM (1986) Capital market equilibrium with transaction costs. *J. Political Econom.* 94:842–862.
- Dai M, Yi F (2009) Finite horizon optimal investment with transaction costs: A parabolic double obstacle problem. *J. Differential Equations* 246:1445–1469.
- Dai M, Zhong Y (2010) Penalty methods for continuous-time portfolio selection with proportional transaction costs. *J. Comput. Finance* 13:1–31.
- Davis MHA, Norman AR (1990) Portfolio selection with transaction costs. *Math. Oper. Res.* 15:676–713.
- Eleswarapu VR (1997) Cost of transacting and expected returns in the NASDAQ market. *J. Finance* 52:2113–2127.
- Eleswarapu VR, Reinganum M (1993) The seasonal behavior of the liquidity premium in asset pricing. *J. Financial Econom.* 34:281–305.
- Fama EF, French KR (1992) The cross-section of expected stock returns. *J. Finance* 2:427–465.
- Fama EF, French KR (1993) Common risk factors in stocks and bonds. *J. Financial Econom.* 33:3–56.
- Fama EF, MacBeth JD (1973) Risk, return, and equilibrium: Empirical tests. *J. Political Econom.* 81:607–636.
- Fleming WH, Sonner HM (1993) *Controlled Markov Processes and Viscosity Solutions* (Springer, New York).
- French K, Roll R (1986) Stock return variances: The arrival of information and the reaction of traders. *J. Financial Econom.* 17:5–26.
- Heaton J, Lucas DJ (1996) Evaluating the effects of incomplete markets on risk sharing and asset pricing. *J. Political Econom.* 104:443–487.
- Hong H, Wang J (2000) Trading and returns under periodic market closures. *J. Finance* 50:297–354.
- Jang BG, Koo HK, Liu H, Loewenstein M (2007) Liquidity premia and transaction costs. *J. Finance* 62:2329–2366.
- Liu H (2004) Optimal consumption and investment with transaction costs and multiple risky assets. *J. Finance* 59:289–338.
- Liu H, Loewenstein M (2002) Optimal portfolio selection with transaction costs and finite horizons. *Rev. Financial Stud.* 15:805–835.
- Lockwood LJ, Linn SC (1990) An examination of stock market return volatility during overnight and intraday periods, 1964–1989. *J. Finance* 45:591–601.
- Longstaff FA (2009) Portfolio claustrophobia: Asset pricing in markets with illiquid assets. *Amer. Econom. Rev.* 99:1119–1144.
- Lynch A, Tan S (2011) Explaining the magnitude of liquidity premia: The roles of return predictability, wealth shocks and state-dependent transaction costs. *J. Finance* 66:1329–1368.
- Merton RC (1971) Optimum consumption and portfolio rules in a continuous-time model. *J. Econom. Theory* 3:373–413.
- Shreve SE, Sonner HM (1994) Optimal investment and consumption with transaction costs. *Ann. Appl. Probab.* 4:609–692.
- Stoll HR, Whaley RE (1990) Stock market structure and volatility. *Rev. Financial Stud.* 3:37–41.
- Tsiakias I (2008) Overnight information and stochastic volatility: A study of European and US stock exchanges. *J. Banking Finance* 32:251–268.
- Vayanos D (1998) Transaction costs and asset prices: A dynamic equilibrium model. *Rev. Financial Stud.* 11:1–58.
- Acharya V, DeMarzo P, Kremer I (2011) Endogenous information flows and the clustering of announcements. *Amer. Econom. Rev.* 101(7):2955–2979.
- Admati A, DeMarzo P, Hellwig M, Pfleiderer P (2013) Fallacies, irrelevant facts, and myths in the discussion of capital regulation: Why bank equity is not expensive. Rock Center for Corporate Governance Working Paper Series 161, Stanford Graduate Business School, Stanford, CA.
- Aghion P, Bolton P (1992) An incomplete contracts approach to financial contracting. *Rev. Econom. Stud.* 59(3):473–494.
- Almazan A, de Motta A, Titman S (2015) Debt, labor markets, and the creation and destruction of firms. *J. Financial Econom.* 118(3):636–657.
- Auerbach AJ (2002) Taxation and corporate financial policy. Auerbach AJ, Feldstein M, eds. *Handbook of Public Economics*, Vol. 3, *Handbook in Economics* 4 (Elsevier, Amsterdam), 1251–1292.
- Austen B (2011) The end of Borders and the future of books. *Businessweek* (November 10), <http://www.bloomberg.com/bw/magazine/the-end-of-borders-and-the-future-of-books-11102011.html>.
- Board S, Skrzypacz A (2014) Revenue management with forward-looking buyers. Unpublished manuscript, Stanford University, Stanford, CA.
- Bolton P, Scharfstein D (1990) A theory of predation based on agency problems in financial contracting. *Amer. Econom. Rev.* 80(1):93–106.
- Borenstein S, Rose N (2003) The impact of bankruptcy on airline service levels. *Amer. Econom. Rev.* 93(2):415–419.
- Brander J, Lewis T (1986) Oligopoly and financial structure: The limited liability effect. *Amer. Econom. Rev.* 76(5):956–970.
- Bulow J, Klemperer P (1999) The generalized war of attrition. *Amer. Econom. Rev.* 89(1):175–189.
- Campbell J, Giglio S, Pathak P (2011) Forced sales and house prices. *Amer. Econom. Rev.* 101(5):2108–2131.
- Che Y, Gale I (2003) Optimal design of research contests. *Amer. Econom. Rev.* 93(3):646–671.
- Chetty R, Saez E (2010) Dividend and corporate taxation in an agency model of the firm. *Amer. Econom. J.: Econom. Policy* 2(3):1–31.
- Chevalier J (1995) Capital structure and product-market competition: Empirical evidence from the supermarket industry. *Amer. Econom. Rev.* 85(3):415–435.
- Chevalier J, Scharfstein D (1996) Capital-market imperfections and countercyclical markups: Theory and evidence. *Amer. Econom. Rev.* 86(4):703–725.
- Congressional Budget Office (1997) The economic effects of comprehensive tax reform. Report, U.S. Congress, Congressional Budget Office, Washington, DC. <http://www.cbo.gov/publication/10355>.
- Congressional Budget Office (2005) Corporate income tax rates: International comparisons. Report, U.S. Congress, Congressional Budget Office, Washington, DC. <http://www.cbo.gov/publication/17501>.
- Cramton P (1992) Strategic delay in bargaining with two-sided uncertainty. *Rev. Econom. Stud.* 59(1):205–225.

- DeAngelo H, DeAngelo L (1991) Union negotiations and corporate policy: A study of labor concessions in the domestic steel industry during the 1980s. *J. Financial Econom.* 30(1):3–43.
- Dewatripont M, Tirole J (1994) A theory of debt and equity: Diversity of securities and manager-shareholder congruence. *Quart. J. Econom.* 109(4):1027–1054.
- Diamond D, Rajan R (2011) Fear of fire sales, illiquidity seeking, and credit freeze. *Quart. J. Econom.* 126(2):557–591.
- Eisfeldt A, Rampini A (2008) Managerial incentives, capital reallocation, and the business cycle. *J. Financial Econom.* 87(1):177–199.
- Farhi E, Werning I (2012) Capital taxation: Quantitative explorations of the inverse Euler equation. *J. Political Econom.* 120(3):398–445.
- Fuchs W, Skrzypacz A (2010) Bargaining with arrival of new traders. *Amer. Econom. Rev.* 100(3):802–836.
