CRA Charles River Associates

Presented to:

Massachusetts Department of Public Health

Independent Cost Analysis for:

Mass General Brigham Incorporated
DoN Application #21012113-AS

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* The views expressed herein are the views and opinions of the author and do not reflect or represent the views of Charles River Associates or any organizations with which the author is affiliated.

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I. Executive Summary

1.   Mass General Brigham filed a Determination of Need Application that proposes construction of three ambulatory care centers in Westborough, Westwood, and Woburn. Each of the Proposed Ambulatory Care Centers would include four operating rooms and Computed Tomography and Magnetic Resonance Imaging units. Primary care and specialist physician services would also be offered at each of the sites. Collectively, the total proposed expenditure associated with the three ambulatory care centers is approximately $223.7 million.

2.   The Massachusetts Department of Public Health has required an independent cost analysis for the project to assist in determining whether the project would be consistent with the health care cost containment goals of Massachusetts. As directed by the Determination of Need program, the two primary elements to be addressed in the analysis are (i) the effects of the proposed project on prices of and competition for health care services in Massachusetts and (ii) the effects of the proposed project on the utilization of health care services in Massachusetts and the capacity of health care providers in Massachusetts to render those services. Our analysis in connection with the independent cost analysis supports the following conclusions.

3.   The populations of the service areas of the Proposed Ambulatory Care Centers are projected to increase by between five and seven percent from 2020 to 2030. However, the number of residents in these areas age 65 and older (who tend to use more health care services) is projected to grow between 30 and 39 percent over this period.

4.   Among patients residing in the service areas of the Proposed Ambulatory Care Centers who received an outpatient service that would be offered at the Proposed Ambulatory Care Centers, a significant fraction either recently received care at a Mass General Brigham facility or recently received care from a Mass General Brigham primary care provider.

5.   The predicted changes in Mass General Brigham's shares in the service areas of the Proposed Ambulatory Care Centers are modest and unlikely to meaningfully change the system's bargaining leverage with health insurers. Rather, the weight of the economics literature suggests that allowing health care providers to enter an area or expand their presence there lowers health care prices and reduces expenditures on health care services.

6.   On average, the proposed project will reduce expenditures on outpatient diagnostic imaging services and outpatient surgical services for patients who switch to receiving care at the Proposed Ambulatory Care Centers. The reductions in expenditures on health care services will be larger if the patients receiving care at the centers otherwise would have received care at other facilities operated by Mass General Brigham. The magnitude of these reductions depends on the prices that Mass General Brigham will negotiate for care provided at the Proposed Ambulatory Care Centers. Overall, we predict a decrease in health care expenditures across the service lines associated with the Proposed Ambulatory Care Centers of at least 0.1 percent for the Westborough location, at least 0.2 percent for the Westwood location, and at least 0.1 percent for the Woburn location.

7.   For these reasons, we believe that the proposed project is consistent with the Commonwealth of Massachusetts' health care cost-containment goals.

II.   Introduction and Background

A. Introduction

8.   Mass General Brigham Incorporated ("MGB" or "the Applicant") filed a Determination of Need Application for project number 21012113-AS on January 21, 2021 ("Clinics DoN"). In this project, the Applicant proposes constructing three ambulatory care centers: one in Westborough, Massachusetts; one in Westwood, Massachusetts; and one in Woburn, Massachusetts.[1] Each of the Proposed Ambulatory Care Centers would include four operating rooms and diagnostic imaging services, including Computed Tomography ("CT") and Magnetic Resonance Imaging ("MRI" or "MR Scan").[2] Primary care and specialist physician services would also be offered at each of the sites.[3] Collectively, the total proposed expenditure associated with the three ambulatory care centers is approximately $223.7 million.[4]

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[1] mass-general-brigham-incorporated-multisite-application-attachments.pdf [hereinafter, Clinics DoN], Attachment 1, p.1.

[2] Clinics DoN, Attachment 1, pp. 1-2 and Section F1.a.ii.B, pp. 9-12.

[3] Clinics DoN, Attachment 1, pp. 1-2.

[4] Clinics DoN, Attachment A, Section I, p.1.

9.   The Massachusetts Department of Public Health ("DPH") has required an independent cost analysis ("ICA") for the project to assist in determining whether the project will be consistent with the health care cost containment goals of Massachusetts. The ICA is being conducted by Charles River Associates ("CRA") to provide an independent analysis at the direction of the Determination of Need ("DoN") program of DPH. As described by DPH:

> The purpose and objective of the DoN program is to encourage competition with a public health focus; to promote population health; to support the development of innovative health delivery methods and population health strategies within the health care delivery system; and to ensure that resources will be made reasonably and equitably available to every person within the Commonwealth at the lowest reasonable aggregate cost. In this way the Department [of Public Health] hopes to advance the Commonwealth's goals for cost containment, improved public health outcomes, and delivery system transformation.[5]

While MGB is paying for CRA's services in conducting the ICA, CRA does not represent MGB. CRA also conducted the ICA analyses independently of the staff of the DoN program at the Massachusetts DPH. In the next subsection, we briefly describe the questions that the DoN program asked CRA to address in its ICA for this project.

B. Elements of the ICA

10.   As directed by the DoN program at the Massachusetts DPH, the two primary elements the ICA must address are (i) the effects of the proposed project on prices of and competition for health care services in Massachusetts and (ii) the effects of the proposed project on the utilization of health care services in Massachusetts and the capacity of health care providers in Massachusetts to render those services.

11.   Regarding the first element, the DoN program asked that CRA address specific questions in the ICA. Among other things, the ICA answers the following questions:

- How will each Project change utilization at higher versus lower priced providers, and what will be the subsequent impact on health care prices/spending for commercial and public payors?

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[5] Massachusetts Department of Public Health. "Determination of Need (DoN)," *available at* https://www.mass.gov/determination-of-need-don.

- How will each Project change price levels for the Applicant's relevant services, and what will be the subsequent impact on health care prices/spending for commercial and public payors?

- How will each Project impact the Applicant's relevant market share for services and its negotiating leverage, and what will be the subsequent impact on health care prices/spending for commercial and public payors?

In addition to setting forth these general issues and questions, the DoN program set forth specific areas of inquiry related to prices and competition for the proposed project that inform the more general questions described above.

12.   Regarding the second element, the DoN program also asked that CRA address specific questions in the ICA. Among other things, the ICA should:

- Evaluate the Applicant's calculation of need for the proposed project. The ICA should document current service availability in the project region, the current population and demographics of the region, and expected changes in the population and demographics of the region. The ICA should also analyze current and potential utilization of the services and shifts from existing providers and subsequent cost impacts, including assessing MGB's and competitors' patient profiles (*e.g.*, demographics, insurance coverage, and acuity levels).

- Evaluate potential shifts in utilization of services by patients, including assessing changes from lower-cost to higher-cost services or health care providers.

- Evaluate access to the project services by MassHealth Accountable Care Organization participants and individuals in subsidized insurance products through the Health Connector Authority (*i.e.*, ConnectorCare health plans).[6]

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[6] We note that the data we rely on throughout the ICA distinguish between commercial and Medicare health plans, but do not distinguish between individuals enrolled in health plans offered through the Health Connector Authority and employer-sponsored group health plans. Rather, the data typically identify the insurer or claims administrator, but not the specific type of plan in which the patient was enrolled (*e.g.*, we cannot distinguish between Tufts commercial group health plans and Connector plans—the data simply identify the patient as being covered by a Tufts plan). As such, throughout our analyses we only distinguish between patients enrolled in Original Medicare, Medicare health

- Evaluate the potential for the project to lead to "supply-induced demand" for health care services.

In addition to setting forth these general issues and questions, the DoN program set forth specific areas of inquiry related to capacity and utilization for the project that inform the more general questions described above.

13.   The DoN program also asked that the ICA address two overarching questions in addition to the price and competition questions and the capacity and utilization questions. The first such question asks: If costs increase under the project, who bears the consequences of that increase in costs: third-party payors, patients, or health plan sponsors (*e.g.*, employers)? The second such question parallels the first: If savings are realized under the project, who benefits from those savings? Before turning to the ICA questions, in the next subsection we briefly summarize the key elements of the proposed project. A more detailed description of the proposed project is contained in the DoN application itself.

C. Integrated Care Clinics Project

14.   In its DoN application for Mass General Brigham Integrated Care, Inc. and Mass General Brigham Amsurg, Inc., MGB proposes construction of three ambulatory care centers. These ambulatory care centers would be located at 1400 West Park Drive in Westborough, Massachusetts ("Westborough Site"); 100 Brigham Way in Westwood, Massachusetts ("Westwood Site"); and 2 Hill Street in Woburn, Massachusetts ("Woburn Site").[7] The Westborough, Westwood, and Woburn Sites (collectively, the "Proposed Sites")[8] would be licensed separately from MGB's

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plans, MassHealth non-managed care, MassHealth managed care, and commercial health plans (including both ConnectorCare and employer-sponsored group health plans).

[7] Clinics DoN, Attachment 1, p. 1.

[8] Throughout the ICA, we interchangeably refer to the Proposed Ambulatory Care Centers as the "Proposed Sites," "Proposed Clinics," or "Proposed Integrated Care Clinics." While we understand that the Proposed Ambulatory Care Centers will offer more than just outpatient surgical services, when discussing economics literature and payment methodologies we use the term Ambulatory Surgery Center ("ASC") interchangeably.

existing facilities, *i.e.*, the proposed locations would not operate as hospital outpatient departments ("HOPDs").[9]

15.   Each Proposed Site would include four operating rooms for outpatient surgical procedures that may include gastroenterology, general surgery, neurosurgery, non-invasive cardiology, ophthalmology, orthopedics, otolaryngology, and urology.[10]

16.   The Proposed Sites would also include diagnostic imaging equipment. The Westwood and Woburn Sites would both include two CT units and two MRI units; the Westborough Site would include one CT unit and one MRI unit.[11] The Applicant also notes that the Proposed Sites may also include other types of diagnostic imaging equipment, including X-ray, ultrasound, echocardiograms, and mammography.[12] However we only assess the Proposed Sites' effect on the delivery of "advanced" imaging services that include CT and MR.

17.   Lastly, each of the Proposed Sites would include physician offices.[13] (The Applicant already provides physician services in an existing medical office building at the Westwood Site.)[14] The physician services offered at each site may include primary care, allergy/immunology, cardiology, dermatology, endocrinology, gastroenterology, general surgery, neurology, neurosurgery, ophthalmology, orthopedics, otolaryngology, pulmonary, pain management, physiatry, psychiatry, rheumatology, and urology.[15]

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[9] Clinics DoN, Attachment 1, pp. 2-3 and 15.

[10] Clinics DoN, Attachment 1, pp. 9-10 and Mass General Brigham Inc. – Multisite - 21012113-AS Application_DoN Question Responses.pdf [hereinafter, Clinics Applicant Response], p. 13.

[11] Clinics DoN, Attachment 1, p. 12.

[12] Clinics DoN, Attachment 1, p. 2. Throughout the ICA we discuss only the effects of the proposed projects on the delivery of advanced diagnostic imaging services (*i.e.*, CT and MR scans).

[13] Clinics DoN, Attachment 1, pp. 2 and 10.

[14] Clinics DoN, Attachment 1, note 1.

[15] Clinics Applicant Response, p. 13.

III. Data Sources, Service Line Definitions, and Prices for Health Care Services

18.   In this section we discuss the data sources, service line definitions, and information on prices for health care services that we use throughout this report to respond to the ICA questions posed by the DoN program.

A. Data Sources Used for Analyses

1. CHIA All-Payer Claims Database

19.   The Center for Health Information and Analysis ("CHIA") annually releases the Massachusetts All-Payer Claims Database ("APCD").[16] The APCD includes medical claims submitted by a variety of public and private payors, including Medicare, MassHealth, and commercial health plans.[17, 18] All fully insured commercial health plans with membership in Massachusetts are required to submit claims data for inclusion in the APCD.[19] Self-insured commercial plans that are preempted by the Employee Retirement Income Security Act of 1974 are no longer required to submit their claims data for inclusion in the database but may choose to participate on a voluntary basis.[20] The majority of Massachusetts residents with public or private health coverage are enrolled in plans that submit claims data to the APCD.

20.   The APCD includes claim line-level data for each adjudicated claim from a contributing health plan. These data include the following:[21]

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[16] CHIA, "Massachusetts All Payer Claims Database," *available at* https://www.chiamass.gov/ma-apcd/.

[17] CHIA, "Massachusetts All Payer Claims Database," *available at* https://www.chiamass.gov/ma-apcd/.

[18] In addition to medical claims, the APCD also includes information on pharmacy and dental claims. However, we limit our analysis to the claims included in the APCD's medical claims files.

[19] CHIA, "The Massachusetts All-Payer Claims Database: Medical Claim File Submission Guide, February 2019," *available at* https://www.chiamass.gov/assets/docs/p/apcd/2019-apcd-submission-guides/2019-apcd-medical-claim-file-submission-guide-FINAL-Revision-1.0.pdf, p. 9.

[20] Prior to 2016, self-insured plans were required to submit claims data for inclusion in the APCD. The APCD does not include claims submitted to workers' compensation plans, claims submitted through TRICARE or the Veterans' Health Administration, or claims submitted to the Federal Employee Health Benefits Plan. (CHIA, "Overview of the Massachusetts All-Payer Claims Database, September 2016," av*ailable at* https://www.chiamass.gov/assets/docs/p/apcd/APCD-White-Paper-2016.pdf, p. 2).

[21] A list of the fields contained in the APCD medical claims is available on CHIA's website: CHIA, "The Massachusetts All-Payer Claims Database: Medical Claim File Submission Guide, February 2019," *available at*

- For claims associated with facility charges, the type of facility, such as hospital outpatient department, hospital inpatient department, or critical access hospital.[22]

- For claims for services provided by a professional, the place of service, such as an office or clinic, on-campus or off-campus hospital outpatient department, inpatient hospital department, or hospital emergency room.

- The procedures performed (*e.g.*, Current Procedural Terminology ("CPT") and Healthcare Common Procedure Coding System ("HCPCS") procedure codes).

- Diagnostic information, including primary and secondary diagnosis codes.

- The identity of the reporting payor and the type of plan (*e.g.*, commercial, MassHealth managed care, MassHealth non-managed care, Medicare health plans).

- The amount charged by the provider as well as the amount allowed by the plan.[23]

- The payment arrangement type (*e.g.*, fee-for-service, capitation, bundled payment).

- Patient demographic information, including birth year, gender, and ZIP Code of residence.

- The ZIP Code of the service provider.

- The National Provider Identifier ("NPI")[24] associated with the servicing, rendering, and billing provider.

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https://www.chiamass.gov/assets/docs/p/apcd/2019-apcd-submission-guides/2019-apcd-medical-claim-file-submission-guide-FINAL-Revision-1.0.pdf.

[22] The "bill type" for each claim indicates the type of facility that provided care.

[23] The allowed amount represents the maximum amount the health plan (or plan sponsor) is expected to pay for the service. For claims associated with contracted providers in a health plan's network who have agreed to negotiated rates, the allowed amount corresponds to the applicable negotiated fee. For providers where the health plan does not have an advanced negotiated rate, the allowed amount generally represents the rate that the health plan or plan sponsor determines as the usual, customary, and reasonable fee for the service. The amount that a health plan or plan sponsor pays the provider may be less than the allowed amount due to patient cost-share obligations (*e.g.*, deductible, coinsurance, and copayment).

[24] *See* Section III.A.4 below for additional discussion about NPIs.

- Provider identification numbers that can be linked to the APCD's provider file to determine the location of the facility where the service was provided and the identity of the rendering provider.

21.   The provider file that accompanies the APCD claims data contains various demographic information for each provider (*e.g.*, clinician, hospital, freestanding HOPD, clinic, physician group), including:[25]

- The name of the provider.

- The address of the provider.

- The provider's NPI.

- The provider's association with another entity or to a specific facility, and the start and end dates of that affiliation.

- The entity type of the provider (*e.g.,* person, facility, financial parent).

22.   A single claim may be adjudicated by a payor multiple times. For example, a claim that was originally denied may be reprocessed by a payor following the receipt of additional information from a plan member or provider. Similarly, the allowed amount for a claim may be adjusted by a payor following the claim's initial adjudication. Because re-adjudication of a claim can create additional records in the APCD, the data must be limited to final adjudicated claim lines prior to analysis.

23.   For each of the largest carriers (*i.e.*, payors) in the APCD, CHIA has developed carrier-specific logic that the agency uses to flag the most recent version of each claim.[26] When available,

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[25] A list of the fields contained in the provider file is available on CHIA's website: CHIA, "The Massachusetts All-Payer Claims Database: Provider File Submission Guide, February 2019," *available at* https://www.chiamass.gov/assets/docs/p/apcd/2019-apcd-submission-guides/2019-apcd-provider-file-submission-guide-FINAL.pdf.

[26] CHIA applies payor-specific logic to determine the final "highest" version of each claim line among the largest contributors to the APCD. (*See* CHIA, "Overview of the Massachusetts All-Payer Claims Database, September 2016," *available at* https://www.chiamass.gov/assets/docs/p/apcd/APCD-White-Paper-2016.pdf, p. 5; and CHIA, "Massachusetts All-Payer Claims Database: Release 8.0; 2014-2018 Documentation Guide," *available at* https://www.chiamass.gov/assets/docs/p/apcd/apcd-8.0/APCD-Release-8-Documentation-Guide.pdf, pp. 21-22.)

we rely on this flag to identify final adjudicated claim lines. For payors where the CHIA versioning flag is not available, we implement steps similar to those described in CHIA documentation to identify the most recent version of each claim.[27] These steps include (1) identifying duplicate entries and void records, (2) removing records with certain claim statuses, and (3) narrowing the remaining records based on the *Type of Claim* field. We also remove any claims where the total charge or the allowed amount is negative.[28]

24.   After determining the final adjudicated claim lines, we next identify the ZIP Code where the service was provided and the owner of the facility.

- To identify the ZIP Code where the service was provided, we first rely on the Service Provider ZIP Code field in the claims data. For some claims, this ZIP Code differs from the ZIP Code associated with the provider location identification number in the APCD provider file. When the ZIP Code in the provider file is unique or if it aligns with the primary business practice ZIP Code associated with the NPI in the claims data, we use the ZIP Code in the provider file (to the extent it differs from the Service Provider ZIP Code field in the claims data) to determine the location where the service was provided.

- To determine the ownership for the facility, we first identify the organization name associated with the facility where the service was provided using the service, rendering, and billing provider NPIs recorded in the claims data.[29] We then assign each facility its parent or owner based on online research.[30]

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[27]   CHIA,   "Medical   Claims   Versioning   Brief,"   *available   at* https://www.bidnet.com/bneattachments?/489972194.docx.

[28] Specially, we exclude claims where either the allowed amount field or the sum of values in the plan payments and patient cost-share fields, aggregated to the claim-level, is negative.

[29] We use these three NPI fields in an iterative approach. If the service provider NPI is an organizational NPI, we use the provider name and business practice address as recorded in the National Plan and Provider Enumeration System database for that NPI. If the service provider NPI is not an organizational NPI, we then rely on the provider name and address associated with the rendering provider NPI (to the extent that it is an organizational NPI), followed by the billing provider NPI. (The National Plan and Provider Enumeration System database is discussed in Section III.A.4)

[30] We are unable to assign facility ownership for some claims. These include claims where the service, rendering, and billing provider NPIs are not organizational NPIs or if those NPIs did not appear in the National Plan and Provider Enumeration System database (*i.e.*, they are invalid NPIs).

25.   Finally, we limit the APCD claims data to outpatient care episodes with start dates in 2018 where care was provided to a MassHealth beneficiary or to a member of a commercial or Medicare health plan.[31] We also exclude claims from out-of-state providers and limit to patients residing in one of the following Massachusetts counties: Suffolk, Essex, Middlesex, Norfolk, Bristol, Plymouth, and Worcester.

26.   When analyzing relative prices for outpatient services, we also remove any claims from the APCD where the total charge or allowed amount aggregated across claim lines is zero or missing.[32] Additionally, we exclude any claims where the claim-level allowed amount was (1) greater than claim-level charges or (2) less than ten percent of claim-level charges. Finally, we exclude claims with a non-zero coordination of benefits amount (*i.e.*, when a secondary payor is involved), and claims associated with capitated, global or bundled payments, as well as other payment arrangements.[33]

2. Medicare Claims Data

27.   While the APCD includes information on claims submitted by Medicare health plans, it does not include data on care provided to beneficiaries enrolled in Original Medicare. Unlike Medicare health plans, where a beneficiary receives Medicare benefits through a health benefits company that in turn reimburses providers, Original Medicare reimburses providers directly.

28.   We rely on two Medicare Claim files in our analysis:

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[31] We rely on the APCD for information on care provided to members of Medicare health plans (*i.e.*, Medicare Advantage (Part C) and supplemental Medicare plans). For care provided to beneficiaries enrolled in Original Medicare, we rely on the Medicare Claims data described in the following section.

[32] We exclude claims where either the allowed amount field or the sum of values in the plan payments and patient cost-share fields, aggregated to the claim-level, is zero.

[33] We also exclude claims associated with payment amount per episode, enhanced ambulatory patient grouping, other, or missing payment arrangement information.

- The Medicare Outpatient File includes facility claims submitted by institutional outpatient providers, including hospital outpatient departments, outpatient rehabilitation facilities, and renal dialysis facilities.[34]

- The Medicare Carrier File includes claims submitted by professional providers and certain facility claims.[35] Professional claims include claims submitted by physicians, physician assistants, clinical social workers, and nurse practitioners. Among the facility claims included in the Carrier File are claims submitted by independent clinical laboratories, ambulance providers, freestanding ambulatory surgery centers ("ASCs"), and freestanding radiology centers.[36]

29.   Similar to the APCD, the Medicare Claims data reflect detailed claim line-level data with various information, including:[37]

- For professional claims, the place of service (such as an office or clinic, on-campus or off-campus hospital outpatient department, or hospital emergency room), service location, and NPIs for the performing physician, the billing provider, and the site of service.

- For outpatient facility claims, the facility's Centers for Medicare and Medicaid Services ("CMS") certification number and ZIP Code, as well as the organization/group practice and attending physician NPIs.

- The procedure performed (*e.g.*, CPT or HCPCS code) and the date of service.

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[34] Research Data Assistance Center, "Outpatient (Fee-for-Service)," *available at* https://resdac.org/cms-data/files/op-ffs.

[35] Research Data Assistance Center, "Carrier (Fee-for-Service)," *available at* https://resdac.org/cms-data/files/carrier-ffs.

[36] Facility claims in the Carrier File include claims submitted on Centers for Medicare and Medicaid Services ("CMS") claim form 1500 (or its electronic equivalent), which is also used for the submission of professional claims. Hospitals and other facilities whose claims are included in the Medicare Outpatient Claim File submit claims to Medicare using CMS claim form 1450 (sometimes referred to form UB-04).

[37] Lists of the fields contained in the Medicare Carrier and Outpatient files are available on the Research Data Assistance Center's website: Research Data Assistance Center, "Outpatient (Fee-for-Service)," *available at* https://resdac.org/cms-data/files/op-ffs. Research Data Assistance Center, "Carrier (Fee-for-Service)," *available at* https://resdac.org/cms-data/files/carrier-ffs.

- The provider's billed charge for each claim, the amount reimbursed by Medicare, and any cost-share amounts owed by the beneficiary.

- Diagnostic information, including primary and secondary diagnosis codes.

- Patient demographics, including the patient's gender, date of birth, race, and ZIP Code of residence.

30.   We rely on 2018 Medicare Outpatient and Carrier Files, in conjunction with the APCD, to analyze outpatient utilization. Following an approach similar to the APCD, we first identify the relevant set of outpatient claims based on the facility type for institutional outpatient claims and the place of service for professional claims.

31.   For each claim, we then identify the ZIP Code where the service was provided and the owner of the facility.

- To identify the ZIP Code where the service was provided, we use the *Claim Service Facility ZIP Code* field in the Medicare Outpatient File and the *Line Place of Service ZIP Code* in the Medicare Carrier File.

- To determine the ownership for the facility, we first identify the name of the facility where the service was provided. We use the CMS certification number in the Medicare Outpatient File[38] and the site of service, rendering physician, and billing provider NPIs in the Medicare Carrier File[39] to determine the identity of the providing facility. We then assign each facility its parent or owner based on online research.[40]

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[38] We rely on the CMS Provider of Services File to identify the provider name associated with each CMS certification number. (CMS, December 2018 POS OTHER CSV File and Layouts, *available at* https://downloads.cms.gov/files/pos_other_csv_dec18.zip.)

[39] We use these three NPI fields in an iterative approach. If the site of service NPI is an organizational NPI, we use the provider name and primary business practice address as recorded in the National Plan and Provider Enumeration System database for that NPI. If the site of service NPI is not an organizational NPI, we then rely on the provider name and address associated with the rendering physician NPI (to the extent that it is an organizational NPI), followed by the billing provider NPI.

[40] We are unable to assign facility ownership for some claims. These include claims where the site of service, rendering physician, and billing provider NPIs are not populated, are not organizational NPIs, or did not appear in the NPPES database.

32.   Finally, we limit to claims for patients residing in Massachusetts and who received care in the following Massachusetts counties: Suffolk, Essex, Middlesex, Norfolk, Bristol, Plymouth, and Worcester.

3. Medicare Outpatient Prospective Payment System Tables

33.   Throughout our analysis, we analyze the rates paid to facilities for providing outpatient care relative to Medicare reimbursement rates, which are commonly used as benchmarks in health care economics. There are many advantages to benchmarking reimbursement rates relative to Medicare payment rates. First, Medicare reimbursement rates account for differences in complexity across services. Second, these rates account for differences in costs across different types of outpatient facilities and across geographies. Third, these rates are updated annually to account for changes in costs and medical practice over time. The methodology used by CMS to calculate these rates is known as the Outpatient Prospective Payment System ("OPPS"). The OPPS methodology is described in further detail below.[41]

34.   First, to account for differences in complexity across services, the OPPS assigns each procedure that is reimbursable by Medicare to an Ambulatory Payment Classification ("APC"). APCs are numeric codes utilized by CMS to group together outpatient services with similar costs and clinical characteristics. For each APC, CMS calculates a "relative weight" that measures the resources required for providing care for that APC relative to the resources necessary for an average outpatient episode of care. This relative weight is applied when calculating Medicare reimbursement, so that a procedure assigned to an APC with a relative weight of two will receive twice the reimbursement of a procedure assigned to an APC with a relative weight of one. These relative weights are published quarterly by CMS in "Addendum B," which also includes a listing of which CPT procedure codes are assigned to each APC.[42]

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[41] Medicare Payment Advisory Commission ("MedPAC") Payment Basics, "Outpatient Hospital Services Payment System" (Revised: November 2021), *available at* https://www.medpac.gov/wp-content/uploads/2021/11/medpac_payment_basics_21_opd_final_sec.pdf.

[42] CMS, Addendum A and Addendum B Updates, *available at* https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/HospitalOutpatientPPS/Addendum-A-and-Addendum-B-Updates.

35.   Second, to account for differences in costs across outpatient facilities, the OPPS incorporates a wage index calculated by CMS separately for each Core-Based Statistical Area ("CBSA").[43] This reflects, for example, differences in labor costs between the Boston area and the Worcester area, which are each assigned to different CBSAs. Further adjusting for differences across outpatient facility providers, Medicare reimbursements to freestanding ASCs are approximately 40 percent less than reimbursements to hospital outpatient departments.[44]

36.   Third, CMS revises the APCs and relative weights used in the OPPS each year to reflect changes in medical practice and technology, new services, and changes in the cost of providing care.[45] While we focus on 2018 OPPS payment rates, the regular annual updates to the OPPS to reflect changes in costs over time are an additional reason why these rates are widely used in health care economics as a benchmark when comparing payment rates. In our analysis, we utilize the prices paid by commercial plans, Medicare health plans, and MassHealth managed care plans relative to Original Medicare reimbursement rates when estimating the price-cost effects of potential shifts in outpatient facility utilization patterns.

4. National Plan and Provider Enumeration System

37.   Every health care provider in the United States must obtain an NPI in order to electronically submit claims to payors or participate in Medicare. This requirement includes individual physicians and practitioners, physician groups, and hospital departments. CMS's National Plan

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[43] CBSAs are geographical areas (either metropolitan statistical areas or micropolitan statistical areas) with at least one urbanized area with a minimum population of 50,000 (metropolitan) or 10,000 (micropolitan) and adjacent territory with a "high degree of social and economic integration with the core as measured by commuting ties." (U.S. Census Bureau, "Core-Based Statistical Areas," *available at* https://www.census.gov/topics/housing/housing-patterns/about/core-based-statistical-areas.html.)

[44] The methodology used by CMS to calculate Medicare reimbursement rates to ASCs is similar to the OPPS methodology. Both methods utilize the same APC-level relative weights and adjust for differences in labor costs across CBSAs, although the wage adjustment is slightly smaller for ASCs. (MedPAC Payment Basics, "Ambulatory Surgical Center Services Payment System," (Revised: November 2021), *available at* https://www.medpac.gov/wp-content/uploads/2021/11/medpac_payment_basics_21_asc_final_sec.pdf.)

[45] MedPAC Payment Basics, "Outpatient Hospital Services Payment System," (Revised: November 2021), *available at* https://www.medpac.gov/wp-content/uploads/2021/11/medpac_payment_basics_21_opd_final_sec.pdf, p 4.

and Provider Enumeration System ("NPPES") assigns NPIs and maintains an updated database of providers that is available for download.[46, 47]

38.   Each record in the NPPES downloadable file reflects a unique NPI,[48] and contains, among other things, the following information about the health care provider:

- The name of the health care professional or organization.

- Entity type (*i.e.*, individual or organization).

- Primary specialty.

- Primary business address.

As discussed above, we rely on the NPPES database in determining the ownership of facilities and each facility's ZIP Code. We also rely on the NPPES database to estimate the supply of health care professionals in the Boston and Worcester Metropolitan Statistical Areas.

5.   Supply of Health Care Professionals

i.   NPPES Database

39.   We utilize the NPPES database to estimate the supply of certain health care professionals in the Massachusetts portions of the Boston and Worcester Metropolitan Statistical Areas ("MSA").[49] For some health care professionals, such as physicians and physician assistants, the

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[46] For additional details regarding NPIs, *see* CMS, "NPI: What You Need to Know," *available at* https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/downloads/NPI-What-You-Need-To-Know.pdf.

[47] The NPPES downloadable file is *available at* https://download.cms.gov/nppes/NPI_Files.html. The complete database of all NPIs is updated on a monthly basis with incremental NPI files published weekly.

[48] A provider is assigned one NPI, which never expires (and can remain active even if a provider retires or is no longer in clinical practice) and is never recycled or assigned to a different health care provider. Providers are able to update information associated with their NPI (*e.g.*, their name, credentials, address, taxonomy codes, etc.) but their NPI will remain the same. (CMS, "NPI Fact Sheet," *available at* https://www.cms.gov/Regulations-and-Guidance/Administrative-Simplification/NationalProvIdentStand/Downloads/NPIFactSheet012606.pdf.)

[49] The Boston-Cambridge-Newton, MA-NH MSA ("Boston MSA") includes the following counties in Massachusetts: Middlesex, Essex, Suffolk, Norfolk, and Plymouth. The Boston MSA also includes Rockingham County and Strafford County in New Hampshire, but professionals practicing in those counties are excluded from the analysis. We also exclude the out-of-state portion of the Worcester, MA-CT MSA in our analyses. (U.S. Census Bureau, Delineation Files, Core based statistical areas (CBSAs), metropolitan divisions, and combined statistical areas (CSAs) (March

NPPES database provides an upper bound on the number of providers in an area because the database may include individuals who are no longer involved in clinical practice (*e.g.*, professionals who have retired but have not deactivated their NPI, shifted to research or teaching roles, or are no longer actively involved in patient care for other reasons).[50]

40. In contrast, the NPPES database may undercount health professionals who do not typically bill medical claims directly, including medical assistants, registered nurses, and radiology or surgical technicians. For these health care professionals, we rely on two alternative sources (discussed below) to estimate the supply of providers in the Massachusetts portion of the Boston and Worcester MSAs.

<center>

ii.   Massachusetts Health Professions License Data

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41. To identify the supply of registered nurses in the Boston and Worcester Metropolitan Statistical Areas, we rely on the online directory of nursing licenses published by the Massachusetts Office of Health and Human Services.[51] This directory includes all registered nurses, licensed practical nurses, certified nurse practitioners, certified nurse midwives, certified registered nurse anesthetists, clinical nurse specialists, and psychiatric clinical nurse specialists. In addition to the certification type, the Massachusetts nurse database also identifies the residential address and licensing status for each nurse.[52]

2020), *available at* https://www.census.gov/geographies/reference-files/time-series/demo/metro-micro/delineation-files.html.)

[50] We exclude NPIs that have been deactivated from our analyses. NPIs are typically deactivated when an individual retires or dies, an organization is disbanded, or because of fraudulent use. (*See* North Dakota Department of Human Services, "Frequently Asked Questions About the National Provider Identifier (NPI)," *available at* https://www.nd.gov/dhs/services/medicalserv/medicaid/docs/npi-info-04-26-2006.pdf; and Arkansas Department of Human Services, "National Provider Identifier (NPI) Information," *available at* https://humanservices.arkansas.gov/divisions-shared-services/medical-services/provider-enrollment/npi/.)

[51] Massachusetts Office of Health and Human Services, "Massachusetts Health Professions License Verification Site," *available at* https://madph.mylicense.com/verification/. (The information available on this website is provided by the Massachusetts Department of Public Health.)

[52] We limit to nurses with active licenses (as of November 1, 2021) residing in the Boston or Worcester Metropolitan Statistical Areas.

42.   The Bureau of Labor Statistics publishes state-level employment estimates for various professions, including medical assistants, radiology technicians, and surgical technicians.[53] To estimate the number of medical assistants, radiology technicians, and surgical technicians in the Boston and Worcester Metropolitan Statistical Areas, we allocate the Bureau of Labor Statistics' statewide estimates for Massachusetts proportionally based on the population of each Metropolitan Statistical Area.[54]

6. UMass Donahue Institute Population Projections

43.   The UMass Donahue Institute ("UMDI") produces population projections for Massachusetts, with the most recently available estimates extending to the year 2040 in five-year increments.[55] The projections include breakdowns by age group and gender for each municipal civil division ("MCD"), *i.e.*, each city and town, in the state.

44.   We rely on UMDI's modeling for demographic projections of patients residing in the service areas of MGB's DoN projects in 2025 and 2030.[56] These projections are also incorporated into our estimates of future demand for outpatient services that are relevant to each of the projects.

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[53] U.S. Bureau of Labor Statistics, "Occupational Employment and Wage Statistics," State-Level May 2020 OEWS Data, *available at* https://www.bls.gov/oes/special.requests/oesm20st.zip.

[54] According to the 2020 Census, 76 percent of Massachusetts residents reside in the Boston or Worcester Metropolitan Statistical Areas. (U.S. Census Bureau, Massachusetts: 2020 Census, *available at* https://www.census.gov/library/stories/state-by-state/massachusetts-population-change-between-census-decade.html.)

[55] UMass Donahue Institute, "Massachusetts Population Estimates Program," *available at* https://donahue.umass.edu/business-groups/economic-public-policy-research/massachusetts-population-estimates-program/population-projections.

[56] We define patient service areas based on patient ZIP Codes, which are smaller geographic units than MCDs. We allocate UMDI's MCD-level population estimates to ZIP Codes based on each ZIP Code's share of the total land area of an MCD. Land area measurements for each MCD-ZIP Code pair are obtained from the U.S. Department of Housing and Urban Development's County Subdivision to ZIP Code crosswalk file, *available at* https://www.huduser.gov/portal/datasets/usps_crosswalk.html. For ZIP Codes that span multiple MCDs, we aggregate the MCD/ZIP Code-specific demographic estimates across MCDs to the ZIP Code-level.

B. Service Lines Definitions Used for Analyses

45.   We use the APCD and Medicare Claims data for our analysis of outpatient services. We rely on the type of bill fields[57] in the APCD and the Medicare Outpatient File to limit to facility charges associated with claims from hospital outpatient departments or ASCs, and the place of service fields[58] in the APCD and Medicare Carrier file for services rendered at an ASC. For diagnostic imaging services, we also include professional claims from the APCD or Medicare Carrier File with a place of service indicating office, clinic, or urgent care settings because radiology services are often provided at these locations. [59] As previously mentioned, we limit our analyses to patients who reside in Massachusetts and received care in either Suffolk, Essex, Middlesex, Norfolk, Bristol, Plymouth, or Worcester Counties.

1. Diagnostic Imaging Services

46.   To identify diagnostic imaging services in the APCD and Medicare Claims data, we first review CPT codes and associated descriptions to categorize relevant values into one of the following services: CT, MRI, Positron Emission Tomography/Computed Tomography ("PET/CT"), and Positron Emission Tomography/Magnetic Resonance. We then limit the processed APCD and Medicare Claims data to any claim line belonging to one of the above imaging services to create the data used in our analysis of diagnostic imaging services.

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[57] The type of bill is reflected in the *Type of Bill - on Facility Claims* field in the APCD. The type of bill in the Medicare Outpatient File is determined by combining the *Claim Facility Type Code* field with the *Claim Service Classification Type Code* field.

[58] The place of service is reflected in the *Site of Service* and *Place of Service* fields in the APCD and Medicare Carrier File, respectively.

[59] The facility fees (*i.e.*, the technical component) associated with diagnostic imaging services provided at these locations are submitted on CMS claim form 1500 (or its electronic equivalent), which is also used for the submission of professional claims. Our analysis excludes the professional fees (*i.e.*, the radiologist's fee billed with modifier 26) associated with claims from these locations.

2. Outpatient Surgical Services Offered at the Integrated Care Clinics

47.   MGB provided information on the surgical CPTs it understands could be performed at the Proposed Sites.[60] We limit the processed APCD and Medicare Claims data to claim lines with these CPTs for use in our analysis of surgical services.

48.   We also categorize each surgical CPT into one of 15 body groupings: General Surgical Procedures, Surgical Procedures for Maternity Care and Delivery, Surgical Procedures on the Cardiovascular System, Surgical Procedures on the Digestive System, Surgical Procedures on the Endocrine System, Surgical Procedures on the Eye and Ocular Adnexa, Surgical Procedures on the Female Genital System, Surgical Procedures on the Hemic and Lymphatic Systems, Surgical Procedures on the Integumentary System, Surgical Procedures on the Male Genital System, Surgical Procedures on the Mediastinum and Diaphragm, Surgical Procedures on the Musculoskeletal System, Surgical Procedures on the Nervous System, Surgical Procedures on the Respiratory System, and Surgical Procedures on the Urinary System.

C. Prices for Health Care Services Used for Analyses

49.   Addressing the elements of the ICA requires estimating how the forecasted changes in where patients choose to receive health care services affects the total cost of those services. To do so, we construct the necessary relative price information for services provided at health care facilities in Massachusetts.

1. Relative Prices for Commercial, Medicare Health Plans, and MassHealth Managed Care Plans

50.   To estimate the effect of changes where outpatient care is provided on prices paid by commercial insurance, MassHealth managed care, and Medicare health plans we utilize the APCD in conjunction with Addendum B of the OPPS. For each outpatient service, we calculate a reimbursement rate (*i.e.*, the allowed amount) for each facility, payor, and insurance type

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[60] This information does not represent the surgical services that MGB plans to provide at the Proposed Sites and simply represents the surgical services that could be performed at the Proposed Sites. In addition, the surgical services include certain services which Medicare excludes from reimbursement at ASCs.

combination relative to the amount Original Medicare would pay for the same service.[61] As discussed previously, expressing reimbursement rates relative those to paid by Original Medicare allows us to compare prices at facilities despite differences in service mix.[62] For diagnostic imaging services and surgical services provided at freestanding surgery centers, we determine the amount that Original Medicare would pay for each CPT code identified in Section III.B using the values indicated in Addendum B.

51.   As recorded in the APCD, MassHealth managed care plan reimbursement rates for some diagnostic imaging procedures are substantially higher than the corresponding reimbursement rates for Original Medicare (which we use for our relative prices). However, we understand that MassHealth managed care reimbursement levels are similar to MassHealth non-managed care rates,[63] and that MassHealth non-managed care rates are generally less than Original Medicare fee schedule rates. Given our concern about the reliability of the price information for outpatient diagnostic imaging services covered by MassHealth managed care plans, when we calculate the predicted cost impact of the DoN application on the overall cost of outpatient diagnostic imaging services, we assume that each health care provider would be paid the MassHealth non-managed care fee schedule amount for the outpatient diagnostic imaging service at issue. MassHealth non-managed care relative prices are discussed in the following section.

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[61] To calculate the overall reimbursement rate for a given outpatient service, facility, payor, and insurance type combination, we restrict the set of reimbursements to those we could assign an Original Medicare payment. For example, suppose a facility received $10,000 in reimbursements for CT scans performed on enrollees in BCBS-MA Commercial health plans, but we can only assign an Original Medicare reimbursement rate to claims underlying $9,000 of the $10,000 in reimbursements. The overall reimbursement rate then equals the ratio of these restricted reimbursements (*e.g.,* $9,000) to what Original Medicare would have paid the facility for the same set of claims. If Original Medicare would have reimbursed the facility $6,000 for the $9,000 in CT scan claims BCBS-MA reimbursed the facility, the overall CT scans reimbursement rate for the facility, payor, and insurance type combination would be 1.50 (= $9,000 / $6,000).

[62] Addendum B indicates the rates that Original Medicare pays for services in HOPDs and not the rates paid for services provided at other types of facilities. However, expressing prices as a ratio to the HOPD rate allows us to capture differences in the relative prices across facilities. To remove potential outliers, we exclude claims with charges relative to Original Medicare payments that fall into the top and bottom five percent of claims, separately for each service line (*e.g.,* outpatient cardiovascular).

[63] While we are not aware of any study that compares MassHealth managed care rates with MassHealth non-managed care rates, a related study documents that Medicare Advantage rates are similar to Original Medicare's fee schedule amounts. (Robert A. Berenson, Jonathan H. Sunshine, David Helms, and Emily Lawton. "Why Medicare Advantage Plans Pay Hospitals Traditional Medicare Prices." *Health Affairs* (2015).)

2. Relative Prices for MassHealth Non-Managed Care

52.   For outpatient care provided at in-state hospitals, MassHealth non-managed care has a standardized adjudicated payment amount per episode of care (*i.e.*, per outpatient visit).[64] We utilize this standardized adjudicated payment amount per outpatient episode of care to construct relative prices at in-state hospitals. [65]

53.   For outpatient diagnostic imaging services provided in a non-hospital setting, MassHealth non-managed care has a single fee schedule that pays the same amount for a specific diagnostic imaging service regardless of where the service was provided.[66] As such, we do not expect any changes to health care expenditures for MassHealth non-managed care related to changes in where diagnostic imaging services are rendered, when rendered outside of a hospital. Similarly, MassHealth pays for surgical services at ASCs utilizing a single fee schedule. As such, we do not expect any changes to health care expenditures for MassHealth non-managed care related to changes in where surgical services are rendered, when rendered outside of a hospital.[67]

54.   We estimate cost savings specific to each service associated with instances when a MassHealth non-managed care patient shifts from receiving outpatient services at an HOPD to an ASC.[68] We estimate these cost savings using a combination of the APCD and MassHealth fee

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[64] MassHealth: Payment for In-State Acute Hospital Services and Out-of-State Acute Hospital Services, effective November 1, 2021. pp. 10-11, *available at* https://www.mass.gov/doc/notice-of-final-agency-action-masshealth-payment-for-in-state-acute-hospital-services-and-out-of-state-acute-hospital-services-effective-november-1-2021-0.

[65] MassHealth: Payment for In-State Acute Hospital Services and Out-of-State Acute Hospital Services, effective November 1, 2021. p. 57, *available at* https://www.mass.gov/doc/notice-of-final-agency-action-masshealth-payment-for-in-state-acute-hospital-services-and-out-of-state-acute-hospital-services-effective-november-1-2021-0.

To calculate the specific payment for each in-state outpatient episode of care, a wage adjusted outpatient standard amount is multiplied by the MassHealth Enhanced Ambulatory Patient Group ("EAPG") weight assigned to each claim line and the result is aggregated to the episode level. This EAPG specific weight scales up (or down) the wage adjusted outpatient standard amount to account for differences in the cost of treatment associated with each EAPG. To compare relative rates for outpatient services between hospitals this final scaling is not necessary. We do not adjust the standardized amount to account for hospitals wage areas as this would necessitate identifying the wage rate for every individual facility in the APCD data.

[66] Rates for Radiology Services (effective August 1, 2021), *available at* https://www.mass.gov/doc/rates-for-radiology-services-effective-august-1-2021-0, p. 1.

[67] Rates for freestanding ASCs, *available at* https://www.mass.gov/doc/101-cmr-347-rates-for-freestanding-ambulatory-surgery-centers.

[68] Shifts from ASCs to HOPDs by MassHealth non-managed care patients incur a corresponding increase in cost.

schedules. For outpatient services we limit the APCD to the surgical services as identified in Section III.B.2 for patients enrolled in MassHealth non-managed care. Then, separately for ASCs and HOPDs, we calculate the amount that MassHealth non-managed care plans reimbursed for each outpatient surgical service relative to what Original Medicare would have paid for the same service at an HOPD. Finally, we construct a common basket of services that is offered at both ASCs and HOPDs and calculate the average ratio of ASC to HOPD relative prices. For diagnostic imaging services we compare the technical component indicated in the MassHealth radiology fee schedule to the rates for the same services paid to in-state hospitals described above.

3. Relative Prices for Original Medicare

55.   Original Medicare pays for services rendered in HOPDs using the OPPS.[69] Under the OPPS, the fees paid to HOPDs are adjusted for regional variation in wage rates, but all HOPDs in our analysis have the same wage rate.[70] We therefore do not estimate any savings related to changes in which HOPDs outpatient services are rendered.

56.   Under CMS's payment methodology for services rendered at ASCs, Original Medicare reimbursements are set at approximately 59 percent of what Original Medicare pays for the same service provided at an HOPD in an area with the same wage rate.[71] Therefore, we estimate a cost savings of 41 percent for Original Medicare due to the shift of services from HOPDs to ASCs.

IV.   MGB's Patient Panel and Utilization of Health Care Services

57.   In connection with our evaluation of the DoN application, the DoN program asked us to analyze the demographics of patients who reside in the service areas of the Westwood, Westborough, and Woburn Proposed Sites. We also evaluate the current utilization of MGB facilities for outpatient diagnostic imaging services and outpatient surgical services for residents

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[69] MedPAC Payment Basics, "Outpatient Hospital Services Payment System," (Revised: November 2021), *available at* https://www.medpac.gov/wp-content/uploads/2021/11/medpac_payment_basics_21_opd_final_sec.pdf.

[70] CMS, FY 2019 Final Rule and Correction Notice Data Files, *available at* https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/FY2019-IPPS-Final-Rule-Home-Page-Items/FY2019-IPPS-Final-Rule-Data-Files.

[71] MedPAC Payment Basics, "Ambulatory Surgical Center Services Payment System," (Revised: November 2021), *available at* https://www.medpac.gov/wp-content/uploads/2021/11/medpac_payment_basics_21_asc_final_sec.pdf, p. 1.

of these areas and we document the frequency with which residents of these areas sought primary care services from an MGB-affiliated health care provider.