- Fudenberg D, Tirole J (1986) A theory of exit in duopoly. *Econometrica* 54(4):943–960.
- Gordon R, Dietz M (2006) Dividends and taxes. Working Paper 12292, National Bureau of Economic Research, Cambridge, MA.
- Graham J (2000) How big are the tax benefits of debt? *J. Finance* 55(5):1901–1941.
- Harrigan K, Porter M (1983) End-game strategies for declining industries. *Harvard Bus. Rev.* 61(4):111–120.
- Hart O, Moore J (1994) A theory of debt based on inalienability of human capital. *Quart. J. Econom.* 109(4):841–879.
- Heider F, Ljungqvist A (2015) As certain as debt and taxes: Estimating the tax sensitivity of leverage from exogenous state tax changes. *J. Financial Econom.* 118(3):684–712.
- Hopenhayn H, Squintani F (2011) Preemption games with private information. *Rev. Econom. Stud.* 78(2):667–692.
- Jensen M (1993) The modern industrial revolution, exit, and the failure of internal control systems. *J. Finance* 48(3):831–880.
- Jensen M, Meckling W (1976) Theory of the firm: Managerial behavior, agency costs and ownership structure. *J. Financial Econom.* 3(4):305–360.
- Jovanovic B, Tse C (2006) Creative destruction in industries. Working Paper 12520, National Bureau of Economic Research, Cambridge, MA.
- Kashyap A, Stein J, Hanson S (2010) An analysis of the impact of “substantially heightened” capital requirements on large financial institutions. Working paper, Booth School of Business, University of Chicago, Chicago.
- Kovenock D, Phillips G (1997) Capital structure and product market behaviour: An examination of plant exit and investment decisions. *Rev. Financial Stud.* 10(3):767–803.
- Kreps D, Wilson R (1982) Reputation and imperfect information. *J. Econom. Theory* 27(2):253–279.
- Lambrecht B (2001) The impact of debt financing on entry and exit in a duopoly. *Rev. Financial Stud.* 14(3):765–804.
- Leland H (1994) Corporate debt value, bond covenants, and optimal capital structure. *J. Finance* 49(4):1213–1252.
- Lorenzoni G (2008) Inefficient credit booms. *Rev. Econom. Stud.* 75(3):809–833.
- Maksimovic V, Phillips G (1998) Asset efficiency and reallocation decisions of bankrupt firms. *J. Finance* 53(5):1619–1643.
- McKinnon J (2011) Potential tax change is red flag for some firms. *Wall Street Journal* (April 4), <http://www.wsj.com/articles/SB10001424052748704530204576236972476831228>.
- Modigliani F, Miller M (1958) The cost of capital, corporation finance and the theory of investment. *Amer. Econom. Rev.* 48(3):261–297.
- Moldovanu B, Sela A (2001) The optimal allocation of prizes in contests. *Amer. Econom. Rev.* 91(3):542–558.
- Mowbray R (2011) The Fresh Market to open in former Borders site in New Orleans. *The Times-Picayune* (September 19), http://www.nola.com/business/index.ssf/2011/09/the_fresh_market_to_open_in_ne.html.
- Newman R (2011) 4 Lessons from the demise of Borders. *U.S. News* (July 20), <http://www.usnews.com/news/blogs/rick-newman/2011/07/20/4-lessons-from-the-demise-of-borders>.
- Panier F, Villanueva P, Perez-Gonzalez P (2013) Capital structure and taxes: What happens when you (also) subsidize equity? Working Paper 3111, Stanford Graduate School of Business, Stanford, CA.
- President’s Advisory Panel on Federal Tax Reform (2005) Simple, fair, and pro-growth: Proposals to fix America’s tax system. Report, President’s Advisory Panel on Federal Tax Reform, Washington, DC.
- Rajan R (1992) Insiders and outsiders: The choice between informed and arm’s-length debt. *J. Finance* 47(4):1367–1400.
- Ramey V, Shapiro M (1998) Capital churning. Working paper, National Bureau of Economic Research, Cambridge, MA.
- Ramey V, Shapiro M (2001) Displaced capital: A study of aerospace plant closings. *J. Political Econom.* 109(5):958–992.
- Royden HL (1988) *Real Analysis*, 3rd ed. (Prentice-Hall, Upper Saddle River, NJ).
- Schumpeter J (1934) *The Theory of Economic Development* (Harvard University Press, Cambridge, MA).
- Shleifer A, Vishny R (1992) Liquidation values and debt capacity: A market equilibrium approach. *J. Finance* 47(4):1343–1366.
- Siegel R (2009) All-pay contests. *Econometrica* 77(1):71–92.
- Siegel R (2010) Asymmetric contests with conditional investments. *Amer. Econom. Rev.* 100(5):2230–2260.
- Stein J (2012) Monetary policy as financial-stability regulation. *Quart. J. Econom.* 127(1):57–95.
- Stigler G (1971) The theory of economic regulation. *Bell J. Econom. Management Sci.* 2(1):3–21.
- Strauss L (2005) Book values. *Barron’s* (August 29), <http://online.barrons.com/articles/SB112510551177924618?tesla=y>.
- Wurgler J (2000) Financial markets and the allocation of capital. *J. Financial Econom.* 58(1):187–214.
- Zingales L (1998) Survival of the fittest or the fattest? Exit and financing in the trucking industry. *J. Finance* 53(3):905–938.
- Zwiebel J (1995) Corporate conservatism and relative compensation. *J. Political Econom.* 103(1):1–25.
- Ait-Sahalia Y, Parker JA, Yogo M (2004) Luxury goods and the equity premium. *J. Finance* 59(6):2959–3004.
- Bansal R, Ochoa M (2012) Temperature, aggregate risk, and expected returns. Working paper, Duke University, Durham, NC.
- Bansal R, Yaron A (2004) Risks for the long run: A potential resolution of asset pricing puzzles. *J. Finance* 59(4):1481–1509.
- Bansal R, Tallarini TD, Yaron A (2004) The return to wealth, asset pricing, and the intertemporal elasticity of substitution. Working paper, Duke University, Durham, NC.
- Baxter M, Jermann UJ (1999) Household production and the excess sensitivity of consumption to current income. *Amer. Econom. Rev.* 89(5):902–920.
- Becker GS (1965) A theory of the allocation of time. *Econom. J.* 75(299):493–517.
- Benhabib J, Rogerson R, Wright R (1991) Homework in macroeconomics: Household production and aggregate fluctuations. *J. Political Econom.* 99(6):1166–1187.
- Breeden DT (1979) An intertemporal asset pricing model with stochastic consumption and investment opportunities. *J. Financial Econom.* 7(3):265–296.
- Breeden DT, Gibbons MR, Litzenberger RH (1989) Empirical tests of the consumption-oriented CAPM. *J. Finance* 44(2):231–262.
- Campbell JY, Cochrane JH (1999) By force of habit: A consumption-based explanation of aggregate stock market behavior. *J. Political Econom.* 107(2):205–251.
- Cochrane JH (2005) *Asset Pricing* (Princeton University Press, Princeton, NJ).
- Constantinides GM (1990) Habit formation: A resolution of the equity premium puzzle. *J. Political Econom.* 98(3):519–543.
- Constantinides GM, Duffie D (1996) Asset pricing with heterogeneous consumers. *J. Political Econom.* 104(2):219–240.

- Devereux J, Locay L (1992) Specialization, household production, and the measurement of economic growth. *Amer. Econom. Rev.* 82(2):399–403.