58.   For the analyses in this section, we adopt the definitions of outpatient service lines that we previously described in Section III.B. As we described earlier, we also limit the data we use for these analyses (*i.e.*, the APCD and Medicare Claims data) to patients who resided in Massachusetts and to claims for health care providers located in Suffolk, Essex, Middlesex, Norfolk, Bristol, Plymouth, and Worcester Counties. These limitations and exclusions apply to all analyses we discuss in this section. As we noted earlier, the APCD does not include claims for all self-insured commercial health plans. As such, our analyses in this section may understate the fraction of patients covered by commercial health insurance.

59.   In what follows, we describe the characteristics of patients who resided in the service areas of the Westwood, Westborough, and Woburn Sites in 2018 and received either outpatient diagnostic imaging services (*i.e.*, MR or CT scans) or one of the outpatient surgical procedures that MGB may offer at the Proposed Integrated Care Clinics.

A. Diagnostic Imaging Services

60.   Figure ICC1 summarizes patient characteristics (*i.e.*, gender, race/ethnicity, age, insurance coverage) for patients who resided in the service area of one of the Proposed Sites and who received an outpatient CT or MR scan in 2018. For this analysis we adopt the service area for each Proposed Site as specified in MGB's DoN.[72] MGB identified the service area for each Proposed Site as being comprised of the ZIP Codes that are approximately within a 20-minute drive of the Proposed Site.[73] A map of the patient service areas for the Proposed Sites are shown in Figure ICC2.[74]

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[72] Clinics DoN, Attachment 2.

[73] Clinics DoN, Attachment 1, p. 6. We also identified ZIP Codes within a 20-minute drive time of each Proposed Site. Our list of ZIP Codes largely agreed with the primary service areas provided by MGB, the largest differences were for the Westwood Site, where we identified several more ZIP Codes than MGB.

[74] Each Proposed Site has one combined patient service area for diagnostic imaging services (CT and MRI) and surgical services. Figure ICC2 is limited to facilities that provided at least 300 diagnostic imaging visits in the 2018 APCD and Medicare Claims data after applying the aforementioned exclusions.

61.   As shown in the Figure ICC1, the characteristics of patients who received outpatient diagnostic imaging services in each of the three proposed service areas were similar.

- Between 56 and 57 percent of these patients were female.

- Information on patients' race and ethnicity is not available in the APCD, so the figure reflects this information only for patients covered by Original Medicare. These data indicate between 88 and 93 percent of patients who received outpatient diagnostic imaging services in these areas were White, with Black and Hispanic patients together accounting for between one and seven percent of patients who received outpatient diagnostic imaging services in these areas.

- Between 45 and 49 percent of patients who received diagnostic imaging services in these areas were 65 years of age and older, while patients 39 years old and younger accounted for 18 percent or less of patients in each service area.

- Between 34 and 39 percent of patients who received diagnostic imaging services in these areas had commercial insurance (which will include some Health Connector Authority plans), between 45 and 49 percent were covered by Medicare (either through Original Medicare or Medicare health plans), and between 11 and 16 percent were covered by MassHealth (either through a managed care plan or non-managed care coverage).

B. Outpatient Surgical Services Offered at the Integrated Care Clinics

62.   Figure ICC3 summarizes patient characteristics for patients who resided in the service area of one of the Proposed Sites and who received an outpatient surgical procedure that MGB may offer at the Proposed Integrated Care Clinics. As with our analysis of patient characteristics for outpatient diagnostic imaging, we adopt the service area for each Proposed Site as specified in MGB's DoN. A map of the patient service areas for the Proposed Sites are shown in Figure ICC4.[75]

63.   As shown in the Figure ICC3, the characteristics of patients who received outpatient surgical services in each of the three proposed service areas were similar.

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[75] Each Proposed Site has one combined patient service area for diagnostic imaging services (CT and MRI) and surgical services. Figure ICC4 is limited to facilities that provided at least 300 surgical procedures in the 2018 APCD and Medicare Claims data after applying the aforementioned exclusions.

- Between 54 and 56 percent of these patients were female.

- Information on patients' race and ethnicity is not available in the APCD, so the figure reflects this information only for patients covered by Original Medicare. These data indicate between 87 and 93 percent of patients who received outpatient surgical services in these areas were White, with Black and Hispanic patients together accounting for between one and eight percent of patients who received outpatient surgical services in these areas.

- Between 40 and 43 percent of patients who received outpatient surgical services in these areas were 65 years of age and older, while patients 39 years old and younger accounted for between 19 and 21 percent of patients in each service area.

- Between 39 and 44 percent of patients who received outpatient surgical services in these areas had commercial insurance (which will include some Health Connector Authority plans), between 40 and 43 percent were covered by Medicare (either through Original Medicare or Medicare health plans), and between ten and 16 percent were covered by MassHealth (either through a managed care plan or non-managed care coverage).

C. MGB Patients Residing in the Proposed Service Areas

64.   As part of the ICA for the Integrated Care Clinics DoN, the DoN program asked us to evaluate the number of MGB's patients who currently reside in the service areas of the three Proposed Sites. We discuss MGB's share of outpatient diagnostic imaging services and outpatient surgical services in the service areas of each of Proposed Sites in greater detail in Sections VII.C and VII.D, but here we provide an overview of MGB's patient panel in these service areas.

65.   For the proposed service area of each Integrated Care Clinic, we evaluate both the number and the share of patients residing in that area who received care at MGB facilities or from MGB primary care providers in 2018. For this analysis, we use the 2018 MA APCD and Medicare Claims data. We limit the data to patients who resided in these service areas who received either an outpatient surgical service or an outpatient diagnostic imaging service (*i.e.*, CT or MRI) of the types that may be offered at the Proposed Clinics. Among these patients, we identify patients in MGB's panel in two ways. First, for residents of the service area of each Proposed Site, we identify who received care at an MGB facility (*e.g.*, a hospital campus or an off-campus hospital outpatient

department) during the year. Second, for residents of the service area of each Proposed Site, we identify any patient who received care from an MGB primary care provider during the year.[76] These tabulations are shown in Figure ICC5.

66.　　Across all the service areas of three Proposed Sites, approximately 173 thousand patients residing in those service areas received either an outpatient surgical service or an outpatient CT or MR scan in 2018. Of these patients, 37 percent received care at an MGB facility during the year and 28 percent visited an MGB primary care provider during the year (some patients may be in both categories).[77] For the individual service areas of the Proposed Clinics, the fraction of patients who received care at an MGB facility during the year ranges between 27 percent (Westborough) and 54 percent (Westwood). The fraction of patients who visited an MGB primary care provider during the year ranges between 21 percent (Woburn) and 35 percent (Westborough).

67.　　In summary, a significant fraction of the patients who resided in the service areas of the Proposed Clinics and received an outpatient CT or MR scan or an outpatient surgical procedure have either received care at an MGB facility or received care from an MGB primary care provider.

V.　　Five- and Ten-Year Estimates of Demand for MGB Services

68.　　The DoN program has requested that we provide short-term (*i.e.*, five years) and long-term (*i.e.*, ten years) estimates of the expected changes in total population and projected demographic shifts in each Integrated Care Clinic's service area.

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[76] MGB primary care physicians are identified by collecting MGB primary care provider names from the MGB website, *available at* https://doctors.massgeneralbrigham.org/search?id=nav_utility, and the 2019 physician roster data from the Massachusetts Registration of Provider Organizations ("MA-RPO"), which identifies, among other things, whether a physician is a primary care provider and the provider organization and contracting entity for the physician. The MA-RPO MGB primary care physician names are then linked with the APCD and Medicare Claims data using provider NPIs. Since there are no NPIs available on the MGB website, we link these MGB primary care physician names using the provider name associated with the NPI in the APCD and Medicare Claims data. (Additional information on the MA-RPO data, including reporting requirements for provider organizations, is *available at* https://www.mass.gov/doc/ma-rpo-program-overview/download. The MA-RPO data is available upon request from the Massachusetts Health Policy Commission.)

[77] This is likely a conservative estimate of the fraction of patients with an MGB primary care provider because not every patient visits their primary care provider in each year.

69.   Figures ICC6, ICC7, and ICC8 summarize short- and long-term estimates of expected changes in total population and projected demographic shifts in the service areas—as defined by MGB in its DoN for the Integrated Care Clinics—of the Proposed Integrated Care Clinics in Westborough, Woburn, and Westwood.[78] These population projections use the UMDI population projections and include projections by gender and age group; however, estimates by race and ethnicity are not available.

- As shown in Figure ICC6, within the service area of the Westborough Clinic, the total population is projected to grow from 314 thousand in 2020 to 337 thousand in 2030, an increase of seven percent. During this period, the number of residents age 65 and older is expected to grow at a faster rate than the overall population, increasing by 39 percent from 54 thousand in 2020 to 75 thousand in 2030.

- As shown in Figure ICC7, within the service area of the Woburn Clinic, the total population is projected to grow from 497 thousand in 2020 to 521 thousand in 2030, an increase of five percent. During this period, the number of residents age 65 and older is expected to grow at a faster rate than the overall population, increasing by 30 percent from 95 thousand in 2020 to 123 thousand in 2030.

- As shown in Figure ICC8, within the service area of the Westwood Clinic, the total population is projected to grow from 213 thousand in 2020 to 224 thousand in 2030, an increase of five percent. During this period, the number of residents age 65 and older is expected to grow at a faster rate than the overall population, increasing by 30 percent from 40 thousand in 2020 to 52 thousand in 2030.

VI.   Models of Patients' Demand for Health Care Services

70.   Addressing elements of the ICA requires forecasting how the proposed project will affect where patients choose to receive health care services. To forecast how the proposed project will impact patients' demand for outpatient services, we use the APCD and Medicare Claims data to

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[78] Clinics DoN, Attachment 1, p.1.

estimate models of Massachusetts patients' demand for outpatient services. The framework for this model assumes that patients have preferences with respect to outpatient health care providers and the facilities they operate, and patients' choices of where to receive outpatient health care reflect these preferences. The framework we use to develop this model was peer-reviewed[79] and is flexible enough to estimate projections of consumer demand for outpatient health care that allow us to address the core elements of the ICA.

71.   We estimate separate models for outpatient diagnostic imaging services, which we use to estimate demand for the CT and MRI units at each of the Proposed Sites, and for outpatient surgical procedures, which we use to estimate demand for the four-operating-room ASC at each of the Proposed Sites.[80] For each of these services, we restrict the APCD and Medicare Claims data to those patients whose demand for outpatient health care services may be affected by the proposed project. We describe our model of patient demand for outpatient diagnostic imaging services first, followed by our model of patient demand for outpatient surgical procedures. Because these two models share many features, descriptions of the latter often reference the former.

72.   As we noted in our discussion of the APCD, not all commercial health plans in Massachusetts are required to submit their claims data for inclusion in the database.[81] Because of this, the volume of any outpatient procedure calculated using these data will be incomplete and will not match the volume of outpatient procedures that MGB—or any other health care provider in Massachusetts—would calculate using its own internal records of outpatient volume, including any volume calculations referenced by MGB in its DoN application.

A. Diagnostic Imaging Services

73.   In estimating our model of demand for outpatient diagnostic imaging services, we restrict the APCD and Medicare Claims data to those patients who received outpatient CT, MRI, or

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[79] Devesh Raval, Ted Rosenbaum, and Steven A Tenn. "A Semiparametric Discrete Choice Model: An Application to Hospital Mergers." *Economic Inquiry* (2017).

[80] Clinics DoN, Attachment 1, p. 2 and Attachment 2, pp. 7, 9, and 10.

[81] Specifically, self-insured health plans are not required to, but may voluntarily, submit their claims data to CHIA's APCD.

PET/CT diagnostic imaging services. We exclude claims associated with patients who reside outside of Massachusetts, and we limit to claims with service locations in Suffolk, Essex, Middlesex, Norfolk, Bristol, Plymouth, and Worcester Counties in Massachusetts.[82]

74.   Using these data, we assume that patients' preferences over outpatient diagnostic imaging services vary based on, among other things, where the patients live (*e.g.*, the ZIP Code of their residence), the type of outpatient imaging procedure they require (*e.g.*, the CPT or HCPCS code associated with the procedure), their health insurance coverage (*e.g.*, Original Medicare), and their demographics (*e.g.,* age and gender). [83] In our model, patients' preferences for outpatient diagnostic imaging facilities also implicitly depend on the characteristics of the facilities from which the patients are choosing (*e.g.*, the outpatient facilities' reputation for quality, the locations of the facilities, or the amenities offered by the facilities).[84] Based on these preferences, patients choose at which facility they receive their diagnostic imaging scans.[85,86]

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[82] We restrict the data to these seven counties because it is unlikely that patients who might receive care at the Proposed Sites for outpatient diagnostic imaging services would travel outside of this region for these services, except under unusual or exceptional circumstances.

[83] More specifically, patient preferences in our model of demand for outpatient diagnostic imaging services depend on (i) the patient's county and ZIP Code of residence; (ii) the CPT or HCPCS code associated with the imaging services the patient received; (iii) the region of the body (*e.g.*, breast, spine, pelvis, chest) associated with the imaging services the patient received; (iv) whether the patient received a CT, MR, or PET/CT scan; (v) the patient's health insurance coverage (commercial, Original Medicare, Medicare health plan, MassHealth non-managed care, MassHealth managed care, or other types of coverage such as self-pay); (vi) the patient's gender; and (vii) the patient's age category (18-45, 46-62, and 63 and older).

[84] We use a "semi-parametric" method to estimate demand that does not require we explicitly specify the facility characteristics that patients care about. Instead, for each facility, the method estimates one parameter for each group of patients that measures the overall attractiveness of the facility to that group of patients. This parameter implicitly reflects all the characteristics of that facility that affect the utility of patients in that group.

[85] The unit of observation in our model of patient demand for diagnostic imaging services is a single CT, MR, or PET/CT scan because patients in the APCD and Medicare Claims data choose to receive different types of advanced imaging services at different facilities.

[86] Our model combines claims for outpatient diagnostic imaging facilities that share the same facility type (*e.g.*, physician offices and clinics or HOPDs), have the same owner, and are located in the same ZIP Code. This means the patients in our model do not choose specific locations (*e.g.,* a Shields clinic at 40 Allied Drive in Dedham, MA 02026). Instead, this choice is represented as Shields – Office/Clinic – 02026 in the demand model. We aggregate the data in this way because it is not feasible to reliably identify the exact facility address where health care services were provided in the APCD and Medicare Claims data. Therefore, we are unable to calculate the facility-level shares needed to reliably estimate a facility-level demand model. Aggregating the data to the owner – facility type – ZIP Code-level (*e.g.,* Shields – Office/Clinic – 02026) mitigates this issue. Consequently, we cannot distinguish between demand for outpatient facilities of the same type with the same owner in the same ZIP Code.

75.   Our estimation proceeds in two steps. In the first step, we identify groups of patients who are similar in terms of the aforementioned characteristics and who are, therefore, likely to have similar preferences across outpatient diagnostic imaging facilities.[87] In the second step, we estimate patients' preferences for imaging facilities within each group. We assume that patients grouped together have the same preferences across imaging facilities and estimate these preferences based on the observed choices made by patients assigned to the group. In particular, we assume that the likelihood a patient in the group receives an imaging service at a particular facility is equal to the share of patients within the group who actually chose that facility, and that substitution patterns across facilities for patients in the group are proportional to these group-level shares. We estimate this model of demand for outpatient diagnostic imaging using approximately 1.2 million CT, MR, and PET/CT scans performed at Massachusetts outpatient facilities.

76.   Economists often calculate "diversion ratios" to assess competition and forecast the consequences of changes in competition or market structure.[88] In the context of our model, diversion ratios between MGB facilities and competing imaging facilities answer the question: If a patient wanted to receive a diagnostic imaging procedure at an MGB facility but could not because of capacity constraints at MGB, what competing providers might that patient choose, and how likely is the patient to choose each one of those competing providers? Suppose, for example, that the simulated diversion ratio for MR scans from the Westwood Site to imaging facilities operated by Beth Israel Lahey Health was 50 percent, the diversion ratio to Shields Health Care Group was 30 percent, and the diversion ratio to Atrius Health was 20 percent. If a patient could not receive an MR scan at the Westwood Site, the model then predicts that there is a 50 percent chance the patient chooses a Beth Israel Lahey facility instead, a 30 percent chance the patient chooses a Shields facility instead, and a 20 percent chance that the patient chooses an Atrius facility instead. Equivalently, each MR scan lost by MGB at the Westwood Site would increase the

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[87] We use an iterative process to allocate patients into groups subject to a minimum group size of 30 claims with diagnostic imaging. When possible, the process allocates patients into the most granular category, *e.g.*, male patients aged 18-44 with commercial insurance coverage who reside in ZIP Code 02118 (located in Suffolk County) who received an MR scan with CPT code 73221 (shoulder, elbow, or wrist MRIs without contrast). If there are not 30 such patients who share those characteristics, the iterative process allocates patients into broader categories, *e.g.*, patients who reside in Suffolk County who received any type of MRI.

[88] Diversion ratios are commonly used in assessing competition between firms in differentiated product markets. *See*, for example, U.S. Department of Justice and the Federal Trade Commission. *Horizontal Merger Guidelines* (2010)*, §* 6.1.

expected number of imaging scans at Beth Israel Lahey, Shields, and Atrius by 0.5, 0.3, and 0.2 scans, respectively.

77. Conversely, diversion ratios can be used to predict from which competing outpatient diagnostic imaging facilities the Proposed Integrated Care Clinics would attract patients if the project were approved. For example, the diversion ratios from the preceding paragraph assumed that if the Westwood Site had capacity for one additional MR scan, the number of expected MR scans at Beth Israel Lahey, Shields, and Atrius would decrease by 0.5, 0.3, and 0.2, respectively. We use similar calculations to forecast the effect on expected demand at Beth Israel Lahey, Shields, and other providers when the Westwood Site achieves the volumes projected by MGB.

78. Our forecasts of the effect of the Proposed Integrated Care Clinics on demand for diagnostic imaging services are derived as follows. After a ramp-up period, MGB anticipates performing 9,413, 10,518, and 3,981 CT scans at the Woburn, Westwood, and Westborough Proposed Sites, respectively.[89] MGB also anticipates performing 5,722, 6,957, and 3,114 MR scans at the Woburn, Westwood, and Westborough Proposed Sites, respectively, after a ramp-up period.[90] To address the ICA questions related to shifts in utilization of diagnostic imaging facilities if the proposed project were approved, we use the outpatient demand model to predict which patients would switch to the Proposed Integrated Care Clinics in Woburn, Westwood, and Westborough. We simulate these predictions in two ways. First, we assume that when possible, the Proposed Clinics serve patients who would otherwise utilize other more distant MGB outpatient facilities. In the second simulation, we allow the Proposed Clinics to draw patients who currently utilize any outpatient facility. We calibrate the demand model so that when these new facilities open, they perform the exact number of CT and MR scans specified by MGB in its DoN application submissions, *i.e.*, we assume that the new facilities meet MGB's volume projections.

79. Simulating the effects of the Proposed Integrated Care Clinics in Woburn, Westwood, and Westborough is complicated by the fact that—because the Integrated Care Clinics would represent new entry at each site—we cannot directly infer patients' preferences for receiving care at these

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[89] Clinics Applicant Response, pp. 9 and 12.

[90] Clinics Applicant Response, pp. 9 and 12.

sites using the historic APCD and Medicare Claims data.[91] Because addressing the ICA questions requires us to model entry of a new health care facility rather than expansion of an existing facility, we use our model of demand for outpatient diagnostic imaging services to simulate the effect of the proposed project on demand for diagnostic imaging services in two steps. In the first step, we choose diagnostic imaging facilities that are currently operational and that are reasonably similar to each of the Proposed Integrated Care Clinics.[92] In the second step, we use the estimated model and simulate post-entry utilization of outpatient diagnostic imaging services under two assumptions: (i) MGB opens an imaging facility that is similar to the facility chosen in the first

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[91] In contrast, suppose that MGB currently offered diagnostic imaging services at these sites and proposed expanding the number of CT or MRI units in operation at each site. In this situation, we could determine, based on the information contained in the APCD and Medicare Claims data, which patients currently received care at each site and infer which patients would most likely switch to receive diagnostic imaging services at the sites if MGB expanded its diagnostic imaging capacity.

[92] To identify facilities that are similar to each of the Proposed Integrated Care Clinics, we consider facilities' proximity to the Proposed Sites and the volumes of each outpatient service (*i.e.*, CT or MR scans) those facilities provide within (and outside of) the service areas MGB identified for the Proposed Clinics. For each Proposed Clinic, we select a nearby benchmark competitor that has a large volume share inside of the Proposed Clinic's service area but not outside. This ensures the outpatient facilities we use as a benchmark for the Proposed Clinics will offer similar services to the Proposed Clinics and attract patients from the same geographic areas as the Proposed Clinics. Our method permits multiple competing facilities to be used as a benchmark for each Proposed Clinic. Below, we indicate which outpatient facilities we use to model each type of care (*e.g.,* CT scans) the Proposed Clinics will offer. Our qualitative results are not sensitive to the choice of which competing facilities we use to model the Proposed Integrated Care Clinics so long as the competing facilities satisfy these proximity and volume conditions.

step,[93] and (ii) the predicted number of CT and MR scans performed at the facility match the volumes projected by MGB in its DoN application submissions.[94,95]

80.   For example, for the Woburn Proposed Site, in the first step we identify a Shields Health Care Group facility at Winchester Hospital, which is located approximately one-half mile from the Woburn Site, to determine the patients who may use MRI services at the Woburn Proposed Site. In the second step, we simulate utilization of MRI services after the Proposed Integrated Care

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[93] We previously explained that the semi-parametric method for estimating demand organizes patients into groups based on patients' observable characteristics (*e.g.,* ZIP Code of residence, CPT code, age, and gender) that determine those patients' preferences. For each of group of patients i and each health care facility j these patients might choose, the method estimates one parameter (call it δ_{ij}) that measures the relative attractiveness of facility j to patients in group i. To simulate the entry of a Proposed Clinic, we assign the Proposed Clinic the same measures of attractiveness (*i.e.,* δ_{ij}) that we estimate for the facilities we use as a benchmark for the Proposed Clinic. If we use multiple facilities to model a Proposed Clinic, we assign the Proposed Clinic the simple average of the benchmark facilities' δ_{ij} in each group of patients. After assigning the Proposed Clinic a measure of relative attractiveness to each group of patients, we use the estimated demand model to predict patients' choices after entry occurs.

[94] The previous note explains how we determined the relative attractiveness (*i.e.,* δ_{ij}) each group of patients assigns to the Proposed Clinic. This approach does not ensure, however, that volume at the Proposed Clinics will match MGB's projections.

     To match MGB's projected volume, we mathematically "expand" or "shrink" the Proposed Clinic until the volumes predicted by our model match MGB's projections. Suppose, for example, that we need to expand a Proposed Clinic to match MGB's volume projections. So, in a way that preserves the Proposed Clinic's patients' characteristics, we increase every patient's probability of choosing the Proposed Clinic by the same relative amount regardless of which group the patient is assigned to, as long as doing so is feasible.

     For example, consider two groups of patients who might choose to receive care at the Westwood Site. The first group includes patients from a ZIP Code close to the Westwood Site, and the second group includes patients from a more distant ZIP Code. Assume that 50 percent of the first group chooses to receive care at the Westwood Site, but only one percent of the second group chooses to receive care at the Westwood Site. Our calculations assume that when the Westwood Clinic "expands," its shares within the two groups increase by the same relative amounts. For example, if the clinic's share in the first group increases from 50 percent to 55 percent (*i.e.,* by ten percent), then the clinic's share in the second group increases from one percent to 1.1 percent (*i.e.,* by ten percent).

      This relationship holds as long as it is feasible for the Westwood Clinic to attract additional patients from a group. Suppose, for example, that 95 percent of a third group of patients is predicted to choose the Proposed Clinic. When the clinic's shares in the first two groups are expanded by ten percent to 55 percent and 1.1 percent, respectively, the clinic's share in the third group can only increase from 95 percent to 100 percent, which is less than a ten percent increase.

     Implicitly, these simulations assume that the Proposed Clinics will admit more of the types of patients that value the clinic the most, according to the estimated demand model for outpatient services, where "value" is reflected in the clinic's predicted group shares.

[95] To adjust the simulations so that the Proposed Clinics would primarily serve patients who currently receive care at other MGB facilities, we only allow the Proposed Clinics' shares within different patient groups (*e.g.,* the three groups in the prior note) to increase at the expense of other MGB facilities' share in that group.

Clinic enters the market with characteristics like those of the Shields Health Care Group facility, and then adjust the Woburn Site entrant's scale until the model forecasts the Proposed Clinic would provide the same number of MR scans (5,722) as projected in MGB's DoN.[96] We perform a similar exercise for the CT imaging services that would be offered at the Woburn Proposed Site[97] and the MR and CT imaging services that would be offered at the Westwood and Westborough Proposed Sites.[98]

B. Surgical Services Offered at the Integrated Care Clinics

81.   To estimate patients' demand for outpatient surgical procedures that MGB may offer at the Proposed Integrated Care Clinics, we use a method that is similar to the one we used to estimate demand for diagnostic imaging services at the Proposed Clinics. In estimating this model, we restrict the APCD and the Medicare Claims data to those patients living in the Proposed Clinics' patient service areas and who received outpatient surgical services that may be offered in the Proposed Clinics' ASCs.[99] We also exclude claims associated with patients who reside outside of Massachusetts, and we limit to claims with service locations in the following Massachusetts counties: Suffolk, Essex, Middlesex, Norfolk, Bristol, Plymouth, and Worcester.[100]

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[96] Clinics Applicant Response, p. 9.

[97] For CT scans, we use the outpatient department at Beth Israel Lahey's Winchester Hospital as a model for MGB's Proposed Clinic in Woburn. This facility is located 0.6 miles from the Woburn Site.

[98] For the Westwood Site, we use a Shields Health Care Group facility in Dedham and the Atrius Health Dedham facilities located in/around Dedham to model the types of patients who might utilize the Proposed Clinic for MR scans. These two groups that provide MR scans are approximately two and six miles from the Westwood Proposed Site. For CT scans, we use the outpatient department at Steward's Norwood Hospital to model the types of patients who might utilize the Proposed Clinic. The Steward Norwood Hospital HOPD is approximately five miles from the Westwood Site.

For the Westborough Site, we use a Shields Health Care Group facility in Marlborough to model the types of patients who might utilize the Proposed Clinic for MR scans and the hospital outpatient department at UMass Memorial Health to model the types of patients who might utilize the Proposed Clinic for CT scans. Both facilities are approximately eight miles from the Westborough Site but are the closest MRI and CT facilities to the Westborough Proposed Site that currently operate at the scale MGB anticipates for the Proposed Clinic.

[99] *See* Section III.B.2.

[100] We restrict the data to these seven counties because it is unlikely that patients who might receive care at the Proposed Sites for outpatient imaging and surgical services would travel outside of this region for these services, except under unusual or exceptional circumstances.

82.   Using these data, we assume that patients' preferences for facilities offering outpatient surgery vary based on the same factors as in our model of demand for outpatient diagnostic imaging, including where the patients live (*e.g.*, the ZIP Code of their residence), the type of surgical procedure they seek (*e.g.*, the type of outpatient surgery and the associated CPT procedure code), their health insurance coverage (*e.g.*, Original Medicare), and their demographics (*e.g.*, age and gender).[101] Based on these preferences, patients choose a facility for their outpatient surgical care.[102] We estimate the model using approximately 1.2 million outpatient surgical procedures and the same two-step estimation process as in our model of demand for outpatient diagnostic imaging services; as before, we use the model to calculate diversion ratios between facilities offering outpatient surgical services.

83.   To forecast the effect of the proposed project on demand for outpatient surgical procedures, we apply the same methodology used for outpatient diagnostic imaging. After a ramp-up period, MGB anticipates performing 5,770, 5,349, and 3,169 outpatient surgical procedures per year at the Woburn, Westwood, and Westborough Proposed Sites, respectively.[103] However, as we discussed in the context of our model for diagnostic imaging services, we cannot directly infer patients' preferences for receiving care at the Proposed Integrated Care Clinics using the APCD and Medicare Claims data because the clinics do not yet exist. Therefore, to address the ICA questions regarding the effect of entry of the Proposed Clinics, we use our model of demand for outpatient surgical procedures and simulate the effect of the project if the Proposed Clinics achieve the volumes projected by MGB in its DoN application and if the Proposed Clinics resemble outpatient

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[101] More specifically, patient preferences in our model of demand for outpatient surgical procedures depend on (i) the patient's county and ZIP Code of residence; (ii) the CPT or HCPCS code associated with the surgical procedure the patient received; (iii) the type of surgical procedure (*e.g.*, surgical procedures on the urinary system, surgical procedures on the digestive system, and so on); (iv) the patient's health insurance coverage (commercial, Original Medicare, Medicare health plan, MassHealth non-managed care, MassHealth managed care, or other types of coverage such as self-pay); (v) gender; and (vi) age category (18-45, 46-62, and 63 and older).

[102] In our model, patients make separate choices for each outpatient surgical service (*i.e.*, CPT procedure code) that they receive.

[103] Clinics Applicant Response, p. 9.

facilities that are currently operational and are reasonably similar to each of the Proposed Integrated Care Clinics.[104]

VII.   Predicted Changes in MGB's Shares and Bargaining Leverage

84.   As part of our evaluation of the proposed project on health care costs in Massachusetts, the DoN program asked that we evaluate MGB's market share for the services addressed in its DoN application and that we assess how those shares might change if MGB's DoN application were approved. Related to this, the DoN program also asked that we consider how changes in MGB's shares might affect the prices it negotiates with third-party payors (*i.e.*, its negotiating leverage with third-party payors). In this section we discuss the economic literature related to market shares and concentration in health care and the relationship between market structure and health care prices. We then turn to an assessment of MGB's current share for the services addressed in its DoN and use our models of patient demand for health care services to predict how those shares might change if the proposed project were approved.

85.   Before turning to this discussion, we provide a brief overview of the bargaining dynamics between health insurers and health care providers that determine the rates they negotiate for inpatient and outpatient services. Economists generally view the competition between health care providers as occurring in two stages.[105] Negotiations over prices occur in the first stage, when providers negotiate with insurers to be included as in-network providers. In the second stage, after health insurers have formed these networks, in-network providers compete (primarily over non-price terms) to attract the patients who have in-network access to them. The two stages of competition among health care providers are closely related: the factors that may allow a health

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[104] As with our model of demand for outpatient diagnostic imaging services, we identify comparable facilities based on the volume of outpatient surgical procedures that it provides and its proximity to each of the Proposed Sites. For the Woburn Site, we use the outpatient department at Beth Israel Lahey's Winchester Hospital. This facility is approximately 0.6 miles from the Woburn Site. For the Westwood Site, we use the outpatient department at Steward's Norwood Hospital and Eastern Massachusetts Surgery Center in Norwood. The Steward Norwood Hospital HOPD is approximately five miles from the Westwood Site. The Eastern Massachusetts Surgery Center in Norwood is approximately six miles from the Westwood Site. For the Westborough Site, we use the outpatient department at UMass Memorial Health in Marlborough, MA. This facility is approximately eight miles from the Westborough Site.

[105] Robert Town and Gregory Vistnes. "Hospital Competition in HMO Networks." *Journal of Health Economics* (2001); Cory Capps, David Dranove, and Mark Satterthwaite. "Competition and market power in option demand markets." *RAND Journal of Economics* (2003).

care provider to negotiate higher rates with a health insurer in the first stage also typically make the provider more attractive to patients in the second stage.

86.   In models of the second stage, the reimbursement rates that a provider and health insurer negotiate are determined by the value to each of reaching an agreement to include the provider in the insurer's network and the prospects of each if they fail to reach an agreement. To the health insurer, the extra value from adding a provider to its network depends on the extra value the insurer's enrollees derive from a network that includes the provider relative to one that excludes it. The greater this extra value, the more the insurer is willing to pay the provider to participate in its network. For example, providers that offer a broad range of services, have a superior reputation or clinical quality, are conveniently located, or offer desirable amenities have more bargaining leverage with insurers and receive higher rates. In contrast, providers for which there are reasonable or superior alternatives in the eyes of consumers (in terms of location, services, reputation, and so on) have less bargaining leverage with insurers and receive lower rates. Much of the economics literature we discuss below explicitly or implicitly relies on the same two-stage framework to assess the relationship between prices and concentration in health care markets. When considering the potential impact to prices from a change in market structure such as an acquisition or the proposed project, economists consider how the change will affect the values that providers and insurers put on reaching an agreement.

A. Competition Between Health Care Providers

87.   Turning first to the economics literature on the relationship between market structure and health care prices, we note that most of this literature focuses on prices paid by commercial health insurers for health care services. This is because, while commercial insurers typically negotiate reimbursement rates with health care providers like MGB, reimbursement for government programs like Original Medicare or MassHealth non-managed care is set by regulation rather than through negotiation with providers and would be unaffected by any changes in MGB's bargaining leverage. [106] Although government-sponsored health plans like Medicare Advantage plans

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[106] *See* MedPAC Payment Basics, "Hospital Acute Inpatient Services Payment System," (Revised: November 2021), *available at* https://www.medpac.gov/wp-content/uploads/2021/11/medpac_payment_basics_21_hospital_final_sec.pdf.; MedPAC Payment Basics,

negotiate prices with hospitals, research has found that the prices negotiated by these plans are typically comparable to the corresponding Medicare fee schedule amounts.[107]

88.   In assessing the effect of the proposed project on MGB's bargaining leverage, we rely on a measure of hospital market concentration known as the Herfindahl-Hirschman Index ("HHI"), which is calculated as the sum of the squares of shares of the firms that compete in the market.[108] Federal and state antitrust agencies often include analyses of HHIs in their evaluations of the competitive effects of mergers, and the standards used by the federal agencies in these analyses are described in the *Horizontal Merger Guidelines* promulgated by the Federal Trade Commission and Department of Justice.[109] We also note that the HHI has been adopted by the Massachusetts Health Policy Commission in assessing the competitive effects of recent Cost and Market Impact Reviews.[110]

89.   As the *Guidelines* describe, the Federal Trade Commission and Department of Justice generally classify markets into three types depending on the HHI: unconcentrated markets, which are those with an HHI below 1,500; moderately concentrated markets, which are those with an

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"Outpatient Hospital Services Payment System" (Revised: November 2021), *available at* https://www.medpac.gov/wp-content/uploads/2021/11/medpac_payment_basics_21_opd_final_sec.pdf; Massachusetts Executive Office of Health and Human Services (EOHHS), Office of Medicaid. "Notice of Final Agency Action. MassHealth: Payment for In-State Acute Hospital Services and Out-of-State Acute Hospital Services, effective November 1, 2021," *available at* https://www.mass.gov/doc/notice-of-final-agency-action-masshealth-payment-for-in-state-acute-hospital-services-and-out-of-state-acute-hospital-services-effective-november-1-2021-0, pp. 1-6.

[107] Robert A. Berenson, Jonathan H. Sunshine, David Helms, and Emily Lawton. "Why Medicare Advantage Plans Pay Hospitals Traditional Medicare Prices." *Health Affairs* (2015).

[108] For example, if there were four firms competing in the market and each firm had a share of 25 percent, the HHI would be calculated as $2,500 = 25^2 + 25^2 + 25^2 + 25^2$. In the case of a single firm competing in the market, the HHI is 10,000. In the case of a large number of firms competing in the market where each such firm has a small share, the HHI would be close to zero. In general, if there are n equally sized firms competing in the market, the HHI is 10,000 ÷ n.

[109] U.S. Department of Justice and the Federal Trade Commission. *Horizontal Merger Guidelines* (2010).

[110] *See*, for example, Massachusetts Health Policy Commission Review of The Proposed Merger of Lahey Health System; CareGroup and its Component Parts, Beth Israel Deaconess Medical Center, New England Baptist Hospital, and Mount Auburn Hospital; Seacoast Regional Health Systems; and Each of their Corporate Subsidiaries into Beth Israel Lahey Health; AND The Acquisition of the Beth Israel Deaconess Care Organization by Beth Israel Lahey Health; AND The Contracting Affiliation Between Beth Israel Lahey Health and Mount Auburn Cambridge Independent Practice Association (HPC-CMIR-2017-2), Final Report (September 27, 2018), pp. 47-48.

HHI between 1,500 and 2,500; and highly concentrated markets, which are those with an HHI above 2,500.[111] Because mergers typically increase concentration,[112] the *Guidelines* also describe the circumstances in which a proposed merger may give rise to competitive concerns. Among other things, the *Guidelines* state that mergers resulting in a change in HHI of less than 100 points or which maintain an unconcentrated market are unlikely to lead to adverse competitive effects.[113] (Of course, non-merger transactions such as new entry can result in *decreases* in concentration, which would be either competitively neutral or may lead to procompetitive effects based on HHI calculations.) While the *Guidelines* provide a "safe harbor" for horizontal mergers that increase concentration by less than 100 points, in practice many mergers involving health care providers that result in substantially higher changes in concentration are not challenged by state or federal enforcement agencies. To our knowledge, no hospital merger resulting in a change in HHI of less than 700 points has been challenged (either successfully or unsuccessfully) by antitrust enforcement agencies in the last 15 years.[114]

90.   As explained above, for the Integrated Care Clinics project, MGB proposes constructing three new ambulatory care centers at the Westborough, Westwood, and Woburn Sites that would provide outpatient surgical services, MRI and CT imaging, and physician services to MGB patients who reside in the sites' respective service areas. While MGB patients currently reside in the service areas of these sites, MGB does not currently operate facilities in these areas (*i.e.,* MGB patients travel outside of the service areas to receive care or choose other providers located in those areas). That is, the Integrated Care Clinics project would represent *entry* into the provision of outpatient

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[111] U.S. Department of Justice and the Federal Trade Commission. *Horizontal Merger Guidelines* (2010)*, § 5.3.

[112] The change in HHI associated with a merger is equal to twice the product of the shares of the merging firms. For example, the merger of firms with a five percent share and a ten percent share would increase the HHI by $100 = 2 \times 5 \times 10$.

[113] U.S. Department of Justice and the Federal Trade Commission. *Horizontal Merger Guidelines* (2010)*, § 5.3.

[114] The Federal Trade Commission unsuccessfully challenged the acquisition of Albert Einstein Healthcare Network by Thomas Jefferson University in 2020. In its complaint, the Federal Trade Commission alleged that the transaction would increase concentration in the market for the provision of inpatient general acute care hospital services in Montgomery County, Pennsylvania by at least 700 points to more than 3,500 points. (Complaint, *In the Matter of Thomas Jefferson University and Albert Einstein Healthcare Network*, Docket No. 9392, ¶ 50.) The administrative complaint was later dismissed after the Commission voted to voluntarily dismiss its appeal of the District Court's decision declining to preliminarily enjoin the transaction. (Federal Trade Commission, Case Summary. "Thomas Jefferson University, In the Matter of." *available at* https://www.ftc.gov/enforcement/cases-proceedings/181-0128/thomas-jefferson-university-matter.)

surgical services and advanced imaging in these areas. Because entry typically results in a decrease in market concentration, the general guidance contained in the *Horizontal Merger Guidelines* on the relationship between the competitiveness of markets and HHI can be used to infer the effects of the proposed entry on the competitiveness of the provision of those health care services in the service areas of the Westborough, Westwood, and Woburn Sites. In addition, in the next section we review studies of the effect of entry and expansion on market dynamics in health care.

B. Effect of Entry and Expansion on Competition in the Provision of Health Care Services

91.   There is an extensive health economics literature on the effect of hospital acquisitions on hospitals' negotiating leverage with commercial insurers and hospital prices. While this literature does not speak directly to the effect of entry or expansion on health care providers' bargaining leverage, it is potentially relevant for evaluating the competitive impact of the proposed project because acquisitions of health care providers can be thought of as the inverse of health care provider entry. That is, while hospital acquisitions remove an independent competitor from the market (the acquired hospital does not close, but ceases to exist as a separate firm), entry achieves the opposite effect. As such, if there is some symmetry in the effects of removing and adding a competitor, studying the effects of health care provider acquisitions may provide useful guidance as to the likely competitive effects of provider entry.

92.   Gaynor and Town (2012) summarize older research on the impact of hospital mergers on price and the quality of care provided by the hospitals.[115] Based on their review of the empirical economics literature, the authors conclude that the consensus view is that "hospital consolidation generally results in higher prices" and that competition improves the quality of care provided by hospitals. Gaynor *et al.* (2015) is a more recent critical review of the empirical evidence on the effect of hospital competition on prices.[116] Based on their review, the authors conclude that "mergers between rival hospitals are likely to raise the price of inpatient care and these effects are larger in concentrated markets. The estimated magnitudes are heterogenous and differ across

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[115] Martin Gaynor and Robert Town. "The impact of hospital consolidation—Update." Robert Wood Johnson Foundation: The Synthesis Project (2012).

[116] Martin Gaynor, Kate Ho, and Robert J. Town. "The Industrial Organization of Health-Care Markets." *Journal of Economic Literature* (2015).

market settings, hospitals, and insurers." Applying these findings to the question of the effect of the Integrated Care Clinics project suggests that MGB's entry at the Westborough, Westwood, and Woburn Sites may engender competition with incumbent providers, but that the magnitude of the pro-competitive effects is heterogenous and depends on the particular market circumstances.

93.   We are aware of one study that provides evidence on the effects of expansions of health care providers and the effects of these expansions on negotiating leverage with commercial insurers and prices. Ho (2009) finds that capacity-constrained hospitals negotiate, on average, payments from health insurers that are $6,900 more than hospitals that are not capacity-constrained. [117,118] The author argues that capacity-constrained hospitals are able to negotiate higher rates with health insurers because demand for those hospitals' services exceeds what the hospital can supply. The author also notes that health care providers might intentionally underinvest in capacity so as to benefit from the advantages this provides in negotiations with health insurers. Conversely, relaxing providers' capacity constraints through entry or expansion decreases their negotiating leverage with health insurers and may result in lower prices for health care services.

94.   Turning to studies of entry and competition for the outpatient services offered at the Proposed Clinics, Carey *et al.* (2011) study the effects of entry by ASCs on the financial performance (*i.e.*, costs, revenue, and profitability) of hospitals. [119] The authors note that competition from ASCs has the potential to promote efficiency in the provision of hospital services by incentivizing competing hospitals to better control the rate of increase in costs, but also may lead to a decrease in the revenue or profitability of hospitals. Using data on entry by ASCs in Hospital Referral Regions in Arizona, California, and Texas between 1997 and 2004, the authors

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[117] Kate Ho. "Insurer-Provider Networks in the Medical Care Market." *The American Economic Review* (2009).

[118] The author defines a hospital as capacity-constrained if, according to their model of patient hospital demand, the hospital's expected utilization in terms of patient days exceeds 85 percent of its maximum capacity, calculated as its bed count times 365 days.

   The author also finds that "star" hospitals are able to negotiate payments from health insurers that are $6,700 more than hospitals that are not "stars," which is similar to their finding on capacity-constrained hospitals. The author explains that capacity-constrained hospitals tend to be stars (and vice versa), but that the effect from capacity-constraints is important because "capacity constraints seem to give the hospital additional leverage in the bargaining process, perhaps by acting as a commitment device to persuade plans that it will choose to contract selectively."

[119] Kathleen Carey, James F. Burgess Jr., and Gary J. Young. "Hospital Competition and Financial Performance: The Effects of Ambulatory Surgery Centers." *Health Economics* (2011).

find that competitive entry by ASCs places downward pressure on both hospital costs and revenue, although the magnitude of the revenue effect is larger than the cost effect. As such, the authors find that hospital margins decreased following entry by ASCs. We note, however, that this research focuses on the effect of competition on *competitors* rather than on *consumers* (*i.e.*, patients and third-party payors), whereas consumer benefits in the form of lower prices or improved quality are typically the focus of studies of the effects of competition in health care.

95.   Two related studies are Bian and Morrisey (2007), which examines the association between the number of ASCs in a metropolitan area and the volume of inpatient and outpatient surgical volumes of hospitals in that area,[120] and Courtemanche and Plotzke (2010), which examines the effect of entry of ASCs on the inpatient and outpatient surgical volume of nearby hospitals.[121] Using nationwide data from 1993 to 2001, Bian and Morrisey (2007) find that metropolitan areas with a larger number of ASCs per 100,000 residents saw relative declines in hospital outpatient surgery volume, but no change on hospital inpatient surgery volume. The authors conclude that this association suggests ASCs provide meaningful competition for hospitals, but they do not address the effect of this competition on the prices or quality of outpatient surgery. Similarly, Courtemanche and Plotzke (2010) use nationwide data from 1997 to 2004 and find that entry of an ASC within about four miles of a hospital reduces the hospital's outpatient surgery volume. Entry by more distant ASCs has no effect on hospital outpatient surgery volume. The decline in volume averages only about two to four percent of the hospital's outpatient surgery volume, with entry by larger ASCs and early entry (*i.e.*, entry by the first ASC in the area) leading to larger declines. Inpatient surgery volume is unaffected by entry of an ASC. As noted above for Carey *et al.* (2011), Bian and Morrisey (2007), and Courtemanche and Plotzke (2010) offer limited insight because both address the effect of competition on competitors, rather than the more relevant question of the effect of competition on consumers.

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[120] John Bian and Michael A. Morrisey. "Free-Standing Ambulatory Surgery Centers and Hospital Surgery Volume." *Inquiry* (2007).

[121] Charles Courtemanche and Michael Plotzke. "Does competition from ambulatory surgical centers affect hospital surgical output?" *Journal of Health Economics* (2010).

96.   Hollenbeck *et al.* (2015) use a sample of Medicare beneficiaries to assess trends in outpatient surgery between 2001 and 2010.[122] The authors divide hospital service areas across the United States into three groups: those in which ASCs were present for the entire period, those with no ASCs, and those in which an ASC opened for the first time between 2001 and 2010. The authors assess the impact of ASC entry on the volume of hospital-based outpatient surgeries, perioperative mortality, and hospital admission rates. They find that hospital-based outpatient surgery volume declined by seven percent following the entry of an ASC, but that ASC volume grew by greater amounts, indicating that aggregate outpatient surgical volume increased. The authors find no change in perioperative mortality or hospital admission.

97.   Turning to competition for advanced imaging services, Wu *et al.* (2014) study the effect of a price-transparency initiative that provided patients in the Northeast, Midwest, and Southeast with information about the relative prices of providers of advanced imaging services.[123] As part of a prior authorization process for MRs, members of a commercial health plan were contacted by benefit management staff if pricing at the imaging facility that members had been referred to exceeded pricing at competing facilities by at least $400. If the member was willing, the benefit management staff scheduled an MR appointment for the member at a lower-priced provider. Relative to pre-intervention costs, the authors found that this program decreased average expenditures on MRs by $220 per scan (or 18.7 percent of the average cost of an MR). This decrease was attributable to two effects. First, in response to the program, members shifted away from higher-price hospital-based outpatient departments to lower-price freestanding diagnostic imaging centers. Second, hospital-based outpatient departments decreased their prices in response to the price transparency initiative. These results suggest that the entry of non-hospital-based facilities like the Proposed Integrated Care Clinics may reduce expenditures on diagnostic imaging services if consumers are made aware of price differentials.

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[122] Brent K. Hollenbeck, Rodney L. Dunn, Anne M. Suskind, Seth A. Strope, Yun Zhang, and John M. Hollingsworth. "Ambulatory Surgery Centers and Their Intended Effects on Outpatient Surgery." *Health Services Research* (2015).

[123] Sze-jung Wu, Gosla Sylwestrzak, Christiane Shah, and Andrea DeVries. "Price Transparency For MRIs Increased Use of Less Costly Providers and Triggered Provider Competition." *Health Affairs* (2014).