- Eichenbaum M, Hansen LP, Singleton KJ (1988) A time-series analysis of representative agent models of consumption and leisure choice under uncertainty. *Quart. J. Econom.* 103(1):51–78.
- Epstein LG, Zin SE (1989) Substitution, risk aversion and the temporal behavior of consumption and asset returns: A theoretical framework. *Econometrica* 57(4):937–969.
- Epstein LG, Zin SE (1991) Substitution, risk aversion and the temporal behavior of asset returns. *J. Political Econom.* 99(2):263–286.
- Fama EF, French KR (1993) Common risk factors in the returns on stocks and bonds. *J. Financial Econom.* 33(1):3–56.
- Fama EF, French KR (1996) Multifactor explanations of asset pricing anomalies. *J. Finance* 51(1):55–84.
- Ferson WE, Constantinides GM (1991) Habit persistence and durability in aggregate consumption. *J. Financial Econom.* 29(2):199–240.
- Ferson WE, Harvey CR (1992) Seasonality and consumption-based asset pricing. *J. Finance* 47(2):511–552.
- Ferson WE, Lin J (2014) Alpha and performance measurement: The effect of investor heterogeneity. *J. Finance* 69(4):1565–1596.
- Fisher JDM (1997) Relative prices, complementarities and comovement among components of aggregate expenditures. *J. Monetary Econom.* 39(3):449–474.
- Greenwood J, Hercowitz Z (1991) The allocation of capital and time over the business cycle. *J. Political Econom.* 99(6):1188–1214.
- Greenwood J, Rogerson R, Wright R (1993) Putting home economics into macroeconomics. *Federal Reserve Bank of Minneapolis Quart. Rev.* 17(3):2–12.
- Greenwood J, Seshadri A, Yorukoglu M (2005) Engines of liberation. *Rev. Econom. Stud.* 72(1):109–133.
- Hansen LP, Singleton KJ (1982) Generalized instrumental variables estimation of nonlinear rational expectations models. *Econometrica* 50(5):1269–1288.
- Hansen LP, Heaton JC, Li N (2008) Consumption strikes back? Measuring long-run risk. *J. Political Econom.* 116(2):260–302.
- Jagannathan R, Wang Y (2007) Lazy investors, discretionary consumption, and the cross section of stock returns. *J. Finance* 62(4):1623–1661.
- Jagannathan R, Marakani S, Takehara H, Wang Y (2012) Calendar cycles, infrequent decisions, and the cross section of stock returns. *Management Sci.* 58(3):507–522.
- Juster FT, Stafford FP (1991) The allocation of time: Empirical findings, behavioral models, and problems of measurement. *J. Econom. Literature* 29(2):471–522.
- Kan R, Zhang C (1999) GMM tests of stochastic discount factor models with useless factors. *J. Financial Econom.* 54(1):103–127.
- Kroencke TA (2013) Asset pricing without garbage. Working paper, University of Basel, Basel, Switzerland.
- Lancaster KJ (1966) A new approach to consumer theory. *J. Political Econom.* 74(2):132–157.
- Lewellen J, Nagel S, Shanken J (2010) A skeptical appraisal of asset pricing tests. *J. Financial Econom.* 96(2):175–194.
- Lucas R (1978) Assets prices in an exchange economy. *Econometrica* 46(6):1429–1445.
- Malloy CJ, Moskowitz TJ, Vissing-Jorgensen A (2009) Long-run stockholder consumption risk and asset returns. *J. Finance* 64(6):2427–2479.
- McGrattan ER, Rogerson R, Wright R (1997) An equilibrium model of the business cycle with household production and fiscal policy. *Internat. Econom. Rev.* 38(2):267–290.
- Mehra R, Prescott EC (1985) The equity premium: A puzzle. *J. Monetary Econom.* 15(2):145–161.
- Møller SV, Rangvid J (2015) End-of-the-year economic growth and time-varying expected returns. *J. Financial Econom.* 115(1):136–154.
- Muth RF (1966) Household production and consumer demand functions. *Econometrica* 34(3):699–708.
- Newey WK, West KD (1987) A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. *Econometrica* 55(3):703–708.
- Parker JA, Julliard C (2005) Consumption risk and the cross-section of expected returns. *J. Political Econom.* 113(1):185–222.
- Pérez-González F, Yun H (2013) Risk management and firm value: Evidence from weather derivatives. *J. Finance* 68(5):2143–2176.
- Ramey VA (2009) Time spent in home production in the twentieth-century united states: New estimates from old data. *J. Econom. History* 69(2):1–47.
- Rubinstein M (1976) The valuation of uncertain income streams and the pricing of options. *Bell J. Econom. Management Sci.* 7(2):407–425.
- Santos T, Veronesi P (2010) Habit formation, the cross section of stock returns and the cash flow risk puzzle. *J. Financial Econom.* 98(2):385–413.
- Savov A (2011) Asset pricing with garbage. *J. Finance* 66(1):177–201.
- Yogo M (2006) A consumption-based explanation of expected stock returns. *J. Finance* 61(2):539–580.
- Ammann PE, Knight JC (1988) Data diversity: An approach to software fault tolerance. *IEEE Trans. Comput.* 37:418–425.
- Arcuri A (2009) Theoretical analysis of local search in software testing. Watanabe O, Zeugmann T, eds. *Proc. 5th Internat. Sympos. Stochastic Algorithms: Foundations Appl. (SAGA 2009)*, Lecture Notes in Computer Science, Vol. 5792 (Springer-Verlag, Berlin), 156–168.
- Bagnara R, Carlier M, Gori R, Gotlieb A (2013) Symbolic path-oriented test data generation for floating-point programs. *Proc. 6th IEEE Internat. Conf. Software Testing, Verification and Validation* (IEEE Press, New York).
- Bagnara R, Carlier M, Gori R, Gotlieb A (2015) Online supplement to: Exploiting binary floating-point representations for constraint filtering. *INFORMS J. Comput.* Forthcoming.
- Belaïd MS (2013) Résolution de contraintes sur les flottants dédié à la vérification de programmes. Thèse pour obtenir le titre de “Docteur en Sciences,” École doctorale STIC, Université de Nice—Sophia Antipolis, Nice, France.
- Belaïd MS, Michel C, Rueher M (2012) Boosting local consistency algorithms over floating-point numbers. Milano M, ed. *Proc. 18th Internat. Conf. Principles and Practice of Constraint Programming*, Lecture Notes in Computer Science, Vol. 7514 (Springer-Verlag, Berlin), 127–140.
- Blanc B, Bouquet F, Gotlieb A, Jeannot B, Jeron T, Legeard B, Marre B, Michel C, Rueher M (2006) The V3F project. *Proc. 1st Workshop on Constraints in Software Testing, Verification and Anal. (CSTVA’06)*, Nantes, France, 5–21.
- Borges M, d’Amorim M, Anand S, Bushnell D, Pasareanu CS (2012) Symbolic execution with interval solving and meta-heuristic search. *Proc. 5th IEEE Internat. Conf. Software Testing, Verification and Validation* (IEEE Computer Society, Washington, DC), 111–120.
- Botella B, Gotlieb A, Michel C (2006) Symbolic execution of floating-point computations. *Software Testing, Verification Reliability* 16:97–121.
- Burdy L, Dufour J-L, Lecomte T (2012) The B method takes up floating-point numbers. *Proc. 6th Internat. Conf. Exhibition on Embedded Real Time Software and Systems (ERTS 2012)*, Toulouse, France.
- Carlier M, Gotlieb A (2011) Filtering by ULP maximum. *Proc. 23rd IEEE Internat. Conf. Tools with Artificial Intelligence (ICTAI 2011)* (IEEE Computer Society, Washington, DC), 209–214.