98.   While there have been relatively few studies of the effects of entry and expansion by health care providers on prices, a large literature addresses the effects of certificate-of-need programs on health care prices and expenditures. As described by the Federal Trade Commission and Department of Justice, these programs "generally prevent firms from entering certain areas of the health care market unless they can demonstrate to state authorities that there is an unmet need for their services."[124] If certificate-of-need programs prevent entry and expansion, then estimates of the effects of these program on market outcomes may be informative regarding the effect of entry and expansion on health care market outcomes. (Of course, certificate-of-need programs may have benefits or costs that are not captured solely by examining health care expenditures or the prices of health care services.)

99.   We note that federal antitrust enforcers have generally been opposed to certificate-of-need programs because of a belief that such programs are ineffective in controlling health care costs and present a risk of anticompetitive outcomes that may outweigh the benefits of these programs.[125] This position is supported by reviews of the health economics literature on the effects of certificate-of-need regulations. Mitchell (2016) synthesizes the findings of 19 peer-reviewed studies on the effects of certificate-of-need programs.[126] Based on this review, the author concludes that "the overwhelming weight of evidence suggests that [certificate-of-need] laws are associated with both higher per unit costs and higher total expenditures,"[127] although the number of studies that address the effect of certificate-of-need programs on health care expenditures—which take into account

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[124] Federal Trade Commission and Department of Justice, "Improving Health Care: A Dose of Competition." (July 2004), Chapter 8, p. 1.

[125] *See*, for example, Federal Trade Commission and Department of Justice, "Improving Health Care: A Dose of Competition." (July 2004), Executive Summary, p. 22; Joint Statement of the Antitrust Division of the U.S. Department of Justice and the Federal Trade Commission on Certificate-of-Need Laws and Alaska Senate Bill 62; Federal Trade Commission Office of Policy Planning, Bureau of Competition, and Bureau of Economics Comment Before the Georgia Department of Community Health (October 16, 2017); Statement of Commissioner Christine S. Wilson, Joined by Commissioner Noah Joshua Phillips, *In the Matter of Methodist Hospital/Tenet St. Francis Hospital*, File No. 1910-0189 (November 13, 2020); Maureen K. Ohlhausen, "Certificate of Need Laws: A Prescription for Higher Costs." *Antitrust* (2015).

[126] Matthew D. Mitchell. "Do Certificate-of-Need Laws Limit Spending?" Mercatus Working Paper, Mercatus Center, George Mason University (2016).

[127] Matthew D. Mitchell. "Do Certificate-of-Need Laws Limit Spending?" Mercatus Working Paper, Mercatus Center, George Mason University (2016), p. 29.

both price and quantity effects—is much greater than the number of studies that address the effect of these programs on per-unit prices.

100.   Conover and Bailey (2020) provide a comprehensive review of the certificate-of-need literature that synthesizes 90 articles on the effects of certificate-of-need programs on regulatory costs, expenditures on health care services, health outcomes, and access to care.[128] In addition, the authors use the results of these studies to conduct an analysis of the cost-effectiveness of certificate-of-need programs. The authors find that evidence on the effect of certificate-of-need programs on health care expenditures is mixed, but that the weight of the evidence is that these programs increase health care expenditures. These higher expenditures are offset by beneficial effects that certificate-of-need programs have in reducing mortality rates for some patients and procedures. The authors conclude that the costs of certificate-of-need programs somewhat outweigh the benefits, although there is considerable uncertainty in their estimates.

101.   In summary, while there is little economic literature that is directly relevant to the effects of entry by the Proposed Integrated Care Clinics on prices for outpatient surgery and advanced imaging services, the weight of the evidence—including the hospital merger literature and certificate-of-need literature—suggests that entry and expansion in health care markets is likely to lower prices for consumers, although lower prices for consumers may result in lower revenue or profits for incumbent competitors.

C. Outpatient Diagnostic Imaging

102.   In this section we assess MGB's current shares for outpatient diagnostic imaging services (separately for CT and MR scans) and outpatient surgical procedures in the service area of each of the three Proposed Integrated Care Clinics. We also assess how those shares might change if MGB's DoN were approved, and how development of the Proposed Sites might affect the negotiating leverage of MGB or incumbent health care providers with third-party payors.

103.   For diagnostic imaging services, we use the 2018 APCD and Medicare Claims data to calculate the shares of MGB and its competitors in the service areas of the Integrated Care Clinics in two steps. First, we calculate health care providers' share of outpatient diagnostic imaging

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[128] Christopher J. Conover and James Bailey. "Certificate of need laws: a systematic review and cost-effectiveness review." BMC Health Services Research (2020).

procedures (separately for CT and MR scans), and the resulting HHIs, in each ZIP Code in Massachusetts. Second, we calculate the weighted averages of these shares and HHIs across ZIP Codes, where each ZIP Code is weighted by the predicted number of outpatient diagnostic imaging procedures (separately for each of the three Proposed Integrated Care Clinics) in that ZIP Code. This measure of market concentration is commonly used in the hospital competition literature because it does not require precisely delineating the boundaries of a specific geographic market (*e.g.*, the primary service area or secondary service area of a health care provider).[129] The use of this approach also avoids potentially misleading conclusions about changes in providers' competitive significance and bargaining leverage if the geographic market is defined too narrowly or broadly.[130] Rather, the approach we employ reflects MGB's significance in all ZIP Codes in Massachusetts, but we weight more heavily MGB's shares in the ZIP Codes that account for a greater fraction of each of the Proposed Integrated Care Clinic's outpatient diagnostic imaging volume. [131]

104.   We focus below on shares that weight ZIP Codes by the Proposed Clinics' predicted volumes because these shares reflect concentration in the geographic areas in which the Integrated Care Clinics will compete for patients and, therefore, where the effects on concentration will be most pronounced. However, we also consider an approach that reflects potential changes in MGB's bargaining leverage over the broader region in which MGB competes for patients (and negotiates with health insurers). As we explained in Section VII.A, economists have shown that health care providers are able to negotiate higher prices when providers are capacity constrained and this negotiating advantage is mitigated when those constraints are relaxed. To reflect this consideration, in what follows we present alterative concentration calculations that weight ZIP Codes by the volumes of the MGB facilities whose capacity constraints would be eased by the

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[129] *See*, for example*,* Christopher Garmon. "The accuracy of hospital screening methods." *RAND Journal of Economics* (2017).

[130] U.S. Department of Justice and the Federal Trade Commission. *Horizontal Merger Guidelines* (2010)*,* Section 4.

[131] While we report changes in shares and concentration that use this method to weight ZIP Codes, we have also calculated changes in shares and concentration using the service areas of the three Proposed Clinics as defined by MGB. These calculations do not yield qualitatively different results.

Proposed Clinics (*i.e.*, the MGB facilities that we predict the Proposed Clinics will attract patients from).[132]

105. In addition to assessing MGB's current market shares, the DoN asked that we consider how those shares might change if MGB's DoN were approved, and how changes in MGB's shares might affect its negotiating leverage with third-party payors. To address this question, we use our model of demand for outpatient diagnostic imaging services and the method for simulating the effect of the proposed project on patients' demand for those services that we described in Section VI.A. Using this approach, we assess the impact of the project on MGB's shares and market concentration by comparing current shares and concentration to the predicted shares and concentration resulting from our simulation. We do this separately for outpatient CT and MR scans in the service areas for each of the three Proposed Integrated Care Clinics. Based on the economics literature that we summarized in Section VII.A, we then use the predicted change in concentration to determine how MGB's negotiating leverage for outpatient diagnostic imaging services might change as a result of the proposed project.

106. We model the effect of the Proposed Integrated Care Clinics on shares and concentration under two scenarios. (See ¶ 78.) In the first scenario, we assume that each of the three Proposed Integrated Care Clinics attracts patients who currently receive outpatient diagnostic imaging services at an MGB facility. In this scenario, the site of service for the patient may change, but their outpatient diagnostic imaging provider (MGB) would not, so there is no change in either MGB's aggregate share or those of its competitors. In the second scenario, we assume that each of the three Proposed Integrated Care Clinics does not prioritize providing care to patients currently in MGB's patient panel, but rather attracts patients who currently receive care from other outpatient diagnostic imaging providers. In this second scenario we do not preclude the Proposed Clinics from attracting patients from other MGB facilities, but we do not prioritize the shifting of MGB patients from one location to another.

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[132] Specifically, we calculate changes in concentration weighting ZIP Codes by the volumes of the MGB facilities that account for 75 percent of each Proposed Clinic's expected volume. For example, we predict that 79 percent of the Westwood Clinic's expected MRI volume will come from MGB facilities in ZIP Codes 02115 (30 percent), 02114 (20 percent), 02462 (18 percent), and 02130 (11 percent). Our alternative calculations weights ZIP Codes by these four MGB facilities' volumes and reflects their concentration in the area in which the Westwood Proposed Clinic would create additional capacity for MGB in the provision of MR scans.

107.   Using this approach, Figure ICC9 reports predicted shares for outpatient CT scans in the service area of the Proposed Integrated Care Clinic in Woburn under each scenario. As shown in the left panel of the figure, weighting ZIP Codes by the Proposed Clinic's anticipated volumes under the first scenario (*i.e.*, when the Proposed Clinic attracts only patients who currently receive outpatient CT scans at other MGB facilities), we predict the Woburn Proposed Integrated Care Clinic would have a share of 7.6 percent of outpatient CT scans in its own service area. By assumption, these patients currently receive outpatient CT scans at other MGB facilities, so MGB's overall share in the Woburn clinic's service area of 28.6 percent would be unchanged. The results of the second scenario (*i.e.,* when the Proposed Clinic attracts patients from competing providers) are shown in the right panel of the figure. In this scenario, we predict the Woburn Proposed Integrated Care Clinic would have a share of 9.0 percent in its own service area, the share of other MGB facilities in this service area would decline by 1.5 percent, and MGB's total share would be 36 percent. [133,134] In addition to drawing patients from other MGB facilities, the Proposed Clinic is predicted to attract patients from Beth Israel Lahey Health (whose share in the service area declines by 4.9 percentage points) and Wellforce (whose share in the service area declines by 1.5 percentage points).

108.   Figure ICC10 reports predicted shares for outpatient MR scans in the service area of the Proposed Integrated Care Clinic in Woburn. As shown in the left panel of the figure, in the first scenario we predict that the Woburn Proposed Integrated Care Clinic would have a share of 8.8 percent of outpatient MR scans in its own service area. In the second scenario, we predict the Woburn Proposed Integrated Care Clinic would have a share of 9.4 percent in its own service area, which is partially offset by a decline in the share of other MGB facilities of 1.8 percentage

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[133] When calculating shares and HHI in the second scenario, we continue to weight ZIP Codes using the Proposed Clinic's anticipated volumes from the first scenario. We use the same weights in both scenarios so that the shares can be compared.

[134] For outpatient CT scans, when we weight ZIP Codes by the volumes of the MGB facilities that the Woburn Proposed Clinic would attract patients from, we predict the Proposed Clinic's share of outpatient CT scans would be 1.8 percent and MGB's overall share would be unchanged at 37.7 percent. When we use these weights but instead allow the Woburn Clinic to attract patients from other providers, we predict the Woburn Proposed Clinic's share would be 1.3 percent and MGB's overall share in these ZIP Codes increases by 1.0 percent from 37.7 percent to 38.7 percent.

points.[135] In addition to attracting patients from other MGB facilities, the Proposed Clinic is predicted to attract patients from Shields Health Care Group (whose share in the service area declines by 3.2 percentage points) and Beth Israel Lahey Health (whose share in the service area declines by 2.1 percentage points).

109.   Figure ICC11 reports predicted shares for outpatient CT scans in the service area of the Proposed Integrated Care Clinic in Westwood. As shown in the left panel of the figure, in the first scenario we predict that the Westwood Proposed Integrated Care Clinic would have a share of 15.2 percent of outpatient CT scans in its own service area. In the second scenario, we predict the Westwood Proposed Integrated Care Clinic would have a share of 16.6 percent in its own service area, which is partially offset by a decline in the share of other MGB facilities of 3.9 percentage points.[136] In addition to drawing patients from other MGB facilities, the Proposed Clinic is predicted to attract patients from Steward Health Care (whose share in the service area declines by 6.2 percentage points) and Beth Israel Lahey Health (whose share in the service area declines by 2.2 percentage points).

110.   Figure ICC12 reports predicted shares for outpatient MR scans in the service area of the Proposed Integrated Care Clinic in Westwood. As shown in the left panel of the figure, in the first scenario we predict that the Westwood Proposed Integrated Care Clinic would have a share of 9.0 percent of outpatient MR scans in its own service area. In the second scenario, we predict the Westwood Proposed Integrated Care Clinic would have a share of 7.9 percent in its own service area, which is partially offset by a decline in the share of other MGB facilities of 2.5 percentage

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[135] For outpatient MR scans, when we weight ZIP Codes by the volumes of the MGB facilities that the Woburn Proposed Clinic would attract patients from, we predict the Proposed Clinic's share of outpatient MR scans would be 2.1 percent and MGB's overall share would be unchanged at 33.3 percent. When we use these weights but instead allow the Woburn Clinic to attract patients from other providers, we predict the Woburn Proposed Clinic's share would be 1.6 percent and MGB's overall share in these ZIP Codes increases by approximately 1.3 percent from 33.3 percent to 34.6 percent.

[136] For outpatient CT scans, when we weight ZIP Codes by the volumes of the MGB facilities that the Westwood Proposed Clinic would attract patients from, we predict the Proposed Clinic's share of outpatient CT scans would be 2.5 percent and MGB's overall share would be unchanged at 34.2 percent. When we use these weights but instead allow the Westwood Clinic to attract patients from other providers, we predict the Westwood Proposed Clinic's share would be 2.1 percent and MGB's overall share in these ZIP Codes increases by 1.6 percent from 34.2 percent to 35.8 percent.

points. [137] In addition to drawing patients from other MGB facilities, the Proposed Clinic is predicted to attract patients from Beth Israel Lahey Health (whose share in the service area declines by 1.1 percentage points) and Atrius Health (whose share in the service area declines by 1.0 percentage points).

111.   Figure ICC13 reports predicted shares for outpatient CT scans in the service area of the Proposed Integrated Care Clinic in Westborough. As shown in the left panel of the figure, in the first scenario we predict that the Westborough Proposed Integrated Care Clinic would have a share of 6.5 percent of outpatient CT scans in its own service area. In the second scenario, we predict the Westborough Proposed Integrated Care Clinic would have a share of 7.8 percent in its own service area, which is partially offset by a decline in the share of other MGB facilities of 0.8 percentage points. [138] In addition to drawing patients from other MGB facilities, the Proposed Clinic is predicted to attract patients from UMass Memorial Health (whose share in the service area declines by 4.3 percentage points).

112.   Figure ICC14 reports predicted shares for outpatient MR scans in the service area of the Proposed Integrated Care Clinic in Westborough. As shown in the left panel of the figure, in the first scenario we predict that the Westborough Proposed Integrated Care Clinic would have a share of eight percent of outpatient MR scans in its own service area. In the second scenario, we predict the Westborough Proposed Integrated Care Clinic would have a share of 9.9 percent in its own service area, which is partially offset by a decline in the share of other MGB facilities of 1.1

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[137] For outpatient MR scans, when we weight ZIP Codes by the volumes of the MGB facilities that the Westwood Proposed Clinic would attract patients from, we predict the Proposed Clinic's share of outpatient MR scans would be 3.0 percent and MGB's overall share would be unchanged at 31.1 percent. When we use these weights but instead allow the Westwood Clinic to attract patients from other providers, we predict the Westwood Proposed Clinic's share would be 2.6 percent and MGB's overall share in these ZIP Codes increases by 1.8 percent from 31.1 percent to 32.9 percent.

[138] For outpatient CT scans, when we weight ZIP Codes by the volumes of the MGB facilities that the Westborough Proposed Clinic would attract patients from, we predict the Proposed Clinic's share of outpatient CT scans would be 0.7 percent and MGB's overall share would be unchanged at 34.3 percent. When we use these weights but instead allow the Westborough Clinic to attract patients from other providers, we predict the Westborough Proposed Clinic's share would be 0.4 percent and MGB's overall share in these ZIP Codes increases by approximately 0.3 percent from 34.3 percent to 34.6 percent.

percentage points.[139] In addition to drawing patients from other MGB facilities, the Proposed Clinic is predicted to attract patients from Shields Health Care Group (whose share in the service area declines by 5.2 percentage points).

113.   Using the predicted changes in shares, the bottom panels of Figures ICC9-ICC14 show the associated changes in concentration, as measured by HHIs, for outpatient CT and MR scans in the service areas of the three Proposed Integrated Care Clinics. Under the scenario in which we assume that the Proposed Clinics attract patients who currently receive outpatient diagnostic imaging services at another MGB facility, there is no change in MGB's share, competitors' shares or, as a result, in concentration in the clinic service areas. Under the scenario in which we assumed that the Proposed Clinics attract patients both from other MGB facilities and competitors, the changes in concentration range between a decline of 207 points (outpatient CT scans in the Woburn Site's service area) and an increase of 476 points (outpatient CT scans in the Westwood Site's service area).[140] Whether the HHI increases or decreases depends on how MGB's current share in each of the service areas compares to the shares of the competitors from which the Proposed Clinic would attract patients. For the Westborough Site, MGB's current share is relatively low, and we predict that it would attract patients from larger competitors (*e.g.*, UMass Memorial Health and Shields Health Care Group), thereby reducing concentration in the area. For the Westwood Site, MGB's current shares is relatively high, and we predict that it would attract patients from smaller competitors (*e.g.*, Steward Health Care and Beth Israel Lahey Health), thereby reducing concentration in the area. While none of these changes in concentration are large enough to suggest a significant change in negotiating leverage for either MGB or incumbents, we note that MGB

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[139] For outpatient MR scans, when we weight ZIP Codes by the volumes of the MGB facilities that the Westborough Proposed Clinic would attract patients from, we predict the Proposed Clinic's share of outpatient MR scans would be 0.8 percent and MGB's overall share would be unchanged at 31.0 percent. When we use these weights but instead allow the Westborough Clinic to attract patients from other providers, we predict the Westborough Proposed Clinic's share would be 0.5 percent and MGB's overall share in these ZIP Codes increases by 0.5 percent from 31.0 percent to 31.5 percent.

[140] When we weight ZIP Codes by the volumes of the MGB facilities that the Proposed Clinics would attract patients from, there are no changes in concentration if the Proposed Clinics only attract patients from other MGB facilities. When we allow the Proposed Clinics to attract patients from competitors, the changes in concentration are smaller than when we weight ZIP Codes by the Proposed Clinics' volumes. The HHI changes for outpatient CT and MR scans for the Woburn Clinic are -16 and 27 (instead of -207 and 102), the HHI changes for the Westwood Clinic are 51 and 80 (instead of 476 and 281), and the HHI changes for the Westborough Clinic are -7 and -2 (instead of -167 and -43).

does not currently operate diagnostic imaging facilities in the service areas of the Proposed Sites and the weight of the economic literature suggests that entry in health care markets may lead to lower prices for consumers.[141]

D. Surgical Services Offered at the Integrated Care Clinics

114.   As with outpatient diagnostic imaging services, we model the effect of the Proposed Integrated Care Clinics on shares and concentration in the provision of outpatient surgical services under the same two scenarios that we used in our analyses of outpatient diagnostic imaging services.

115.   Figure ICC15 reports predicted shares for outpatient surgical procedures in the service area of the Proposed Integrated Care Clinic in Woburn. As shown in the left panel of the figure, weighting ZIP Codes by the Proposed Clinic's anticipated volumes under the first scenario, we predict the Woburn Proposed Integrated Care Clinic would have a share of 2.5 percent of outpatient surgical procedures in its own service area. By assumption, these patients currently receive outpatient surgical procedures at other MGB facilities, so MGB's overall share of 20.6 percent in the Woburn clinic's service area would remain unchanged. The results of the second scenario are shown in the right panel of the figure. In this scenario, we predict the Woburn Proposed Integrated Care Clinic would have a share of 2.6 percent in its own service area, the share of other MGB facilities in this service area would decline by 0.4 percentage points, and MGB's aggregate service area share would be 22.9 percent. [142,143] In addition to drawing patients from other MGB facilities, the Proposed Clinic is predicted to attract patients from, among others, Beth Israel Lahey Health (whose share in the service area declines by 1.0 percentage points).

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[141] *See* Section VII.B.

[142] As with our analyses of outpatient diagnostic imaging services, when calculating shares and HHI in the second scenario, we continue to weight ZIP Codes using the Proposed Clinic's anticipated volumes from the first scenario. We use the same weights in both scenarios so that the shares can be compared.

[143] For outpatient surgical procedures, when we weight ZIP Codes by the volumes of the MGB facilities that the Woburn Proposed Clinic would attract patients from, we predict the Proposed Clinic's share of surgical procedures would be 0.5 percent and MGB's overall share would be unchanged at 28.2 percent. When we use these weights but instead allow the Woburn Clinic to attract patients from other providers, we predict the Woburn Proposed Clinic's share would be 0.4 percent and MGB's overall share in these ZIP Codes increases by 0.3 percent from 28.2 percent to 28.5 percent.

116.   Figure ICC16 reports predicted shares for outpatient surgical procedures in the service area of the Proposed Integrated Care Clinic in Westwood. As shown in the left panel of the figure, in the first scenario we predict that the Westwood Proposed Integrated Care Clinic would have a share of 5.6 percent of outpatient surgical procedures in its own service area. MGB's overall share of 27.4 percent in the Westwood clinic's service area would be unchanged (by assumption). In the second scenario, we predict the Westwood Proposed Integrated Care Clinic would have a share of 5.0 percent in its own service area, which is partially offset by a decline in the share of other MGB facilities of 1.2 percentage points. [144] In addition to drawing patients from other MGB facilities, the Proposed Clinic is predicted to attract patients from, among others, Steward Health Care (whose share in the service area declines by 1.2 percentage points).

117.   Figure ICC17 reports predicted shares for outpatient surgical procedures in the service area of the Proposed Integrated Care Clinic in Westborough. As shown in the left panel of the figure, in the first scenario we predict that the Westborough Proposed Integrated Care Clinic would have a share of 4.4 percent of outpatient surgical procedures in its own service area. MGB's overall share in the Westborough clinic's service area would be unchanged (by assumption) at 15.7 percent. In the second scenario, we predict the Westborough Proposed Integrated Care Clinic would have a share of 4.9 percent in its own service area, which is partially offset by a decline in the share of other MGB facilities of 0.5 percentage points. [145] In addition to drawing patients from other MGB facilities, the Proposed Clinic is predicted to attract patients from, among others, UMass Memorial Health (whose share in the service area declines by 1.9 percentage points).

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[144] For outpatient surgical procedures, when we weight ZIP Codes by the volumes of the MGB facilities that the Westwood Proposed Clinic would attract patients from, we predict the Proposed Clinic's share of surgical procedures would be 0.7 percent and MGB's overall share would be unchanged at 27.2 percent. When we use these weights but instead allow the Westwood Clinic to attract patients from other providers, we predict the Westwood Proposed Clinic's share would be 0.6 percent and MGB's overall share in these ZIP Codes increases by 0.5 percent from 27.2 percent to 27.7 percent.

[145] For outpatient surgical procedures, when we weight ZIP Codes by the volumes of the MGB facilities that the Westborough Proposed Clinic would attract patients from, we predict the Proposed Clinic's share of surgical procedures would be 0.3 percent and MGB's overall share would be unchanged at 27.2 percent. When we use these weights but instead allow the Westborough Clinic to attract patients from other providers, we predict the Westborough Proposed Clinic's share would be 0.2 percent and MGB's overall share in these ZIP Codes increases by approximately 0.1 percent from 27.2 percent to 27.3 percent.