- Chabert G, Jaulin L (2009) Contractor programming. *Artificial Intelligence* 173:1079–1100.
- Chan FT, Chen TY, Cheung SC, Lau MF, Yiu SM (1998) Application of metamorphic testing in numerical analysis. *Proc. IASTED Internat. Conf. Software Engrg. (SE’98)* (ACTA Press, Calgary, Alberta, Canada), 191–197.

- Clarke EM, Kroening D, Lerda F (2004) A tool for checking ANSI-C programs. Jensen K, Podelski A, eds. *Tools and Algorithms for the Construction and Analysis of Systems, Proc. 10th Internat. Conf. (TACAS 2004)*, Lecture Notes in Computer Science, Vol. 2988 (Springer-Verlag, Berlin), 168–176.
- Cousot P, Cousot R (1977) Abstract interpretation: A unified lattice model for static analysis of programs by construction or approximation of fixpoints. *Proc. Fourth Annual ACM Sympos. Principles of Programming Languages* (ACM Press, New York), 238–252.
- Denmat T, Gotlieb A, Ducassé M (2007) Improving constraint-based testing with dynamic linear relaxations. *Proc. 18th IEEE Internat. Sympos. Software Reliability (ISSRE 2007)* (IEEE Computer Society, Washington, DC), 181–190.
- D’Silva V, Haller L, Kroening D, Tautschnig M (2012) Numeric bounds analysis with conflict-driven learning. Flanagan C, König B, eds. *Tools Algorithms Construction Anal. Systems, Proc. 18th Internat. Conf. (TACAS 2012)*, Lecture Notes in Computer Science, Vol. 7214 (Springer, Berlin), 48–63.
- Godefroid P, Klarlund N, Sen K (2005) DART: Directed automated random testing. Sarkar V, Hall MW, eds. *Proc. ACM SIGPLAN 2005 Conf. Programming Language Design Implementation (PLDI 2005)* (ACM, New York), 213–223.
- Goldberg D (1991) What every computer scientist should know about floating-point arithmetic. *ACM Comput. Surveys* 23: 5–48.
- Goubault E (2001) Static analyses of the precision of floating-point operations. Cousot P, ed. *Static Anal.: 8th Internat. Sympos., SAS 2001*, Lecture Notes in Computer Science, Vol. 2126 (Springer-Verlag, Berlin), 234–259.
- Granvilliers L, Benhamou F (2006) Algorithm 852: RealPaver: An interval solver using constraint satisfaction techniques. *ACM Trans. Math. Software* 32:138–156.
- IBM Labs in Haifa, FPgen Team (2008) Floating-point test-suite for IEEE, version 1.02. Accessed December 29, 2015, <https://www.research.ibm.com/haifa/projects/verification/fpgen/papers/ieee-test-suite-v2.pdf>.
- IEEE Computer Society (2008) *IEEE Standard for Floating-Point Arithmetic*. IEEE Std 754-2008 (IEEE, New York).
- Korel B (1990) Automated software test data generation. *IEEE Trans. Software Engrg.* 16:870–879.
- Kuliamin VV (2010) Standardization and testing of mathematical functions. Pnueli A, Virbitskaite I, Voronkov A, eds. *Perspectives Systems Informatics, Revised Papers 7th Internat. Andrei Ershov Memorial Conf. (PSI 2009)*, Lecture Notes in Computer Science, Vol. 5947 (Springer-Verlag, Berlin), 257–268.
- Lakhotia K, Harman M, Gross H (2010a) AUSTIN: A tool for search based software testing for the C language and its evaluation on deployed automotive systems. *Proc. 2nd Internat. Sympos. Search Based Software Engrg. (SSBSE ’10)* (IEEE Computer Society, Washington, DC), 101–110.
- Lakhotia K, Tillmann N, Harman M, De Halleux J (2010b) FloPSy: Search-based floating point constraint solving for symbolic execution. *Proc. 22nd IFIP WG 6.1 Internat. Conf. Testing Software Systems* (Springer-Verlag, Berlin), 142–157.
- Lebbah Y (2009) ICOS: A branch and bound based solver for rigorous global optimization. *Optim. Methods Software* 24: 709–726.
- Marre B, Blanc B (2005) Test selection strategies for Lustre descriptions in GATeL. Gurevich Y, Petrenko AK, Kossatchev A, eds. *Proc. Workshop Model Based Testing (MBT 2004)*, Electronic Notes in Theoretical Computer Science, Vol. 111 (Elsevier Science Publishers B. V., Amsterdam), 93–111.
- Marre B, Michel C (2010) Improving the floating point addition and subtraction constraints. Cohen D, ed. *Proc. 16th Internat. Conf. Principles Practice Constraint Programming (CP 2010)*, Lecture Notes in Computer Science, Vol. 6308 (Springer, Berlin), 360–367.
- McMinn P (2004) Search-based software test data generation: A survey. *Software Testing, Verification Reliability* 14:105–156.
- Michel C (2002) Exact projection functions for floating point number constraints. *Proc. 7th Internat. Sympos. Artificial Intelligence Math., Fort Lauderdale, FL*.
- Michel C (2013) Personal communication with authors, December.
- Michel C, Rueher M, Lebbah Y (2001) Solving constraints over floating-point numbers. Walsh T, ed. *Proc. 7th Internat. Conf. Principles and Practice of Constraint Programming (CP 2001)*, Lecture Notes in Computer Science, Vol. 2239 (Springer-Verlag, Berlin), 524–538.
- Miller W, Spooner DL (1976) Automatic generation of floating-point test data. *IEEE Trans. Software Engrg.* 2:223–226.
- Monniaux D (2008) The pitfalls of verifying floating-point computations. *ACM Trans. Programming Languages Systems* 30:Article no. 12.
- Muller J-M (2005) On the definition of $ulp(x)$. Technical report RR-5504, INRIA, Montbonnot-Saint-Martin, France.
- Scott NS, Jézéquel F, Denis C, Chesneaux J-M (2007) Numerical “health check” for scientific codes: The CADNA approach. *Comput. Physics Comm.* 176:507–521.
- Skeel R (1992) Roundoff error and the Patriot missile. *SIAM News* 25:11.
- Tang E, Barr ET, Li X, Su Z (2010) Perturbing numerical calculations for statistical analysis of floating-point program (in)stability. Tonella P, Orso A, eds. *Proc. 19th Internat. Sympos. Software Testing and Analysis (ISSTA 2010)* (ACM Press, New York), 131–142.
- Weyuker EJ (1982) On testing non-testable programs. *Comput. J.* 25:465–470.
- Anderson NH (1981) *Foundations of Information Integration Theory* (Academic Press, New York).
- Anderson SP, Ciliberto F, Liaukonyte J (2013) Information content of advertising: Empirical evidence from the OTC analgesic industry. *Internat. J. Indust. Organ.* 31(5):355–367.
- Anis AH, Wen Q (1998) Price regulation of pharmaceuticals in Canada. *J. Health Econom.* 17(1):21–38.
- Azoulay P (2002) Do pharmaceutical sales respond to scientific evidence? *J. Econom. Management Strategy* 11(4):551–594.
- Basuroy S, Chatterjee S, Ravid SA (2003) How critical are critical reviews? The box office effects of film critics, star power, and budgets. *J. Marketing Res.* 67(4):103–117.
- Basuroy S, Rao VR, Ravid SA (2011) What is advertising content worth? Evidence from the motion pictures industry. Working paper, Cornell University, Ithaca, NY.
- Berger J, Sorensen AT, Rasmussen SJ (2010) Positive effects of negative publicity: When negative reviews increase sales. *Marketing Sci.* 29(5):815–827.
- Berndt ER, Bui LT, Reiley DH, Urban GL (1996) The roles of marketing, product quality and price competition in the growth and composition of the U.S. anti-ulcer drug industry. Bresnahan TF, Gordon RJ, eds. *The Economics of New Goods* (University of Chicago Press, Chicago), 277–328.
- Berry ST (1994) Estimating discrete-choice models of product differentiation. *RAND J. Econom.* 25(2):242–262.
- Bertrand M, Karlan D, Mullainathan S, Shafir E, Zinman J (2010) What’s advertising content worth? Evidence from a consumer credit marketing field experiment. *Quart. J. Econom.* 125(1): 263–305.
- Calfee JE, Winston C, Stempski R (2002) Direct-to-consumer advertising and the demand for cholesterol-reducing drugs. *J. Law Econom.* 45(S2):673–690.
- Camacho N, Donkers B, Stremersch S (2011) Predictably non-Bayesian: Quantifying salience effects in physician learning about drug quality. *Marketing Sci.* 30(2):305–320.
- Chan T, Narasimhan C, Xie Y (2013) Treatment effectiveness and side effects: A model of physician learning. *Management Sci.* 59(6):1309–1325.
- Chandy RK, Tellis GJ, MacInnis DJ, Thaivanich P (2001) What to say when: Advertising appeals in evolving markets. *J. Marketing Res.* 38(4):399–414.

- Chen Y, Tan W (2010) Strategic advertising: Evidence in the pharmaceutical industry. Working paper, California State University, Long Beach, Long Beach.
- Chevalier JA, Mayzlin D (2006) The effect of word of mouth on sales: Online book reviews. *J. Marketing Res.* 43(3): 345–354.
- Ching AT, Ishihara M (2010) The effects of detailing on prescribing decisions under quality uncertainty. *Quant. Marketing Econom.* 8(2):123–165.
- Ching AT, Ishihara M (2012) Measuring the informative and persuasive roles of detailing on prescribing decisions. *Management Sci.* 58(7):1374–1387.
- Ching AT, Erdem T, Keane MP (2014) A simple method to estimate the roles of learning, inventories and category consideration in consumer choice. *J. Choice Modelling* 13:60–72.
- Chintagunta PK, Jiang R, Jin GZ (2009) Information, learning, and drug diffusion: The case of Cox-2 inhibitors. *Quant. Marketing Econom.* 7(4):399–443.
- Clemen RT, Winkler RL (1999) Combining probability distributions from experts in risk analysis. *Risk Anal.* 19(2): 187–203.
- Cochrane D, Orcutt GH (1949) Application of least squares regression to relationships containing auto-correlated error terms. *J. Amer. Statist. Assoc.* 44(245):32–61.
- Cockburn IM, Anis AH (2001) Hedonic analysis of arthritis drugs. Cutler DM, Berndt ER, eds. *Medical Care Output and Productivity* (University of Chicago Press, Chicago), 439–462.
- Davignon J, Hanefeld M, Nakaya N, Hunninghake DB, Insull W Jr, Ose L (1998) Clinical efficacy and safety of Cerivastatin: Summary of pivotal phase IIb/III studies. *Amer. J. Cardiology* 82(4B):32J–39J.
- Dunn A (2012) Drug innovations and welfare measures computed from market demand: The case of anti-cholesterol drugs. *Amer. Econom. J.: Appl. Econom.* 4(3):167–189.
- Fischer M, Albers S (2010) Patient- or physician-oriented marketing: What drives primary demand for prescription drugs? *J. Marketing Res.* 47(1):103–121.
- Godden D (2010) Corroborative evidence. Reed C, Tindale C, eds. *Dialectics, Dialogue and Argumentation: An Examination of Douglas Walton's Theories of Reasoning and Argument* (College Publications, London), 201–212.
- Godes D, Mayzlin D (2004) Using online conversations to study word-of-mouth communication. *Marketing Sci.* 23(4): 545–560.
- Goldenberg J, Libai B, Moldovan S, Muller E (2007) The NPV of bad news. *Internat. J. Res. Marketing* 24(3):186–200.
- Graham DJ, Staffa JA, Shatin D, Andrade SE, Schech SD, Grenade LL, Gurwitz JH, Chan KA, Goodman MJ, Platt R (2004) Incidence of hospitalized rhabdomyolysis in patients treated with lipid-lowering drugs. *J. Amer. Medical Assoc.* 292(21): 2585–2590.
- Gupta S (1988) Impact of sales promotions on when, what, and how much to buy. *J. Marketing Res.* 25(4):342–355.
- Heckman JJ (1981) The incidental parameters problem and the problem of initial condition in estimating a discrete time-discrete data stochastic process. Manski CF, McFadden DL, eds. *Structural Analysis of Discrete Data and Econometric Applications* (MIT Press, Cambridge, MA), 179–195.
- Huang J-H, Chen Y-F (2006) Herding in online product choice. *Psych. Marketing* 23(5):413–428.
- Iizuka T, Jin GZ (2005) The effect of prescription drug advertising on doctor visits. *J. Econom. Management Strategy* 14(3): 701–727.
- Jayawardhana J (2013) Direct-to-consumer advertising and consumer welfare. *Internat. J. Indust. Organ.* 31(2):164–180.
- Kalra A, Li S, Zhang W (2011) Understanding responses to contradictory information about products. *Marketing Sci.* 30(6): 1098–1114.
- Law MR, Wald NJ, Rudnicka AR (2003) Quantifying effect of statins on low density lipoprotein cholesterol, ischaemic heart disease, and stroke: Systematic review and meta-analysis. *BMJ* 326(7404):1423–1427.
- Leeflang P, Wieringa J (2010) Modeling the effects of pharmaceutical marketing. *Marketing Lett.* 21(2):121–133.
- Liaukonyte J (2011) Is comparative advertising an active ingredient in the pain relief market? Working paper, Cornell University, Ithaca, NY.
- Liu Q, Gupta S (2011) The impact of direct-to-consumer advertising of prescription drugs on physician visits and drug requests: Empirical findings and public policy implications. *Internat. J. Res. Marketing* 28(3):205–217.
- Luan YJ, Sudhir K (2010) Forecasting marketing-mix responsiveness for new products. *J. Marketing Res.* 47(3):444–457.
- Mintzes B, Morgan S, Wright JM (2009) Twelve years' experience with direct-to-consumer advertising of prescription drugs in Canada: A cautionary tale. *PLoS ONE* 4(5):e5699.
- Narayanan S, Manchanda P (2009) Heterogeneous learning and the targeting of marketing communication for new products. *Marketing Sci.* 28(3):424–441.
- Neslin SA, Rhoads EE, Wolfson P (2009) A model and empirical analysis of patient compliance and persistence in pharmaceuticals. Working paper, Dartmouth College, Hanover, NH.
- Paris V, Docteur E (2006) *Pharmaceutical Pricing and Reimbursement Policies in Canada* (OECD Publishing, Paris).
- Petrin A, Train K (2010) A control function approach to endogeneity in consumer choice models. *J. Marketing Res.* 47(1):3–13.
- Pindyck R, Rubinfeld D (1997) *Econometric Models and Economic Forecasts*, Fourth ed. (McGraw-Hill/Irwin, New York).
- Reis R (2006a) Inattentive consumers. *J. Monetary Econom.* 53(8): 1761–1800.