118.   Using the predicted change in shares, the bottom panels of Figures ICC15-ICC17 show the associated changes in concentration for outpatient surgical services in the service areas of the three Proposed Integrated Care Clinics. Under the scenario in which we assume that the Proposed Clinics attract only patients who currently receive outpatient surgical services at an MGB facility, there is no change in MGB's share, competitors' shares, or, therefore, in concentration in the Proposed Clinics' service areas. Under the scenario in which we assumed that the Proposed Clinics attract patients from other competitors, the changes in concentration range between a decline of 31 points and an increase of 130 points.[146] None of these changes in concentration are large enough to suggest a significant change in negotiating leverage for either MGB or incumbents. However, as in our discussion of outpatient diagnostic imaging services at the Proposed Clinics, we note that MGB does not currently operate surgery centers in the service areas of the Proposed Sites and the weight of the economic literature suggests that entry in health care markets may lead to lower prices for consumers.[147]

VIII.   Reimbursement Rates at Hospital Outpatient Departments and Integrated Care Clinics

119.   In its application for the Integrated Care Clinics, MGB states that it anticipates that it will be 25 percent less costly for patients to receive care at one of the Proposed Sites than at one of MGB's community hospitals (*e.g.*, Newton-Wellesley Hospital, Brigham and Women's Hospital, or Salem Hospital).[148] In a subsequent response to questions from the DoN program, MGB stated that it anticipates that it will be 50 percent less costly for patients to receive care at one of the Proposed Sites than at one of MGB's academic medical centers (*e.g.*, Massachusetts General Hospital or Brigham and Women's Hospital).[149] The applicant also notes that Medicare payments for health care services provided in ambulatory care centers are substantially lower than the

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[146] When we weight ZIP Codes by the volumes of the MGB facilities that the Proposed Clinics would attract patients from, there are no changes in concentration if the Proposed Clinics only attract patients from other MGB facilities. When we allow the Proposed Clinics to attract patients from other competitors, the HHI changes for outpatient surgical services at the Woburn, Westwood, and Westborough Clinics are -2, 14, and -0.2 (instead of -31, 130, and -18).

[147] *See* Section VII.B.

[148] Clinics DoN, Attachment 1, p. 15.

[149] Clinics Applicant Response, p. 52.

Medicare payments for the same service provided in HOPDs like those currently operated by MGB.[150]

120.   In assessing the cost impact of the Integrated Care Clinics, we assume that the prices that will be negotiated by MGB for care provided at the Proposed Sites are as articulated in the Applicant's submissions to the DoN program: 25 percent lower than MGB's community hospital rates and 50 percent lower than MGB's academic medical center rates. We cannot validate these projections using actual negotiated prices for MGB's hospital outpatient departments and ambulatory care centers because MGB does not currently operate freestanding ambulatory care centers in Massachusetts.[151] As such, to assess the reasonableness of MGB's predicted rates for the Integrated Care Clinics, we briefly review the health economics literature on reimbursement differentials between ambulatory care centers and hospital outpatient departments.

121.   As MGB noted in its DoN application, CMS uses a different method to establish Medicare reimbursement rates for services provided in HOPDs and ambulatory care centers. Under CMS reimbursement methods, Medicare reimburses ambulatory care centers approximately 59 percent of what it reimburses hospital outpatient departments for the same service (*i.e.*, for Medicare beneficiaries, the price of care provided at the Proposed Ambulatory Care Centers will be approximately 40 percent less than the price of care provided at MGB's HOPDs).[152] Because the differential is so substantial, the Medicare Payment Advisory Commission ("MedPAC") and others have advocated at least narrowing the payment differential, but the gap remains under the present Medicare fee schedule.[153]

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[150] Clinics DoN, Attachment 1, p. 15.

[151] We understand that MGB is currently affiliated with two ambulatory care centers (*i.e.*, facilities that are not licensed as HOPDs) in Massachusetts, but that both centers only provide endoscopy services rather than the broader range of ambulatory surgery and diagnostic imaging services that are likely to be provided at the Integrated Care Clinics.

[152] MedPAC Payment Basics, "Ambulatory Surgical Center Services Payment System," (Revised: November 2021), p. 1, *available at* https://www.medpac.gov/wp-content/uploads/2021/11/medpac_payment_basics_21_asc_final_sec.pdf, p.1.

[153] MedPAC. "Report to the Congress: Medicare Payment Policy." (March 2021), Chapter 5, pp. 146-47; MedPAC. "Report to the Congress: Medicare and the Health Care Delivery System." (June 2013), Chapter 2, pp. 27-30; Committee for a Responsible Federal Budget. "Equalizing Medicare Payments Regardless of Site-of-Care," (Feb 2021), *available at* https://www.crfb.org/papers/equalizing-medicare-payments-regardless-site-care.

122.   While Medicare reimbursement policy applies only to services reimbursed under the federal Medicare program, other third-party payors tend to follow Medicare's policy and reimburse HOPDs at higher rates than ambulatory care centers. While not peer-reviewed, an analysis of health care claims for 400,000 members of commercial health plans in 2014 found that reimbursement rates for 13 high-volume outpatient procedures were significantly lower in ASCs than in HOPDs.[154] Using these rate differences, the authors estimate that commercial health care expenditures—including expenditures for both the facility and professional components of outpatient surgery—would have been $38 billion higher in 2014 had procedures performed in ASCs been performed in HOPDs instead. Another non-peer reviewed analysis by UnitedHealth Group, which insures or administers commercial health plans for tens of millions of individuals in the United States,[155] of its own commercial claims data for the 12 months ending in February 2020 found a 59 percent reduction in costs when routine outpatient procedures were performed in ASCs rather than HOPDs.[156]

123.   Carey and Morgan (2020) use a large, nationwide database of commercial health care claims from 2014 to 2017 to assess differences in reimbursement for total knee replacement surgery and total hip replacement surgery in ASCs and HOPDs.[157] The authors note that over this period the volume of total joint replacements performed in outpatient settings, particularly in ASCs, grew substantially. Somewhat surprisingly—and in contrast to the previously discussed studies that focused on a broader range of outpatient procedures—the authors found that reimbursement for total knee and total hip replacement surgeries were *higher* in ASCs than in HOPDs, but the differential declined steadily as HOPD rates rose while ASC rates remained flat.

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[154] Ambulatory Surgery Center Association, Healthcare Bluebook, and HealthSmart. "Commercial Insurance Cost Savings in Ambulatory Surgery Centers," (2016), *available at* https://www.ascassociation.org/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=829b1dd6-0b5d-9686-e57c-3e2ed4ab42ca.

[155] UnitedHealth Group Incorporated, Form 10-K for the fiscal year ended December 31, 2020, p. 5.

[156] UnitedHealth Group. "Shifting Common Outpatient Procedures to ASCs Can Save Consumers more than $680 per Procedure," (2021), *available at* https://www.unitedhealthgroup.com/viewer.html?file=/content/dam/UHG/PDF/2021/Site-of-Service-Research-Brief.pdf.

[157] Kathleen Carey and Jake Morgan. "Payments for outpatient joint replacement surgery: A comparison of hospital outpatient departments and ambulatory surgery centers." *Health Services Research* (2020).

124.   Carey (2015) uses a large, nationwide database of commercial health care claims to assess trends in reimbursement rates at ASCs and HOPDs between 2007 and 2012 for six common outpatient surgical procedures.[158] The author finds that, while prices at ASCs increased at a rate that was consistent with overall trends in health care prices, payment rates to HOPDs increased more rapidly, thereby widening the differential between ASC and HOPD reimbursement rates. In 2012, median reimbursement rates at HOPDs exceeded median reimbursement rates at ASCs for each of the six outpatient procedures included in the study, although there was substantial variability in the payment rates in both settings.

125.   Whaley and Brown (2018) study the response of California HOPDs and ASCs to the introduction of reference pricing for three outpatient surgical procedures (cataract removal, colonoscopy, and joint arthroscopy) between 2009 and 2013 for patients covered by the California Public Employees' Retirement System, which provides insurance coverage to 1.4 million California state, county, and municipal employees and their dependents.[159] While not the primary focus of the paper, as part of their analyses, the authors compare prices for the three outpatient surgical procedures at ASCs and HOPDs. This comparison shows that median HOPD prices were substantially higher than median ASC prices, with arthroscopy prices 36 percent lower at ASCs, cataract surgery prices 76 percent lower at ASCs, and colonoscopy prices 66 percent lower at ASCs.[160]

126.   Reschovsky and White (2014) use commercial insurance claims for a health plan covering 590,000 active and retired working-age autoworkers and their dependents to compare prices for common outpatient services provided in HOPDs and community-based settings (*e.g.*, ASCs, freestanding imaging centers, or physicians' offices).[161] Included in the authors' descriptive analyses are reimbursement rates for knee MRs, colonoscopies, and laboratory tests at HOPDs and

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[158] Kathleen Carey. "Price Increases Were Much Lower In Ambulatory Surgery Centers Than Hospital Outpatient Departments In 2007–12." *Health Affairs* (2015).

[159] Christopher Whaley and Timothy Brown. "Firm responses to targeted consumer incentives: Evidence from reference pricing for surgical services." *Journal of Health Economics* (2018).

[160] Christopher Whaley and Timothy Brown. "Firm responses to targeted consumer incentives: Evidence from reference pricing for surgical services." *Journal of Health Economics* (2018), Table 1.

[161] James D. Reschovsky and Chapin White. "Location, Location, Location: Hospital Outpatient Prices Much Higher than Community Settings for Identical Services." *National Institute For Health Care Reform* (2014).

non-hospital-based facilities. The authors find that rates in non-hospital-based settings are consistently lower than in HOPDs: rates for knee MRs are 34 percent lower in non-hospital settings; rates for colonoscopies are 51-55 percent lower in non-hospital settings; and rates for laboratory tests are 50-66 percent lower in non-hospital settings. Despite these rate differentials, the authors found no evidence of differences in patient severity for knee MRIs and colonoscopies.

127.   Much of the previous discussion has focused on reimbursement differentials for outpatient surgical procedures at ASCs and HOPDs; there has been less research on reimbursement differentials for MR and CT—both of which would be offered at the Proposed Sites—at ambulatory care centers and HOPDs. However, as is the case with outpatient surgery, Medicare pays higher rates to hospital-based providers for the technical component of imaging services than it does to ambulatory care centers.[162]

128.   While Medicare covers advanced imaging services in both HOPDs and ambulatory care centers, albeit at different rates, commercial health insurers have changed their coverage policies to favor ambulatory care centers. From 2017 through 2020, Anthem, Cigna, and UnitedHealth Group—three of the four largest commercial health insurers in the United States—began to change their coverage policies so that they do not consider MR or CT scans performed in HOPDs to be medically necessary except in limited circumstances related to patient demographics, the presence of specific conditions or comorbidities, circumstances in which such a requirement would delay or adversely affect care, or a lack of alternative locations available.[163] As part of these efforts, UnitedHealth Group recently issued an eight-page guideline regarding approved sites of service for MR and CT imaging. [164] These policies, which are designed to encourage members of

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[162] MedPAC Payment Basics, "Ambulatory Surgical Center Services Payment System," (Revised: November 2021), p. 1, *available at* https://www.medpac.gov/wp-content/uploads/2021/11/medpac_payment_basics_21_asc_final_sec.pdf, pp. 1-2.

[163] Morgan Haefner. "What Anthem, Cigna, UnitedHealth's hospital-based imaging policies entail." Becker's Hospital Review (October 19, 2020); *See also*, UnitedHealthcare Commercial. "Magnetic Resonance Imaging (MRI) and Computed Tomography (CT) Scan–Site of Service," Utilization Review Guideline Number: URG-13.06 (February 1, 2021), *available at* https://www.uhcprovider.com/content/dam/provider/docs/public/policies/comm-medical-drug/mri-ct-scan-site-of-service.pdf.

[164] UnitedHealthcare Commercial. "Magnetic Resonance Imaging (MRI) and Computed Tomography (CT) Scan – Site of Service," Guideline Number: URG-13.06. February 1, 2021, *available at* https://www.uhcprovider.com/content/dam/provider/docs/public/policies/comm-medical-drug/mri-ct-scan-site-of-service.pdf.

commercial health plans to receive advanced imaging services at ambulatory care centers rather than HOPDs, are consistent with the existence of significantly higher reimbursement rates for MR and CT imaging at HOPDs than at ambulatory care centers.

129.   In summary, while we cannot validate MGB's projections regarding the rates it will negotiate for the Integrated Care Clinics using rates previously negotiated by MGB or comparable health systems in Massachusetts, the health economics literature documents substantial price differences for outpatient surgery and advanced imaging procedures at HOPDs and ambulatory care centers. While the literature does not differentiate between HOPDs affiliated with community hospitals and academic medical centers, the magnitudes of the overall price differentials in the literature are broadly consistent with MGB's own projections.

IX.   Predicted Changes in Health Care Expenditures

130.   As part of our evaluation of the proposed project on health care costs in Massachusetts, the DoN program asked that we evaluate how the project might change utilization of relatively higher- and lower-priced health care providers, and to assess the effect of any changes in utilization on health care expenditures in Massachusetts. To answer this question, we use our models of patients' demand for health care services to predict how patients' choices of health care providers would change if the proposed project were approved. We then use our measures of the relative prices of health care services—separately by health care provider, service line, and third-party payor—to estimate the cost impact of changes in where patients choose to receive care if the proposed project were approved.

131.   We forecast changes in health care expenditures associated with the Proposed Integrated Care Clinics using (i) the simulations described above that forecast utilization of outpatient health care services at different providers after the proposed project, and (ii) estimates of the relative prices of outpatient health care providers—which are based on, among other things, the prices we observe in the APCD—that we discussed in Section III.C. For example, the simulations summarized in Figure ICC10 predict which patients would switch to receiving outpatient MR scans at the Proposed Integrated Care Clinic in Woburn. For each patient who would switch to the Woburn Site, the APCD and Medicare Claims data identify the patient's health insurance coverage. We then use our relative price measures to compare the prices—which are specific to the patient's health insurance coverage—for the outpatient MR scan at the facility the patient is

switching from to the prices for the same outpatient MR scan at the Woburn Site. If the price for the service is higher at Woburn Site than at the facility the patient is currently utilizing, health care expenditures will increase. If the price for the service at the Woburn Site is lower than at the facility the patient is currently utilizing, health care expenditures will decrease. If a patient's choice of outpatient diagnostic imaging facility is unaffected (*i.e.*, the patient continues to receive care at their current MGB facility or one of MGB's competitors), there is no impact on health care expenditures.

132. The left panel of Figure ICC10 predicts changes in outpatient MR procedure shares after the Proposed Integrated Care Clinic at the Woburn Site is completed under the assumption that the clinic only attracts patients who currently receive outpatient MR scans at other MGB facilities. Under this scenario, the Woburn Proposed Clinic is predicted to draw approximately 93 percent of its patients from existing MGB HOPDs (including 41 percent from Massachusetts General Hospital, 17 percent from Brigham and Women's Hospital, and 12 percent from Salem Hospital) and only seven percent of its patients from MGB offices and clinics that offer outpatient MR scans. Under the second scenario, which is reflected in the right panel of Figure ICC10, we predict changes in outpatient MRI procedure shares if the Proposed Clinic in Woburn attracts patients from competing providers as well as MGB facilities. In this second scenario, the Proposed Clinic would attract patients from other providers including Shields Health Care Group (29 percent) and Beth Israel Lahey Health (23 percent).

133. While not reported in Figure ICC10, the APCD and Medicare Claims data contain information on the source of health insurance coverage for each patient predicted to switch to the Woburn Proposed Clinic for outpatient MR scans. In the first scenario where we assume that the clinic primarily draws patients who currently received outpatient MR scans at other MGB facilities, 28 percent of the patients predicted to switch to the Woburn Proposed Clinic from a MGB HOPD are covered by Original Medicare. As we explained in Section III.C.3, Original Medicare reimburses facilities like the Integrated Care Clinics approximately 41 percent less for outpatient MR scans than it reimburses HOPDs for the same procedures. The remainder of patients switching from MGB HOPDs to the Woburn Proposed Clinic are covered by commercial health plans, Medicare health plans, or MassHealth managed care health plans. BCBS-MA commercial plans, for example, cover 22 percent of the patients predicted to switch to the Woburn Proposed Clinic. We directly observe in the APCD data the rates that BCBS-MA commercial health plans

currently reimburse MGB HOPDs for outpatient MR scans. Moreover, as we discussed in Section VIII, MGB indicates that it anticipates negotiating rates at the Integrated Care Clinics that are 25 percent lower than MGB's rates at its community hospitals and 50 percent lower than MGB's rates at its academic medical centers. Because the APCD reports the rates that MGB's community hospitals and academic centers receive for MR scans it provides to BCBS-MA commercial members, we can predict the change in BCBS-MA expenditures when its commercial health plan members switch to receive an outpatient MR scans at the Woburn Proposed Site rather than a HOPD associated with an MGB community hospital or academic medical center.[165]

134.   We perform similar calculations using the shifts in utilization that occur in the second scenario that assumes the Proposed Integrated Care Clinics attract patients from competing health care providers. For example, in this scenario, for the patients who we predict will switch to the Woburn Clinic from a Shields Health Care Group facility, 32 percent are enrolled in Original Medicare and another 21 percent are enrolled in a commercial health plan offered by BCBS-MA. Reimbursement rates for Original Medicare are set by regulation, and we observe the rates that BCBS-MA commercial health plans currently reimburse Shields Health Care Group for outpatient MR scans. As such, we can calculate changes in Original Medicare and BCBS-MA commercial health expenditures on outpatient MR scans when patients shift from Shields Health Care Group facilities to the Woburn Proposed Clinic. We perform this exercise separately for each outpatient facility that the Woburn Clinic is predicted to draw patients from and for each third-party payor that covers the patients predicted to switch to the Woburn Clinic.[166] Aggregating these calculations

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[165] When we calculate the average reimbursement rates that MGB community hospitals and academic centers currently receive for the purposes of determining the rates that BCBS-MA and other third-party payors will negotiate with MGB for care provided at the Integrated Care Clinics, we do so by type of health plan coverage (*e.g.*, commercial or Medicare health plan) instead of by health insurer and by type of coverage. Accordingly, we assume that when, for example, BCBS-MA commercial health plan members switch to the Woburn Proposed Clinic for an outpatient MR scan from Brigham and Women's Hospital, BCBS-MA will pay the Woburn Clinic 50 percent of what Brigham and Women's Hospital was paid for the same procedure by all commercial health plans (and not by BCBS-MA specifically).

[166] To determine relative prices, we calculate the allowed amounts for outpatient MR scans (or outpatient CT scans or outpatient surgical procedures) relative to the Medicare fee schedule by health insurer, type of health plan coverage (*e.g.*, commercial or Medicare health plan), health system (*e.g.*, MGB or Beth Israel Lahey Health), facility type (*e.g.*, HOPD or freestanding diagnostic imaging center), and facility ZIP Code. For some patients who are predicted to switch from a competing provider to the Integrated Care Clinics, there was an insufficient amount of pricing data in the APCD to reliably calculate relative price of the Integrated Care Clinic and the competing provider. We do not use

across facilities and payors for each patient predicted to switch to the Woburn Clinic yields an estimate of how health care expenditures will change following the proposed project.[167]

135.   We perform this exercise under both scenarios for each outpatient facility the Woburn Proposed Clinic is predicted to draw patients from and for each payor that covers the patients predicted to switch to the Woburn Proposed Clinic from these facilities.[168] Aggregating these calculations across payors and facilities then informs us how much total health care expenditures will change following the proposed project.[169] Next, we discuss the results from these calculations.

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the relative price information for these patients from our per-procedure estimate of the change in expenditures on outpatient MR scans.

[167] We calculate the overall chance in health care expenditures as a weighted average of the changes in health care expenditures for the patients who are predicted to switch.

For example, suppose that 50 percent of the patients switching to the Woburn Clinic for outpatient MR scans are BCBS-MA commercial health plan members who switched from a Shields Health Care Group facility and 30 percent are Tufts Health plan Medicare health plan members who switched from a Beth Israel Lahey Health HOPD. Further suppose that we lack reliable information on the relative prices for the remaining 20 percent of patients predicted to switch to the Woburn Site.

If, hypothetically, we calculate that MGB's prices at the Woburn Clinic for BCBS-MA commercial health plan members would be ten percent higher than Shield's Health Care Group's prices for these patients, and the Clinic's prices for Tuft's Health Plan Medicare health plan members would be five percent higher than Beth Israel Lahey Health's prices for these patients, we would calculate the average change in health care expenditures for each patient who switches to the Woburn Clinic as $(0.50 \times 0.10 + 0.30 \times 0.05) \div (0.50 + 0.30) = 0.081$, or 8.1 percent.

[168] We calculate observed MR scan prices (and similarly, CT scan and surgical procedure prices) relative to Medicare at the level of parent facility, facility type, and facility ZIP Code for each payor and type of health plan (*e.g.,* commercial, Medicare health plan) in the APCD data. Because we are unable to calculate relative prices for all the commercial, Medicare health plan, and MassHealth managed care claims in the APCD, we only predict these payors' changes in health care expenditures when an enrollee switches to a Proposed Clinic from an alternative provider if there was sufficient information to calculate a relative price for at least 20 percent of the MR scan volume that the payor reimbursed the alternative provider for. Returning to the example involving BCBS-MA, suppose that one of BCBS-MA's commercial enrollees is predicted to switch from a particular provider (*e.g.,* Shields – Office/Clinic – 02026) to the Woburn Proposed Clinic for a MR scan. Suppose further that when relative price data are available, BCBS-MA reimburses BCBS-MA reimburses Shields – Office/Clinic – 02026 a relative price of 1.4. If commercial payors reimburse MGB academic centers a relative price of 2.5 on average and BCBS-MA anticipates reimbursing the Woburn clinic only half this amount, then BCBS-MA will anticipate a 11 percent decrease in expenditures (= .5 × 2.5 ÷ 1.4 – 1) after an enrollee switches to the Woburn clinic from Shields for a MR scan. We only include this 11 percent decrease in our calculations if the 1.4 relative price at BCBS-MA reimburses Shields – Office/Clinic – 02026 is based on at least 20 percent of BCBS-MA's scan volume at Shields – Office/Clinic – 02026. If not, we exclude the 11 percent decrease when we calculate the average change in expenditures when a commercial payor's enrollee switches to the Woburn Proposed Clinic for a MR scan.

[169] To calculate the average change in health care expenditures across all payors and facilities, we take a weighted average across all facilities from which payors' enrollees are predicted to switch to the Proposed Clinic and for which we have sufficient information to calculate the change in reimbursement the payor will incur following these switches. For example, suppose that 50 percent of the volume switching to the Woburn clinic are BCBS-MA enrollees are

136.   Using the same approach just described to calculate the effect of the proposed project on changes in expenditures associated with outpatient MR scans, in the following sections we also calculate the effect of the proposed project on expenditures for outpatient CT scans and outpatient surgical services that may be offered at the Integrated Care Clinics.

A. Diagnostic Imaging Services

137.   Figures ICC18 – ICC20 report overall changes in health care expenditures for outpatient CT scans associated with the Proposed Clinics in Woburn, Westwood, and Westborough.[170] Each figure reports changes in expenditures for outpatient CT scans in four different ways.

- We identify patients who will switch to each Proposed Clinic under the two scenarios we previously discussed: (i) each Proposed Clinic draws patients from primarily from other MGB facilities, or (ii) each proposed Clinic draws patients from competing health care providers (in addition to drawing patients from other MGB facilities).

- For health plans that negotiate reimbursement rates, we calculate prices at the Proposed Clinics in two ways: (i) the rates that MGB negotiates for the Integrated Care Clinics are 75 percent of the corresponding rates for outpatient CT scans at MGB's community hospitals, or (ii) the rates that MGB negotiates for the Integrated Care Clinics are 50 percent of the corresponding rates for outpatient CT scans at MGB's academic medical centers.

138.   These two approaches to identifying patients who will switch to each Integrated Care Clinic and two approaches to calculating the prices that MGB will negotiate at each Integrated Care Clinic generate four different sets of results for each of the Proposed Clinics. For each set of results,

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switching from a Shields facility and 30 percent of the volume switching to the Woburn clinic are enrollees in Tufts Medicare health plans shifting from a Beth Israel Lahey HOPD. If there are sufficient data available to determine that BCBS-MA and Tufts incurred 20 and ten percent decreases in reimbursement following these shifts but there is not sufficient information available to calculate reimbursement changes for the remaining 20 percent of volume switching to the Proposed Clinic, then we calculate the average decrease in health care expenditures across the volume switching to Woburn as (50% × 0.20 + 30% × 0.10) / (50% + 30%) = 0.1625, or 16.3 percent.