- Reis R (2006b) Inattentive producers. *Rev. Econom. Stud.* 73(3): 793–821.
- Ries A, Ries L (2009) *The Fall of Advertising and the Rise of PR* (HarperCollins, New York).
- Scandinavian Simvastatin Survival Study Group (1994) Randomised trial of cholesterol lowering in 4,444 patients with coronary heart disease: The Scandinavian Simvastatin survival study (4S). *Lancet* 344(8934):1383–1389.
- Sood A, Kappe E, Stremersch S (2014) The commercial contribution of clinical studies for pharmaceutical drugs. *Internat. J. Res. Marketing* 31(1):65–77.
- Stammerjohan C, Wood CM, Chang Y, Thorson E (2005) An empirical investigation of the interaction between publicity, advertising, and previous brand attitudes and knowledge. *J. Advertising* 34(4):55–67.
- Stremersch S, Landsman V, Venkataraman S (2013) The relationship between DTCA, drug requests, and prescriptions: Uncovering variation in specialty and space. *Marketing Sci.* 32(1):89–110.
- Walton D, Reed C (2008) Evaluating corroborative evidence. *Argumentation* 22(4):531–553.
- Winkler RL (1981) Combining probability distributions from dependent information sources. *Management Sci.* 27(4):479–488.
- Winkler RL, Clemen RT (2004) Multiple experts vs. multiple methods: Combining correlation assessments. *Decision Anal.* 1(3):167–176.
- Andersson H, Hoff A, Christiansen M, Hasle G, Løkketangen A (2010) Industrial aspects and literature survey: Combined inventory management and routing. *Comput. Oper. Res.* 37(9):1515–1536.
- Bertsekas DP, Tsitsiklis JN (1996) *Neuro-Dynamic Programming* (Athena Scientific, Belmont, MA).
- Blair CE, Jeroslow RG (1977) The value function of a mixed integer program: I. *Discrete Math.* 19(2):121–138.
- Blair CE, Jeroslow RG (1979) The value function of a mixed integer program: II. *Discrete Math.* 25(1):7–19.
- Bouzaïene-Ayari B, Cheng C, Das S, Fiorillo R, Powell WB (2014) From single commodity to multiattribute models for locomotive optimization: A comparison of integer programming and approximate dynamic programming. *Transportation Sci.*, ePub ahead of print July 28, <http://dx.doi.org/10.1287/trsc.2014.0536>.

- Campbell A, Clarke L, Kleywegt A, Savelsbergh MWP (1998) The inventory routing problem. Crainic TG, Laporte G, eds. *Fleet Management and Logistics* (Kluwer, Boston), 95–113.
- Christiansen M, Fagerholt K (2009) Maritime inventory routing problems. Floudas CA, Pardalos PM, eds. *Encyclopedia of Optimization*, 2nd ed. (Springer-Verlag, New York), 1947–1955.
- Christiansen M, Fagerholt K, Nygreen B, Ronen D (2013) Ship routing and scheduling in the new millennium. *Eur. J. Oper. Res.* 228(3):467–483.
- Coelho LC, Cordeau J-F, Laporte G (2014) Thirty years of inventory-routing. *Transportation Sci.* 48(1):1–19.
- Engineer FG, Furman KC, Nemhauser GL, Savelsbergh MWP, Song J-H (2012) A branch-price-and-cut algorithm for single product maritime inventory routing. *Oper. Res.* 60(1):106–122.
- Fodstad M, Uggen KT, Rømo F, Lium A-G, Stremersch G (2010) LNGScheduler: A rich model for coordinating vessel routing, inventories and trade in the liquefied natural gas supply chain. *J. Energy Markets* 3(4):31–64.
- Furman KC, Song J-H, Kocis GR, McDonald MK, Warrick PH (2011) Feedstock routing in the ExxonMobil downstream sector. *Interfaces* 41(2):149–163.
- George AP, Powell WB (2006) Adaptive stepsizes for recursive estimation with applications in approximate dynamic programming. *Machine Learn.* 65(1):167–198.
- Godfrey GA, Powell WB (2002a) An adaptive dynamic programming algorithm for dynamic fleet management, I: Single period travel times. *Transportation Sci.* 36(1):21–39.
- Godfrey GA, Powell WB (2002b) An adaptive dynamic programming algorithm for dynamic fleet management, II: Multiperiod travel times. *Transportation Sci.* 36(1):40–54.
- Goel V, Furman KC, Song J-H, El-Bakry AS (2012) Large neighborhood search for LNG inventory routing. *J. Heuristics* 18(6):821–848.
- Goel V, Slusky M, van Hoeve W-J, Furman KC, Shao Y (2014) Constraint programming for LNG ship scheduling and inventory management. *Eur. J. Oper. Res.* Forthcoming.
- Grønhaug R, Christiansen M (2009) Supply chain optimization for the liquefied natural gas business. *Innovations in Distribution Logistics*, Lecture Notes in Economics and Mathematical Systems, Vol. 619 (Springer-Verlag, Berlin), 195–218.
- Grønhaug R, Christiansen M, Desaulniers G, Desrosiers J (2010) A branch-and-price method for a liquefied natural gas inventory routing problem. *Transportation Sci.* 44(3):400–415.
- Halvorsen-Weare E, Fagerholt K (2013) Routing and scheduling in a liquefied natural gas shipping problem with inventory and berth constraints. *Ann. Oper. Res.* 203(1):167–186.
- Hewitt M, Nemhauser GL, Savelsbergh MWP, Song J-H (2013) A branch-and-price guided search approach to maritime inventory routing. *Comput. Oper. Res.* 40(5):1410–1419.
- Nascimento JM, Powell WB (2009) An optimal approximate dynamic programming algorithm for the lagged asset acquisition problem. *Math. Oper. Res.* 34(1):210–237.
- Nascimento JM, Powell WB (2013) An optimal approximate dynamic programming algorithm for concave, scalar storage problems with vector-valued controls. *Automatic Control, IEEE Trans.* 58(12):2995–3010.
- Papageorgiou DJ, Keha AB, Nemhauser GL, Sokol J (2014a) Two-stage decomposition algorithms for single product maritime inventory routing. *INFORMS J. Comput.* 26(4):825–847.
- Papageorgiou DJ, Nemhauser GL, Sokol J, Cheon M-S, Keha AB (2014b) MIRPLib—A library of maritime inventory routing problem instances: Survey, core model, and benchmark results. *Eur. J. Oper. Res.* 235(2):350–366.
- Powell WB (2011) *Approximate Dynamic Programming: Solving the Curses of Dimensionality*, 2nd ed. (John Wiley & Sons, Hoboken, NJ).
- Rakke JG, Andersson H, Christiansen M, Desaulniers G (2015) A new formulation based on customer delivery patterns for a maritime inventory routing problem. *Transportation Sci.* 49(2):384–401.
- Rakke JG, Stålhane M, Moe CR, Christiansen M, Andersson H, Fagerholt K, Norstad I (2011) A rolling horizon heuristic for creating a liquefied natural gas annual delivery program. *Transportation Res. Part C* 19(5):896–911.
- Ruszczynski A (2010) Post-decision states and separable approximations are powerful tools of approximate dynamic programming. *INFORMS J. Comput.* 22(1):20–22.
- Savelsbergh MWP, Song J-H (2008) An optimization algorithm for the inventory routing problem with continuous moves. *Comput. Oper. Res.* 35(7):2266–2282.
- Shao Y, Furman KC, Goel V, Hoda S (2014) Bound improvement for LNG inventory routing. *Transportation Sci.* Forthcoming.