[170] We perform these calculations separately for each of the Proposed Clinics (*e.g.*, we assume that the Woburn Clinic is operational but the Westwood and Westborough Clinics are not). We have not simulated the combined effect of the three Proposed Clinics on health expenditures, but this combined effect will be smaller than the sum of the three separate effects that we estimate if there are any patients who are predicted to switch from their current health care provider to more than one of the three Proposed Clinics.

Figures ICC18 – ICC20 summarize three calculations for each category of health insurance coverage (*i.e.*, commercial health plans, Original Medicare, Medicare health plans, MassHealth non-managed care, MassHealth managed care plans, and other types of coverage):

- The fraction of the Proposed Clinic's volume that will be covered by that type of insurance.

- Among patients with that type of coverage who switch to the Proposed Clinic, the average change in expenditures—expressed as a percentage of current expenditures—for outpatient CT scans. Negative numbers correspond to predicted decreases in health care expenditures; positive numbers correspond to predicted increases in health care expenditures.

- Among patients with that type of coverage, the average change in expenditure for both patients who switch to the Proposed Clinics and patients whose choices are unaffected

- These decreases in expenditures on outpatient CT scans are limited to patients who we predict would switch to the Proposed Clinics. However, the choices of most patients who receive outpatient CT scans would be unaffected by project. Because there would be no change in expenditures for these patients, the total percentage effect on expenditures for outpatient CT services will be smaller than the effect we calculate for patients who switch. As such, we also report in the figures the predicted total percentage effect on expenditures for patients—regardless of whether they switch to the Proposed Clinic—who reside in Massachusetts and receive outpatient CT scans from facilities in Suffolk, Essex, Middlesex, Norfolk, Bristol, Plymouth, and Worcester Counties.[171]

139.   In addition to presenting these calculations for each category of health insurance coverage, we calculate an overall effect that captures the total effect (*i.e.*, across all types of health insurance coverage) on expenditures for outpatient CT scans. Because of the large number of variations reflected in these figures, we present only a brief summary of the results here.

- As shown in Figure ICC18, across the four sets of results, the Proposed Integrated Care Clinic at the Woburn Site is predicted to decrease overall expenditures on outpatient CT

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[171] Similarly, the total percentage effect on expenditures for MR scans (or surgical services) are based on patients who reside in Massachusetts and receive outpatient MR scans (or surgical services) from facilities in Suffolk, Essex, Middlesex, Norfolk, Bristol, Plymouth, and Worcester Counties. These results are discussed later in this report.

scans for patients who switch by between 24.0 and 36.1 percent. We also predict that total expenditures (*i.e.*, including both patients who switch to the Woburn Site and patients whose choices are unchanged) on outpatient CT scans would decrease by between 0.4 and 0.7 percent.

- As shown in Figure ICC19, across the four sets of results, the Proposed Integrated Care Clinic at the Westwood Site is predicted to decrease overall expenditures on outpatient CT scans for patients who switch by between 27.6 and 35.3 percent, while total expenditures on outpatient CT scans for all patients would decrease by between 0.4 and 0.6 percent.

- As shown in Figure ICC20, across the four sets of results, the Proposed Integrated Care Clinic at the Westborough Site is predicted to decrease overall expenditures on outpatient CT scans for patients who switch by between 25.3 and 34.6 percent, and total expenditures on outpatient CT scans would decrease by between 0.1 and 0.2 percent.

140.   Figures ICC21 – ICC23 report overall changes in health care expenditures for outpatient MR scans associated with the Proposed Clinics in Woburn, Westwood, and Westborough. The analyses summarized in these figures are presented in a manner similar to our analyses of outpatient CT scans at the Proposed Clinics that we discussed above, so we do not repeat our discussion of how the information in the figures is presented. We briefly summarize these results below.

- As shown in Figure ICC21, across the four sets of results, the Proposed Integrated Care Clinic at the Woburn Site is predicted to decrease overall expenditures on outpatient MR scans for patients who switch by between 20.8 and 35.0 percent. We also predict that total expenditures (*i.e.*, including both patients who switch to the Woburn Site and patients whose choices are unchanged) on outpatient MR scans would decrease by between 0.3 and 0.6 percent.

- As shown in Figure ICC22, across the four sets of results, the Proposed Integrated Care Clinic at the Westwood Site is predicted to decrease overall expenditures on outpatient MR scans for patients who switch by between 22.7 and 33.7 percent. We also predict that total expenditures on outpatient MR scans would decrease by between 0.5 and 0.7 percent.

- As shown in Figure ICC23, across the four sets of results, the Proposed Integrated Care Clinic at the Westborough Site is predicted to decrease overall expenditures on outpatient MR scans for patients who switch by between 13.0 and 34.3 percent. We also predict that total expenditures on outpatient MR scans would decrease by between 0.1 and 0.3 percent.

B. Surgical Services Offered at the Integrated Care Clinics

141.   Figures ICC24 – ICC26 report overall changes in health care expenditures for outpatient surgical services that may be offered at the Proposed Clinics in Woburn, Westwood, and Westborough. The analyses summarized in these figures are presented in a manner similar to our analyses of outpatient diagnostic imaging services at the Proposed Clinics that we discussed above, so we do not repeat our discussion of how the information in the figures is presented. We briefly summarize these results below.

- As shown in Figure ICC24, across the four sets of results, the Proposed Integrated Care Clinic at the Woburn Site is predicted to decrease overall expenditures on outpatient surgical services for patients who switch by between 10.0 and 34.6 percent. We also predict that total expenditures (*i.e.*, including both patients who switch to the Woburn Site and patients whose choices are unchanged) on outpatient surgical services would decrease by between nearly zero and 0.2 percent.

- As shown in Figure ICC25, across the four sets of results, the Proposed Integrated Care Clinic at the Westwood Site is predicted to decrease overall expenditures on outpatient surgical services for patients who switch by between 17.0 and 39.2 percent. We also predict that total expenditures on outpatient surgical services would decrease by between 0.1 and 0.2 percent.

- As shown in Figure ICC26, across the four sets of results, the Proposed Integrated Care Clinic at the Westborough Site is predicted to decrease overall expenditures on outpatient surgical services for patients who switch by between 12.1 and 39.1 percent. We also predict that total expenditures on outpatient surgical services would decrease by between nearly zero and 0.1 percent.

X. Other Considerations

A. The Potential for Supply-Induced Demand

142. In connection with our evaluation of the effects of the proposed project on utilization of health care services in Massachusetts, the DoN program asked that we consider the potential for the project to lead to "supply-induced demand." Supply-induced demand is generally defined by economists as a "physician providing care that a fully informed patient would not choose for [themself]."[172] While we cannot estimate the extent to which utilization of the health care services referenced in the DoN application might increase as a result of supply-induced demand, we review the existing health economics literature on this subject.

143. Assuming for this purpose that the proposed project would be associated with increased service utilization for the Applicant's facilities, the relevant question is how to distinguish between an increase in utilization that is attributable to, on the one hand, the new capacity for MGB to serve demand that was previously unmet due to capacity constraints and, on the other hand, MGB providing more services to patients once the complementary resources (*e.g.*, hospital beds, operating rooms, imaging equipment) are available to do so. This second category of increased utilization corresponds to a supply-induced demand effect.

144. The standard simplified economic model of supply-induced demand assumes that physicians have two motivations: primarily to provide care that maximizes patients' health and secondarily to increase earnings. The presence of a financial motivation for physicians combined with patients' lack of expertise regarding treatment efficacy creates the potential for supply-induced demand. Under this model, observed variation in service utilization in different parts of the country may be at least in part due to how physicians are reimbursed. Physicians who are paid for each service that they provide may be more susceptible to financial motivations than salaried physicians—such as those employed by MGB—and physicians reimbursed under alternative payment models or as part of accountable care organizations.

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[172] Mark V. Pauly, Thomas G. McGuire, and Pedro Pita Barros (eds). *Handbook of Health Economics*, Volume 2. North Holland, Elsevier (2012) [hereinafter, HANDBOOK], Chapter 6: Amitabh Chandra, David Cutler, and Zirui Song. "Who Ordered That? The Economics of Treatment Choices in Medical Care." p. 414. This article provides a good overview of the underlying economic models of supply-induced demand.

145.   It is also critical to recognize that physicians' views about the efficacy of particular treatments, willingness to adopt new technologies, risk aversion, or access to complementary resources (which can affect or be affected by local practice norms) vary. This variability is attributable to physicians' views about *what* services maximize patient health rather than to the characteristics typically linked to supply-induced demand: variability in the importance of financial incentives combined with patients' imperfect information on treatment efficacy. In assessing the potential for variation in utilization, services can be categorized into three groups.[173]

- Treatments that are known (and generally perceived) to be highly effective, *e.g.*, beta blockers for heart attacks. These services may be costly, but they are generally highly productive for well-defined categories of patients, or they are reasonably productive across a wide range of patients and are low cost. As a result, utilization of these services is not likely to exhibit much variability (or be susceptible to supply-induced demand).

- Treatments for which there is substantial heterogeneity in the benefit across different types of patients, *e.g.,* stents that work well for patients with recent heart attacks but are much less effective later in the patients' recovery, or back surgery. Differences of opinions across physicians regarding the likely patient benefit may lead to different utilization patterns for these services.

- Treatments for which evidence of benefit is small or unknown.

This last category is most likely to exhibit substantial variability and be most susceptible to supply-induced demand. However, a service for which clinical guidance is lacking, the scope of harm (the risk) from providing the service is small, or the benefit is idiosyncratic across patients is, all else equal, more likely to exhibit variation in utilization because of differing physician beliefs regarding treatment efficacy.[174]

146.   In assessing the causes of regional variation in observed utilization—either in aggregate or for individual services—the empirical economic literature tends to attempt to distinguish between

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[173] HANDBOOK: Chapter 2: Jonathan Skinner. "Causes and Consequences of Regional Variation in Health Care.", pp. 54-56.

[174] Mark V. Pauly, Thomas G. McGuire, and Pedro Pita Barros (eds). *Handbook of Health Economics*, Volume 2. North Holland, Elsevier (2012) [hereinafter, HANDBOOK], Chapter 6: Amitabh Chandra, David Cutler, and Zirui Song. "Who Ordered That? The Economics of Treatment Choices in Medical Care." pp. 402-403.

variation in direct patient demand due to differences in health status, ability to pay, and supply-induced factors. This literature typically finds that both demand and supply factors are relevant in explaining variation in utilization of health care services, but that more variation is explained by supply factors than by demand factors. This finding alone, however, does not support the conclusion that construction or expansion of health care facilities will lead to supply-induced demand, because differences in utilization are also often attributable to substantial variation in physician beliefs about treatment effectiveness.

147.   There are limitations to many of the existing studies that attempt to distinguish between demand- and supply-driven factors. These studies are often based on the experiences of Medicare beneficiaries because utilization data are more readily available for this patient cohort; however, findings for the Medicare cohort may not be generalizable to the broader population of patients. Many studies are also of limited use because they are descriptive rather than attempting to sort out causation: for example, does the high utilization and lower mortality in McAllen, Texas imply that the additional health care services offered to patients in that community produce "good outcomes," or are those additional services unnecessary because the population's underlying health status is greater?[175] Some recent studies have used a more robust empirical approach to address the issue of causation. We describe findings from a few such studies below.

148.   Cutler *et al.* (2019) use vignette-based physician and patient surveys linked with Medicare claims to assess whether physician or patient characteristics can explain variation in Medicare expenditures across geographic areas.[176] The authors survey both primary care physicians and cardiologists using vignettes that describe elderly patients with particular conditions and medical histories and ask the physicians how they would provide care for such patients. Based on their responses, surveyed physicians are characterized non-exclusively as "cowboys" (physicians who routinely recommend care beyond what clinical guidelines suggest) and "comforters" (those who consistently recommend palliative care for severely ill patients). The surveys also measure the frequency with which physicians recommend that patients return for follow-up visits and collect

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[175] Atul Gawande. "The Cost Conundrum," *The New Yorker* (June 1, 2009), *available at* https://www.newyorker.com/magazine/2009/06/01/the-cost-conundrum; *See also*, HANDBOOK, Skinner, p. 62.

[176] David Cutler, Jonathan S. Skinner, Ariel Dora Stern, and David Wennberg. "Physician Beliefs and Patient Preferences: A New Look at Regional Variation in Health Care Spending." *American Economic Journal of Economic Policy* (2019).

information on the physicians' compensation arrangements and practice structure. Patient preferences are measured by asking patients about whether they would choose aggressive or palliative end-of-life care and whether they would seek additional testing or cardiac referrals for new chest pain.

149.   The authors estimate models that attempt to explain either total health care expenditures in the last two years of life or spending following heart attacks as a function of provider-specific factors and patient preferences. They use data from the Dartmouth Atlas on Medicare spending across the largest Hospital Referral Regions and aggregate physician and patient survey responses to this level. They also estimate a model using individual patient-level expenditures for heart attacks. Using this approach, the authors find that end-of-life spending is positively related to the proportion of cowboys, negatively related to the proportion of comforters, and positively related to the fraction of physicians who recommend more frequent follow up than is suggested by clinical guidelines. [177] Demand-based factors and patient preferences are generally not significant, although physicians' expressed "pressure to accommodate" patients (or their referring physicians) has a small but statistically significant relationship with physician beliefs about appropriate care patterns.

150.   The authors also estimate models that attempt to explain variation in expenditures on heart attack patients across Hospital Referral Regions. They find that high proportions of cowboys and high-follow-up physicians are associated with higher expenditures and the opposite is true for comforters and low-follow-up physicians. They also find that Hospital Referral Regions with larger proportions of cowboys and high-follow-up physicians experience higher-quality care for acute myocardial infarction. While this evidence might be interpreted as indicating supply-induced demand (if physicians become motivated as cowboys due to financial considerations), the authors note the limited role of financial factors in explaining variation in physician practice patterns.[178]

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[177] The local proportion of cowboys/comforters explains 36 percent of variation; when the frequency of high- or low-follow-up recommenders is added, the regressions explain 62 percent of variation.

[178] The authors do find that practice type is associated with treatment recommendations. Solo or two-person practices—practicing in an environment that is dissimilar to MGB-employed physicians—are more likely to be cowboys and high-follow-up physicians.

Rather, the authors find that surveyed physicians express very different beliefs about the efficacy of particular treatments. Most importantly, the variation in health care expenditures in this study was linked to differences in physician practice patterns, not to differences in the number or capacity of health care facilities in each region.

151.   Clemens and Gottlieb (2014) investigate the extent to which physicians' compensation arrangements affect their treatment recommendations.[179] They use a natural experiment based on a 1997 change in the way the Medicare program adjusted physician payment rates geographically to analyze how physician treatment decisions change when their reimbursement changes.[180] The authors estimate both the aggregate effect on the amount of care provided to patients as well as the effect on the number of individual services offered to patients. They find that Medicare services in aggregate indicate a long-run wage elasticity of approximately 0.6 (*i.e.*, the quantity of services provided by physicians increases as their reimbursement for providing those services increases).[181] The authors also assess the effect of the reimbursement change on the provision of particular services. They develop a model of physician incentives based on both perceptions of what maximizes patient health and financial considerations. They posit that elective procedures are more likely to offer moderate benefits for many patients, while other services such as emergency department treatment or chemotherapy benefit only specific patients and may have substantial negative effects as well as benefits. As a result, they predict that elective procedures are more likely to respond to changes in reimbursement. Classifying services into specific categories, they find evidence consistent with their theory: approximately two-thirds of the supply response is attributable to the one-third of services that are relatively "elective."

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[179] Jeffrey Clemens and Joshua Gottlieb. "Do Physicians' Financial Incentives Affect Medical Treatment and Patient Health?" *American Economic Review* (2014).

[180] CMS varies the fee schedule amounts for physicians using "Geographic Adjustment Factors" that account for differences in where physicians practice. In 1997, CMS consolidated the regions in which these Geographic Adjustment Factors were calculated. As a result, some physicians experienced increases in Medicare reimbursements while others experienced decreases.

[181] Specifically, the authors estimate a long-run elasticity of 1.5 but note that Medicare reimbursement rates compensate physicians for the costs they incur in addition to their own efforts. Using an average of about 40 percent of Medicare reimbursement attributable to physician work, they calculate a wage elasticity of 0.6.

152. Finally, the authors focus on two specific services: the provision of MRs and cardiac care. They find that the provision of MRs did respond positively to price changes, but their finding was only marginally statistically significant. Moreover, they found that almost the entire effect was attributable to the increased supply of MRs by non-radiologists performing services in their offices and not in diagnostic imaging centers. The authors also find a positive supply response for elective cardiac services such as catheterization and angioplasty, with most of the response focused on increased services provided to populations already receiving relatively intensive care.

153. Ikegami *et al.* (2021) assess how physicians at one hospital change their use of MRs when a neighboring hospital purchases a new MR.[182] Using administrative panel data on Japanese hospitals' ownership and usage of MRs between 2005 and 2014, they find that a hospital's MR patient count falls by up to 6.6 percentage points when a neighboring hospital purchases an additional MR. They also find that the hospital that loses patients compensates by offering more of its remaining patients MRs than it had previously. They attribute this response to "competition-driven physician-induced demand." The authors note that in the Japanese health system, physicians and hospitals cannot affect the reimbursement they receive for health care services, so the primary competitive response that they can make is in volume. They also note that it is possible that the greater number of patients receiving MRs could be beneficial to patients if it is attributable to the freeing up of formerly capacity-constrained equipment.

154. Finkelstein *et al.* (2016) use another type of natural experiment to assess regional variation in health care utilization.[183] They study Medicare beneficiary utilization patterns between 1998 and 2008 following patients' relocation from an area of high utilization to one of low utilization (or *vice versa*). The authors posit that if patient characteristics drive most of the variation in health care utilization, then patients who relocate should maintain their pre-existing utilization patterns regardless of whether they move to an area with utilization patterns that differ from their own. However, instead what they observe is a sharp change in utilization patterns the year that a patient moves. The change in utilization is equal to about half of the difference between the average

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[182] Kei Ikegami, Ken Onishi, and Naoki Wakamori. "Competition-driven physician-induced demand." *Journal of Health Economics* (2021).

[183] Amy Finkelstein, Matthew Gentzkow, and Heidi Williams. "Sources of Geographic Variation in Health Care: Evidence from Patient Migration." *Quarterly Journal of Economics* (2016).

utilization patterns across the origin and destination locations of the patients' moves, regardless of the direction of the move. Patient characteristics such as health status are important, but the authors find that these characteristics explain, on average, about 47 percent of regional variation in utilization. They also find substantial variation in the effects that patient characteristics have on demand for individual services. Patient characteristics play a stronger role in explaining variation in services such as emergency department care or preventive care and a smaller role in explaining variation in diagnostic testing. Supply-side factors are particularly pronounced in areas with more "cowboy" physicians (using the data collected in Cutler *et al.* (2019) discussed above) and more for-profit hospitals, as well as in areas with more women patients, less-educated patients, and sicker patients.

155.   Finally, Young *et al.* (2021) examine whether physicians who become hospital employees change their usage of MRs following employment.[184] The authors suggest that physicians who are employed by a hospital system may be more likely to refer their patients for services that benefit the hospital financially, particularly for those services for which efficacy is uncertain or disputed. Using the Massachusetts APCD, they assess health insurance claims between 2009 and 2016. They combine these data with information on physician employment derived from Medicare claims data and physicians' Taxpayer Identification Numbers (TINs). They classify MRs used to diagnose causes of lower back pain, knee pain, and shoulder pain as appropriate or inappropriate based on clinical guidelines issued by the American College of Radiology. They find that the odds of a patient receiving a referral for an MR increased by 31 percent, relative to a comparison group, following hospital employment of the patient's physician, while the likelihood of receiving an inappropriate referral increased by 22 percent, relative to the comparison group. As the authors acknowledge, however, identifying "inappropriateness" solely on claims data, rather than through a review of the medical record has its limitations. In addition, the composition of the patient panels may have changed as the physicians transferred to hospital employment, making the results more difficult to interpret.

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[184] Gary J. Young, E. David Zapada, Stephen Flaherty, and Ngoc Thai. "Hospital Employment Of Physicians In Massachusetts Is Associated With Inappropriate Diagnostic Imaging." *Health Affairs* (2021).

156. On balance, the health economics literature finds that both demand- and supply-related factors are important in explaining variability in the utilization of health care services and health care expenditures. However, the literature that examines the causes of supply-related variation in demand for health care services finds that most evidence is consistent with the role of physicians' differing beliefs about the efficacy of alternative treatments and differing practice patterns in explaining that variation, rather than on the availability of the types of complementary inputs that are sought by MGB in its DoN application.

B. Who Bears the Burden of Higher Costs or Benefits from Cost Savings?

157. As we noted earlier, the DoN program asked that the ICA address the question of if costs were to increase because of the proposed project, who bears the burden of that change in costs: third-party payors, patients, or health-plan sponsors, such as employers? Similarly, if costs were to decrease because of the proposed project, who benefits from those savings? We focus our discussion of these questions on commercially insured patients for whom the link between health care expenditures, out-of-pocket costs, health plan premiums, and earnings is most direct. We do not address this question for government-sponsored health insurance such as Medicare or MassHealth because health care provider reimbursement for these programs is typically not negotiated.

158. Assessing who bears health care cost increases or decreases requires an understanding of how, and to what extent, those changes are passed on to various parties. That is, to the extent that the proposed project results in a reduction of health care costs because care is delivered more efficiently, are these cost reductions passed on to third-party payors, and do those payors, in turn, pass them onto employers that purchase health plans on behalf of their workers? Conversely, if the proposed project increases the bargaining leverage of MGB with commercial payors and negotiated prices increase commensurately, do those payors increase premiums for the health plans they insure? An additional, related question is whether patients who receive care are directly affected, either through the out-of-pocket payments (*i.e.*, coinsurance amounts or deductible payments) they make or through changes in their wages or the proportion of health plan premiums that they must pay.

159. Starting with the question of whether increases in health care expenditures are passed on by third-party payors in the form of higher premiums, we note that expenditures on health care

services received by plan members comprise almost all health plan expenses. An analysis conducted by CMS found that slightly fewer than 90 percent of premiums for private health insurance in 2019 were used to pay for health care services received by plan members.[185] As expenditures on health plan benefits, such as hospital services, increase—either because of an increase in utilization of health care services or an increase in reimbursement for those services— so do health plan premiums. As a general matter of economics, increased costs are passed on to consumers in the form of higher prices, with the precise magnitude of the increase in prices resulting from an increase in costs depending on the cost pass-through rate.[186]

160.   The pass-through of costs is particularly evident for self-insured health plans. In such plans, the health plan administrator will receive and process claims, but the employer sponsoring the plan is ultimately responsible for paying those claims. In the United States, 64 percent of people enrolled in private employer-sponsored health plans are enrolled in self-insured plans.[187] For fully insured health plans, the premiums for the plan are typically established at the beginning of the plan year and cannot be subsequently adjusted during the plan year. However, this does not mean that participants in those plans are insulated from the effects of increases in expenditures on health care services. Premiums and the benefit structures for fully insured plans are often determined on an annual basis, and claims incurred by plan participants in the previous year can affect premiums for the plan in subsequent years.[188]

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[185] Centers for Medicare and Medicaid Services, National Health Expenditure Accounts, Table 20, *available at* https://www.cms.gov/files/zip/nhe-tables.zip.

[186] *See* Complaint, *In the Matter of Methodist Le Bonheur Healthcare and Tenet Healthcare Corporation*, Federal Trade Commission Docket No. 9396, ¶ 4. In that complaint, the Federal Trade Commission discussed the loss of competition that would have allegedly resulted from a proposed hospital merger and the effect of increased hospital prices on consumers: "Commercial insurers will have to pass on at least some of those higher healthcare costs to employers and their insurance plan members in the form of increased premiums, co-pays, deductibles, and other out-of-pocket expenses. 'Self-insured' employers that pay the cost of their employees' healthcare claims directly will bear the full and immediate burden of higher reimbursement rates and other less favorable terms."