- Simão HP, Day J, George AP, Gifford T, Nienow J, Powell WB (2009) An approximate dynamic programming algorithm for large-scale fleet management: A case application. *Transportation Sci.* 43(2):178–197.
- Song J-H, Furman KC (2013) A maritime inventory routing problem: Practical approach. *Comput. Oper. Res.* 40(3):657–665.
- Stålhane M, Rakke JG, Moe CR, Andersson H, Christiansen M, Fagerholt K (2012) A construction and improvement heuristic for a liquefied natural gas inventory routing problem. *Comput. Indust. Engng.* 62(1):245–255.
- Sutton RS, Barto AG (1998) *Reinforcement Learning: An Introduction* (MIT Press, Cambridge, MA).
- Topaloglu H (2006) A parallelizable dynamic fleet management model with random travel times. *Eur. J. Oper. Res.* 175(2):782–805.
- Topaloglu H (2007) A parallelizable and approximate dynamic programming-based dynamic fleet management model with random travel times and multiple vehicle types. Zemipekis VS, Giaglis GM, Tarantilis CD, Minis I, eds. *Dynamic Fleet Management: Concepts, Systems, Algorithms and Case Studies* (Springer, New York), 65–93.
- Topaloglu H, Powell WB (2006) Dynamic-programming approximations for stochastic time-staged integer multicommodity-flow problems. *INFORMS J. Comput.* 18(1):31–42.
- Toriello A, Nemhauser GL, Savelsbergh MWP (2010) Decomposing inventory routing problems with approximate value functions. *Naval Res. Logist.* 57(8):718–727.
- Uggen K, Fodstad M, Nørstebø V (2013) Using and extending fix-and-relax to solve maritime inventory routing problems. *TOP* 21(2):355–377.

References

- [1] Alvarez LHR (1999) A class of solvable singular stochastic control problems. *Stochastics Stochastics Rep.* 67(1–2):83–122.
- [2] Alvarez LHR (2001) Singular stochastic control, linear diffusions, and optimal stopping: A class of solvable problems. *SIAM J. Control Optim.* 39(6):1697–1710.
- [3] Alvarez LHR (2003) On the properties of r -excessive mappings for a class of diffusions. *Ann. Appl. Probab.* 13(4):1517–1533.
- [4] Bather J, Chernoff H (1967) Sequential decisions in the control of a spaceship. *Fifth Berkeley Sympos. Math. Statist. Probab.*, vol. 3 (University of California Press, Berkeley, CA), 181–207.
- [5] Bayraktar E, Huang YJ (2013) On the multidimensional controller-and-stopper games. *SIAM J. Control Optim.* 51(2):1263–1297.
- [6] Benes V, Shepp L, Witsenhausen H (1980) Some solvable stochastic control problems. *Stochastics Stochastics Rep.* 4(1):39–83.
- [7] Chow P, Menaldi J, Robin M (1985) Additive control of stochastic linear systems with finite horizon. *SIAM J. Control Optim.* 23(6):858–899.
- [8] Davis MHA, Zervos M (1994) A problem of singular stochastic control with discretionary stopping. *Ann. Appl. Probab.* 4(1):226–240.
- [9] Davis MHA, Zervos M (1998) A pair of explicitly solvable singular stochastic control problems. *Appl. Math. Optim.* 38(3):327–352.
- [10] Feichtinger G, Hartl RF, Sethi SP (1994) Dynamic optimal control models in advertising: Recent developments. *Management Sci.* 40(2):195–226.
- [11] Forde M, Kumar R, Zhang H (2015) Large deviations for the boundary local time of doubly reflected Brownian motion *Statist. Probab. Lett.*, 96:262–268.
- [12] Fudenberg D, Tirole J (1991) *Game Theory* (MIT Press, Cambridge, MA).
- [13] Grosset L, Viscolani B (2004) Advertising for a new product introduction: A stochastic approach. *TOP* 12(1):149–167.
- [14] Harrison JM (1985) *Brownian Motion and Stochastic Flow Systems* (John Wiley & Sons, New York).
- [15] Harrison JM, Taksar MI (1983) Instantaneous control of Brownian motion. *Math. Oper. Res.* 8(3):439–453.
- [16] Jack A, Johnson TC, Zervos M (2008) A singular control model with application to the goodwill problem. *Stochastic Processes Their Appl.* 118(11):2098–2124.
- [17] Karatzas I (1981) The monotone follower problem in stochastic decision theory. *Appl. Math. Optim.* 7(1):175–189.
- [18] Karatzas I (1983) A class of singular stochastic control problems. *Adv. Appl. Probab.* 15(2):225–254.
- [19] Karatzas I, Shreve SE (1998) *Brownian Motion and Stochastic Calculus*, 2nd ed. (Springer, New York).
- [20] Karatzas I, Sudderth W (2006) Stochastic games of control and stopping for a linear diffusion. *Random Walk, Sequential Analysis and Related Topics* (World Scientific Publisher, Hackensack, NJ), 100–117.
- [21] Karatzas I, Zamfirescu IM (2008) Martingale approach to stochastic differential games of control and stopping. *Ann. Probab.* 36(4):1495–1527.
- [22] Keller JJ (1992) Reaching out: AT&T, MCI, Sprint raise the intensity of their endless war. *Wall Street Journal* (October 20) A1.
- [23] Lon PC, Zervos M (2011) A model for optimally advertising and launching a product. *Math. Oper. Res.* 36(2):363–376.
- [24] Marinelli C (2007) The stochastic goodwill problem. *Eur. J. Oper. Res.* 176(1):389–404.
- [25] Maskin E, Tirole J (2001) Markov perfect equilibrium: I. Observable actions. *J. Econom. Theory* 100(2):191–219.
- [26] Matomäki P (2012) On solvability of a two-sided singular control problem. *Math. Methods Oper. Res.* 76:239–271.
- [27] Myerson RB (2004) *Game Theory: Analysis of Conflict* (Harvard University Press, Cambridge, MA).
- [28] Nerlove M, Arrow KJ (1962) Optimal advertising policy under dynamic conditions. *Economica* 29(114):129–142.
- [29] Nilakantan L (1993) Continuous time stochastic games. Unpublished doctoral dissertation, University of Minnesota, Minneapolis.
- [30] Olver FWJ, Lozier DW, Boisvert RF, Clark CW, eds. (2010) *NIST Handbook of Mathematical Functions* (Cambridge University Press, Cambridge, UK).
- [31] Protter PE (2003) *Stochastic Integration and Differential Equations* (Springer, Berlin).
- [32] Schelling TC (1980) *The Strategy of Conflict* (Harvard University Press, Cambridge, MA).
- [33] Tarski A (1955) A lattice-theoretical fixpoint theorem and its applications. *Pacific J. Math.* 5(2):285–309.
- [34] Zhu H (1992) Generalized solution in singular stochastic control: The nondegenerate problem. *Appl. Math. Optim.* 25(3):225–245.
- [35] Altman E (1999) *Constrained Markov Decision Processes* (Chapman & Hall/CRC, Boca Raton, FL).
- [36] Arapostathis A, Borkar VS, Fernández-Gaucherand E, Ghosh MK, Marcus SI (1993) Discrete-time controlled Markov processes with average cost criterion: A survey. *SIAM J. Control Optim.* 31:282–344.
- [37] Bertsekas DP (1972) Infinite time reachability of state space regions by using feedback control. *IEEE Trans. Automatic Control* AC-17:604–613.
- [38] Bertsekas DP (1977) Monotone mappings with application in dynamic programming. *SIAM J. Control Optim.* 15:438–464.
- [39] Bertsekas DP (2012) *Dynamic Programming and Optimal Control*, 4th ed., Vol. II (Athena Scientific, Belmont, MA).
- [40] Bertsekas DP (2013) *Abstract Dynamic Programming* (Athena Scientific, Belmont, MA).
- [41] Bertsekas DP, Shreve SE (1978) *Stochastic Optimal Control: The Discrete Time Case* (Academic Press, New York).
- [42] Bertsekas DP, Tsitsiklis JN (1996) *Neuro-Dynamic Programming* (Athena Scientific, Belmont, MA).
- [43] Bertsekas DP, Yu H (2010) Distributed asynchronous policy iteration in dynamic programming. *Proc. 48th Allerton Conf. Comm., Control Comput.* (IEEE, Piscataway, NJ), 1368–1375.
- [44] Bertsekas DP, Yu H (2012) Q -learning and enhanced policy iteration in discounted dynamic programming. *Math. Oper. Res.* 37(1):66–94.
- [45] Blackwell D (1964) Memoryless strategies in finite stage dynamic programming. *Ann. Math. Statist.* 35:863–865.
- [46] Blackwell D (1965a) Discounted dynamic programming. *Ann. Math. Statist.* 36:226–235.
- [47] Blackwell D (1965b) Positive dynamic programming. *Proc. 5th Berkeley Sympos. Math. Statist. Probab.* (University of California Press, Berkeley, CA), 415–418.
- [48] Blackwell D (1968) A Borel set not containing a graph. *Ann. Math. Statist.* 39:1345–1347.

-
- [49] Blackwell D (1978) Borel-programmable functions. *Ann. Probab.* 6:321–324.
- [50] Blackwell D, Ryll-Nardzewski C (1963) Non-existence of everywhere proper conditional distributions. *Ann. Math. Statist.* 34:223–225.
- [51] Blackwell D, Freedman D, Orkin M (1974) The optimal reward operator in dynamic programming. *Ann. Probab.* 2:926–941.
- [52] Chen RR, Meyn S (1999) Value iteration and optimization of multiclass queueing networks. *Queueing Systems* 32:65–97.
- [53] Dudley RM (2002) *Real Analysis and Probability* (Cambridge University Press, Cambridge, UK).
- [54] Dynkin EB, Yushkevich AA (1979) *Controlled Markov Processes* (Springer, New York).
- [55] Feinberg EA (2002) Total reward criteria. Feinberg EA, Shwartz A, eds. *Handbook of Markov Decision Processes* (Springer, New York), 155–189.
- [56] Feinberg EA, Shwartz A, eds. (2002) *Handbook of Markov Decision Processes* (Springer, New York).
- [57] Feinberg EA, Kasyanov PO, Zadoianchuk NV (2012) Average cost Markov decision processes with weakly continuous transition probabilities. *Math. Oper. Res.* 37(4):591–607.
- [58] Freedman D (1974) The optimal reward operator in special classes of dynamic programming problems. *Ann. Probability* 2:942–949.
- [59] Furukawa N (1972) Markovian decision processes with compact action spaces. *Ann. Math. Statist.* 43:1612–1622.
- [60] Hartley R (1980) A simple proof of Whittle’s bridging condition in dynamic programming. *J. Appl. Prob.* 17:1114–1116.
- [61] Hernández-Lerma O, Lasserre JB (1996) *Discrete-Time Markov Control Processes: Basic Optimality Criteria* (Springer, New York).
- [62] Hernández-Lerma O, Lasserre JB (1999) *Further Topics on Discrete-Time Markov Control Processes* (Springer, New York).
- [63] Hinderer K (1970) *Foundations of Non-Stationary Dynamic Programming with Discrete Time Parameter* (Springer, New York).
- [64] Krep DM, Porteus EL (1977) On the optimality of structured policies in countable stage decision processes. II: Positive and negative problems. *SIAM J. Appl. Math.* 32:457–466.
- [65] Kuratowski K (1966) *Topology I* (Academic Press, New York).
- [66] Maitra A (1968) Discounted dynamic programming on compact metric spaces. *Sankhyā: Indian J. Statist., Ser. A* 30:211–216.
- [67] Maitra A, Sudderth W (1992) The optimal reward operator in negative dynamic programming. *Math. Oper. Res.* 17(4):921–931.
- [68] Meyn S (2008) *Control Techniques for Complex Networks* (Cambridge University Press, Cambridge, UK).
- [69] Meyn S, Tweedie RL (2009) *Markov Chains and Stochastic Stability*, 2nd ed. (Cambridge University Press, Cambridge, UK).
- [70] Miller BL, Veinott AF (1969) Discrete dynamic programming with a small interest rate. *Ann. Math. Statist.* 40:366–370.
- [71] Neveu J (1975) *Discrete-Parameter Martingales* (North-Holland, Amsterdam).
- [72] Parthasarathy KR (1967) *Probability Measures on Metric Spaces* (Academic Press, New York).
- [73] Puterman ML (1994) *Markov Decision Processes: Discrete Stochastic Dynamic Programming* (John Wiley & Sons, New York).
- [74] Rudin W (1976) *Principles of Mathematical Analysis*, 3rd ed. (McGraw-Hill, New York).
- [75] Schäl M (1975) Conditions for optimality in dynamic programming and for the limit of n -stage optimal policies to be optimal. *Z. Wahrscheinlichkeitstheorie verw. Gebiete* 32:179–196.
- [76] Shreve SE (1978) Probability measures and the C -set of Selivanovskij. *Pacific J. Math.* 79:189–196.
- [77] Shreve SE (1979) Resolution of measurability problems in discrete-time stochastic control. *Stochastic Control Theory and Stochastic Differential Systems* (Springer, Berlin), 580–587.
- [78] Shreve SE (1981) Borel-approachable functions. *Fundamenta Mathematicae* 112:17–24.
- [79] Shreve SE, Bertsekas DP (1978) Alternative theoretical frameworks for finite horizon discrete-time stochastic optimal control. *SIAM J. Control Optim.* 16:953–977.
- [80] Shreve SE, Bertsekas DP (1979) Universally measurable policies in dynamic programming. *Math. Oper. Res.* 4(1):15–30.
- [81] Srivastava SM (1998) *A Course on Borel Sets* (Springer, New York).
- [82] Strauch RE (1966) Negative dynamic programming. *Ann. Math. Statist.* 37:871–890.
- [83] Sutton RS, Barto AG (1998) *Reinforcement Learning* (MIT Press, Cambridge).
- [84] van der Wal J (1981) *Stochastic Dynamic Programming* (Mathematical Centre, Amsterdam).
- [85] Veinott AF (1966) On finding optimal policies in discrete dynamic programming with no discounting. *Ann. Math. Statist.* 37:1284–1294.
- [86] Veinott AF (1969) On discrete dynamic programming with sensitive discount optimality criteria. *Ann. Math. Statist.* 40:1635–1660.
- [87] Whittle P (1979) A simple condition for regularity in negative programming. *J. Appl. Prob.* 16:305–318.
- [88] Whittle P (1980) Stability and characterisation conditions in negative programming. *J. Appl. Prob.* 17:635–645.
- [89] Yu H (2014) On convergence of value iteration for a class of total cost Markov decision processes. Unpublished report, <http://arxiv.org/abs/1411.1459>.
- [90] Yu H, Bertsekas DP (2013) Q -learning and policy iteration algorithms for stochastic shortest path problems. *Ann. Oper. Res.* 208:95–132.