[187] Kaiser Family Foundation, "Employer Health Benefits: 2021 Annual Survey," Figure 10.1, *available at* https://files.kff.org/attachment/Report-Employer-Health-Benefits-2021-Annual-Survey.pdf.

[188] *See* Peter R. Kongstvedt (ed.). *The Managed Health Care Handbook,* Fourth Edition. Gaithersburg, Aspen Publishers (2001), Chapter 49.

161.   The relationship between health plan premiums and expenditures on health care services is evident in longitudinal data compiled by CMS on premiums and health care service expenditures that is shown in Figure ICC27.[189] Two features of these data are noteworthy. First, as we noted above, in 2019 almost 90 percent of health plan premiums were used to pay participants' claims—almost all premiums collected by health plans were used to pay for health care services. Second, CMS's data show that expenditures on health care services increased substantially between 2010 and 2019, and health plan premiums increased at almost the same rate. Expenditures on health care services increased by an average annual rate of 4.4 percent over this period, while health plan premiums increased by an average annual rate of 4.3 percent (*i.e.*, slightly less than the rate of increase of health care costs). These data show, therefore, that health care expenditures are the primary determinant of health plan premiums, and as those expenditures increase (or decrease), so do premiums.

162.   Given the strong relation between health care expenditures and health plan premiums, we turn next to the incidence of increases in employer-sponsored health insurance premiums on employers and their workers. This question has been addressed in several economic studies, which are based on models that recognize that this incidence depends on elasticities of labor supply and demand, regulatory and institutional constraints on wages (*e.g.*, minimum hourly wages), and the value that workers place on health insurance. These studies recognize that workers consider their total compensation (*i.e.*, wages plus non-wage benefits) in evaluating alternative employment opportunities and how many hours to work at the prevailing level of compensation. These analyses generally find that workers bear most of the increase in the cost of health insurance premiums through reduced wages—either directly or indirectly through increased required contribution to health insurance premiums—or hours. While there does not appear to be any published literature on the effect of premium reductions because premiums generally increase year-over-year, one would expect that these would also pass on to workers primarily in the form of higher wages.

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[189] Centers for Medicare and Medicaid Services. National Health Expenditure Accounts, Table 20, *available at* https://www.cms.gov/files/zip/nhe-tables.zip.

163.   Kolstad and Kowalski (2016) analyzed Massachusetts' adoption of individual and employer mandates in 2006.[190] The authors found that annual wages for workers with employer-sponsored insurance were lower by about $2,800 relative to what these same workers would have been paid without employer-sponsored insurance. They calculated that this reduction in wages was slightly less than the amount that employers typically spent on insurance coverage (*i.e.*, the cost of health insurance was largely borne by workers in the form of lower wages).

164.   Anand (2017) assessed the relationship between the rising costs of employer-sponsored insurance cost and worker compensation between 2003 and 2010, analyzing separately the effects on wages, non-health fringe benefits, and worker contributions to health plan premiums.[191] The author finds that total hourly compensation decreases by $0.52 for every $1 increase in the cost of employer-sponsored insurance, with almost all the decrease attributable to higher worker contributions to health plans, while hourly wages and non-health benefits remain relatively unchanged.

165.   Baicker and Chandra (2006) examined the effect of rising health insurance premiums between 1996 and 2002 on wages, employment, and the proportions of full- and part-time workers employed by firms.[192] The authors use variation in medical malpractice premiums across states and its effect on health insurance premiums to measure the incidence of cost increases in health care services. (As we discussed above, the authors assume, based on the economic literature, that the demand for medical services is inelastic so that increases in malpractice premiums are passed on to health insurers, who in turn pass them on to their customers.) They find that a ten percent increase in health insurance premiums reduces the likelihood of being employed by 1.2 percentage points, reduces hours worked by 2.4 percent, and increases the likelihood that a worker is employed part-time by 1.9 percentage points. For workers covered by employer-sponsored insurance, the

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[190] Jonathan T. Kolstad and Amanda E. Kowalski. "Mandate-based health reform and the labor market: Evidence from the Massachusetts reform." *Journal of Health Economics* (2016).

[191] Priyanka Anand. "Health Insurance Costs and Employee Compensation: Evidence from the National Compensation Survey." *Health Economics* (2017).

[192] Katherine Baicker and Amitabh Chandra. "The Labor Market Effects of Rising Health Insurance Premiums." *Journal of Labor Economics* (2006).

increase in premiums reduces wages by 2.3 percent. All told, the authors conclude that the cost of rising health plan premiums is borne primarily by workers.

166.   Gruber (1994) examined changes in state and federal laws during the mid- and late 1970s that mandated that insurance plans cover maternity benefits to assess who bears the increased cost associated with benefit mandates. [193] The author finds that the costs of the mandates are shifted completely to workers, with little effect on net labor input.

167.   Lastly, a related question is how the cost of employer-sponsored insurance is shared by employers and workers. Rae *et al*. (2019) found that in 2018, large employers paid approximately two-thirds of the cost of family policies for their workers, while workers bore the remaining one-third of the cost. [194] Of the cost borne by workers, approximately two-thirds was related to premium contributions and one-third was related to cost-sharing in the form of out-of-pocket payments such as copayments, coinsurance, and deductibles. The percentage of total cost borne by workers increased from 32 to 34 percent between 2008 and 2018. This analysis is consistent with data from the National Compensation Survey compiled by the Bureau of Labor Statistics, which indicate a two-thirds employer and one-third worker split in the share of health insurance premiums for family plans, while employers pay 80 percent of the premiums for single coverage.[195]

168.   In summary, the economic evidence suggests that increases in health care expenditures associated with members of employer-sponsored health plans lead to higher health plan premiums, with the pass-through rate being close to one-for-one (*i.e.*, a one dollar increase in expenditures increases health plan premiums by one dollar). Economic studies of the incidence of increases in the cost of employer-sponsored insurance show that both employers and workers bear these costs,

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[193] Jonathan Gruber. "The Incidence of Mandated Maternity Benefits." *American Economic Review* (1994).

[194] Matthew Rae, Rebecca Copeland, and Cynthia Cox. "Tracking the rise in premium contributions and cost-sharing for families with large employer coverage," Peterson-KFF Health System Tracker (2019), *available at* https://www.healthsystemtracker.org/brief/tracking-the-rise-in-premium-contributions-and-cost-sharing-for-families-with-large-employer-coverage.

[195] Bureau of Labor Statistics National Compensation Survey. "Table 4. Medical plans: Share of premiums paid by employer and employee for family coverage," (March 2021), *available at* https://www.bls.gov/news.release/ebs2.t04.htm; Bureau of Labor Statistics National Compensation Survey. "Table 3. Medical plans: Share of premiums paid by employer and employee for single coverage," (March 2021), *available at* https://www.bls.gov/news.release/ebs2.t03.htm.

although the preponderance of evidence suggests that they are borne primarily by workers. While there does not appear to be any published literature on the effect of premium reductions on worker compensation, we would expect that the benefits of lower premiums would pass on to workers in the form of higher wages.

C. Effect on Labor Market Conditions

169.   In connection with our evaluation of the DoN application for the Integrated Care Clinics, the DoN program asked us to evaluate the effect of the proposed project on the region's current labor market for health care professionals, including a consideration of the effect of the proposed project on the prevailing compensation for those professionals. The DoN program asked that we separately consider the effect of the proposed project on the labor market for physicians, mid-level practitioners, nurses, technologists, and other health care professionals. While there is widespread concern regarding worsening shortages for many types of health care professionals—including physicians, nurses, and radiology technologists—several recent analyses suggest that Massachusetts may be better positioned than other states to address these concerns and may even experience surpluses in some fields.

170.   The American Association of Medical Colleges commissions a widely cited annual study that predicts future demand for physicians. The most recent such national analysis indicates that the nationwide shortage will range between approximately 38,000 and 124,000 physicians by 2034.[196] This study attributes the growing shortage to increases in demand for health care services, due largely to population growth and aging, as well as supply factors that lead to increasing physician retirements. It also notes that the COVID-19 pandemic disrupted the pipeline of new physicians because of interruptions in medical education and cancellation of some clinical rotations, while at the same time increasing awareness of inequities in access to health care, which would require an additional supply (beyond the study's baseline need projections) of more than 100,000 physicians to address. Consistent with the American Association of Medical Colleges

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[196] American Association of Medical Colleges (prepared by IHS Markit Ltd). "The Complexities of Physician Supply and Demand: Projections from 2019 to 2034," (2021), *available at* https://www.aamc.org/media/54681/download?attachment.

study, another analysis predicts a nationwide shortage of approximately 139,000 physicians in the next decade but notes that Massachusetts is predicted to enjoy a surplus of more than 10,000 physicians by 2030.[197] Similarly, the Health Resources and Services Administration predicts a nationwide shortage of approximately 18,000 general internal medicine physicians, but a surplus in Massachusetts of more than 1,100 by 2030.[198]

171.   While some areas nationwide are predicted to suffer from a shortage of registered nurses, projections for Massachusetts do not project such a deficit. For example, one study predicts a nationwide shortage of over half a million registered nurses in 2030—largely due to an aging workforce and a decline in the number of people entering nursing, combined with a demographic-based increase in demand for nursing.[199] However, the same study predicts a surplus in Massachusetts of approximately 16,000 registered nurses in 2030. The Health Resources and Services Administration's nursing model shows a nationwide surplus of registered nurses of over eight percent by 2030, with approximately a two percent surplus of registered nurses in Massachusetts by 2030.[200] However, one very recent analysis of Massachusetts notes the disruption to nursing supply caused by the COVID-19 pandemic as layoffs and furloughs during the early days of the pandemic led to increased retirement of nurses and training disruptions.[201]

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[197] Xiaoming Zhang, Daniel Lin, Hugh Pforsich, and Vernon W. Lin. "Physician workforce in the United States of America: forecasting nationwide shortages." *Human Resources for Health* (2020).

[198] Department of Health and Human Services, Health Resources and Services Administration. "Data Downloads: Workforce Projections," *available at* https://data.hrsa.gov//DataDownload/DD_Files/Workforce%20Projections_Full%20Data20210513.xlsx.

[199] Xiaoming Zhang, Daniel Tai, Hugh Pforsich, Vernon W. Lin. "United States Registered Nurse Workforce Report Card and Shortage Forecast: A Revisit." *American Journal of Medical Quality* (2018).

[200] This same analysis shows shortages of licensed practical nurses both nationally and in Massachusetts, but the supply of licensed practical nurses is so much smaller than that of registered nurses that the combined impacts still show surpluses. (Department of Health and Human Services, Health Resources and Services Administration, "Supply and Demand Projections of the Nursing Workforce: 2014 and 2030," (July 21, 2017), *available at* https://bhw.hrsa.gov/sites/default/files/bureau-health-workforce/data-research/nchwa-hrsa-nursing-report.pdf.)

[201] Stephanie Taube and Rachel Lipson. "Covid-19 and the Changing Massachusetts Healthcare Workforce," Harvard Kennedy School and Massachusetts Healthcare Collaborative (2021). Moreover, nationwide, the tightened labor market for nurses has led to substantial increases in wage costs for providers. *See*, for example, Melanie Evans, "Nurse Salaries Rise as Demand for Their Services Soars During Covid-19 Pandemic," *Wall Street Journal* (November 17, 2021), *available at* https://www.wsj.com/articles/nurse-salaries-rise-as-demand-for-their-services-soars-during-covid-19-pandemic-11637145000?st=edqxq520ws85ts9&reflink=article_gmail_share.

172.   The future supply-demand balance for allied health care professionals has been studied less. However, the same Health Resources and Services Administration model described above indicates that Massachusetts should experience a surplus of physician assistants in 2026 and 2030.[202] The American Association of Radiology Technologists performs an annual survey of radiology departments; the 2019 survey indicated vacancy rates by specialty ranging from 3.7 percent for bone densitometry to 10.1 percent for CT, with a median across eight specialties of 7.9 percent.[203] This study noted that New England had the lowest vacancy rates nationwide, averaging 3.8 percent across all specialties.

173.   Turning to the staffing needs at the three Proposed Sites, we note that if the care to be provided at the Westborough, Westwood, and Woburn Sites represents solely a shift in volume from existing MGB academic medical centers or community hospitals, there may be little effect of the proposed project on overall demand for health care professionals in Eastern Massachusetts. In such a case, while the site at which care is delivered may change, the number of health care professionals required to deliver that care may not change (*i.e.*, the staffing needs at the Proposed Sites may be addressed by redeploying MGB employees from the Applicant's existing facilities to the Proposed Sites). In what follows however, we conservatively assume that the care provided at the Proposed Sites would represent entirely new demand for health care services rather than a shift in site of service from other MGB facilities or from competing health care providers. Under this assumption, the Proposed Integrated Care Clinics would require MGB to hire an additional complement of health care professionals to provide care at the Proposed Sites. We assess the incremental demand for health care professionals relative to the current supply of health care professionals in the labor markets in which the clinics are located.

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[202] Department of Health and Human Services, Health Resources and Services Administration. "Workforce Projections_Full Data20210513.xlsx," a*vailable at* https://data.hrsa.gov//DataDownload/DD_Files/Workforce%20Projections_Full%20Data20210513.xlsx.

[203] American Society of Radiologic Technologists. "Radiologic Sciences Staffing and Workplace Survey 2019," (September 2019), *available at* https://www.asrt.org/docs/default-source/research/staffing-surveys/radiologic-sciences-staffing-and-workplace-survey-2019.pdf.

1. Summary of Labor Needs at Each of the Clinic Locations

174.   At our request, the Applicant provided us with its current estimates of anticipated staffing needs—expressed in terms of full-time-equivalent workers—at each of the Proposed Sites by category of worker.[204] We understand that MGB expects that the physicians who provide care at each site may also provide care at other locations affiliated with MGB (*e.g.*, MGB's academic medical centers or community hospitals).[205]

175.   MGB's anticipated staffing needs by category of worker are summarized in Figure ICC28. As shown in the figure, staffing for each of the Proposed Integrated Care Clinics may include advanced practice providers (*e.g.*, behavioral health therapists, licensed independent clinical social workers, nurse practitioners, and physician assistants), clinical pharmacists, certified registered nurse anesthetists, medical assistants, registered nurses, radiology technicians, and surgical technicians. Staffing for each of the Proposed Clinics may also include physicians of different specialties, including primary care, psychiatry, radiology, anesthesiology, otolaryngology (ear, nose, and throat), general surgery, gastroenterology, ophthalmology, orthopedic surgery, spine, pain management, urology, physiatry, rheumatology, allergy/immunology, cardiology, dermatology, endocrinology, neurology, and pulmonary.

176.   In total, MGB estimates it would require 110 full-time-equivalent workers at the Westwood Proposed Site, 163 full-time-equivalent workers at the Westborough Proposed Site, and 174 full-time-equivalent workers at the Woburn Proposed Site. Projected staffing needs at the Westwood Site are lower than at the Westborough and Woburn Sites primarily because MGB currently provides physician services in an existing medical office building at the Westwood Site; consequently, the additional number of physicians that MGB anticipates would be required to staff that Proposed Site is lower. Other categories of staff that account for a large share of each clinic's anticipated staffing needs include medical assistants (32 at both the Westborough and Woburn Sites), registered nurses (31 at the Westwood Site, 32 at the Westborough Site, and 33 at the Woburn Site), and radiology technicians (30 at the Westwood Site, 21 at the Westborough Site,

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[204] We understand that MGB's anticipated staffing needs may change and that the estimates provided by MGB reflect its staffing projections after a three-year ramp-up period at each of the Proposed Sites.

[205] The staffing estimates for the Westwood Proposed Site include only the staffing needs associated with the proposed ASC and imaging equipment. Physician services are currently provided at an existing medical office at the site.

and 30 at the Woburn Site). We next compare MGB's anticipated staffing needs (by category of worker) for the Proposed Integrated Care Clinics to the existing supply of health care professionals (by category of worker) in the region to demonstrate the very modest impact that the projects are expected to have on existing labor market conditions.

2. Comparison of Need to Existing Supply

177.   To assess the impact of the Integrated Care Clinics' hiring plans on the existing supply of health care professionals in the labor markets in which the Proposed Clinics would be located, we delineate the geographic boundaries of the labor markets using the Massachusetts portions of Metropolitan Statistical Areas as defined by the federal Office of Management and Budget.[206] The Westwood and Woburn Sites are both located in the Boston-Cambridge-Newton, MA-NH Metropolitan Statistical Area, the Massachusetts portion of which includes Norfolk, Plymouth, Suffolk, Essex, and Middlesex Counties.[207] The Westborough Site is located in the Worcester, MA-CT Metropolitan Statistical Area, the Massachusetts portion of which is comprised of Worcester County.[208] While we adopt Metropolitan Statistical Areas for our analysis of labor supply, we acknowledge that labor markets for some types of health care professionals may be substantially broader (*e.g.*, recruitment of physicians may occur at regional or national levels).

178.   For each category of health care worker identified by MGB we determine the existing supply of those workers in the Boston-Cambridge-Newton and Worcester Metropolitan Statistical Areas as follows:

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[206] As described by the Office of Management and Budget, "Metropolitan Statistical Areas have at least one urbanized area of 50,000 or more population, plus adjacent territory that has *a high degree of social and economic integration with the core as measured by commuting ties*." Executive Office of the President, Office of Management and Budget, "Revised Delineations of Metropolitan Statistical Areas, Micropolitan Statistical Areas, and Combined Statistical Areas, and Guidance on Uses of the Delineations of These Areas." OMB Bulletin No. 20-01 (March 6, 2020), p. 2 (Emphasis added).

[207] Executive Office of the President, Office of Management and Budget, "Revised Delineations of Metropolitan Statistical Areas, Micropolitan Statistical Areas, and Combined Statistical Areas, and Guidance on Uses of the Delineations of These Areas." OMB Bulletin No. 20-01 (March 6, 2020), p. 44.

[208] Executive Office of the President, Office of Management and Budget, "Revised Delineations of Metropolitan Statistical Areas, Micropolitan Statistical Areas, and Combined Statistical Areas, and Guidance on Uses of the Delineations of These Areas." OMB Bulletin No. 20-01 (March 6, 2020), p. 71.

- We use the National Plan and Provider Enumeration System database maintained by CMS to determine the number of behavioral health therapists, licensed independent clinical social workers, nurse practitioners, physician assistants, clinical pharmacists, certified registered nurse anesthetists, and physicians (separately by physician specialty) residing in these areas.[209]

- We determine the number of registered nurses residing in these areas using the Massachusetts Health Professions License Data.

- We estimate the number of medical assistants, radiology technicians, and surgical technicians in Massachusetts using employment estimates from the Bureau of Labor Statistics,[210] and apportion the statewide employment estimates to the Boston-Cambridge-Newton and Worcester Metropolitan Statistical Areas using the fraction of residents of Massachusetts who reside in those areas.

179.   The left panel of Figure ICC29 summarizes our estimates of the existing labor supply of each category of health care worker in the Boston-Cambridge-Newton and Worcester Metropolitan Statistical Areas. The right panel of the figure expresses MGB's estimates of anticipated staffing needs at each of the Proposed Sites for each category of worker as a fraction of the existing labor supply for that category of health care worker. We note that our estimates of labor supply reflect current labor market conditions while MGB's anticipated staffing need reflects its labor demand after a three-year ramp-up period at each of the Proposed Sites. While this suggests that supply and demand estimates may not be directly comparable, we do not expect that shifts in labor supply during the ramp-up period would be sufficiently substantial to change our conclusions.

180.   While MGB identified the specialties that it anticipates offering at each of the Proposed Sites in addition to primary care, psychiatry, radiology, and anesthesiology, it was unable to determine the number of full-time-equivalent physicians for these other specialties that might be needed (which will, of course, depend on the particular needs of patients in each clinic's service area after the ramp-up period). As such, to determine the labor supply for the "Other Specialist"

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[209] The CMS NPPES Data are discussed in more detail earlier in the report.

[210] The United States Bureau of Labor Statistics Employment Data are discussed in more detail earlier in the report.

category, we can only determine the corresponding total number of physicians across those specialties identified by MGB that practice in the Boston-Cambridge-Newton and Worcester Metropolitan Statistical Areas. These figures are summarized in Figure ICC30. The total across all such specialties for each of the Proposed Sites is reported at the bottom of the figure and is also shown in the "Other Specialists" row of Figure ICC29.

181.   Turning back to Figure ICC28, MGB's anticipated staffing needs at each clinic for each category of worker never comprise more than one percent of the existing labor supply for that category of worker and are often substantially lower (*i.e.*, less than half a percent). Across all three Proposed Sites, MGB's anticipated staffing needs almost never comprise more than two percent of the existing labor supply by category of worker and most often represents less than one percent of the existing labor supply by category of worker. As such, even if MGB were unable to meet its staffing needs at any of the Proposed Sites by moving MGB employees from the Applicant's existing facilities to the Proposed Sites, we do not expect that a *de minimis* increase in the demand for health care professionals in the Boston-Cambridge-Newton and Worcester Metropolitan Statistical Areas would have a meaningful effect on prevailing compensation for those professionals in local labor markets.

XI.   Conclusions

182.   The DoN program requested that we provide short-term (*i.e.*, five years) and long-term (*i.e.*, ten years) estimates of the expected changes in total population and projected demographic shifts in the service area of each Proposed Integrated Care Clinic. Between 2020 and 2030, we find that:

- The population of the Westborough Clinic's service area is projected to increase by **seven percent**, with the number of residents age 65 and older projected to increase by **39 percent**.

- The population of the Westwood Clinic's service area is projected to increase by **five percent**, with the number of residents age 65 and older projected to increase by **30 percent**.

- The population of the Woburn Clinic's service area is projected to increase by **five percent**, with the number of residents age 65 and older projected to increase by **30 percent**.

183.   The DoN program asked that we evaluate MGB's market share for the services addressed in the DoN application and that we assess how those shares might change if MGB's DoN application were approved. We model changes in MGB's share under two scenarios. First, we assume that the Proposed Integrated Care Clinics would be used, where possible, to provide care to patients who otherwise would have received care at another MGB facility. Second, we allow the Proposed Integrated Care Clinics to attract patients from any competing health care provider. The first approach generally results in no change in MGB's overall share because patients are simply switching their site of care from an existing MGB facility to one of the Proposed Integrated Care Clinics. Our calculations for each Proposed Integrated Care Clinic are summarized in Figure ICC31 below. As shown in the figure, in each of the service lines addressed in the DoN application, MGB's current share is between 16 and 33 percent in the service areas of the three Proposed Integrated Care Clinics. Under the first scenario, there would be no change in MGB's share in these service areas; the proposed project would simply shift care from existing MGB facilities to the Proposed Integrated Care Clinics. Under the second scenario, the Proposed Integrated Care Clinics would increase MGB's share by between two and 13 percentage points.

Figure ICC31

Clinic / Service Line	MGB's Share Before Proposed Project	Change in MGB's Share After Proposed Project (From MGB)	Change in MGB's Share After Proposed Project (From All Comp.)
A. Westborough Clinic			
Outpatient CT Scans	22%	0%	7%
Outpatient MR Scans	19%	0%	9%
Outpatient Surgical Procs.	16%	0%	4%
B. Westwood Clinic			
Outpatient CT Scans	31%	0%	13%
Outpatient MR Scans	33%	0%	5%
Outpatient Surgical Procs.	27%	0%	4%
C. Woburn Clinic			
Outpatient CT Scans	29%	0%	7%
Outpatient MR Scans	28%	0%	8%
Outpatient Surgical Procs.	21%	0%	2%

184. We conclude that the predicted changes in MGB's shares and the corresponding changes in concentration associated with the Proposed Integrated Care Clinics are unlikely to meaningfully change the system's bargaining leverage with health insurers. Rather, the weight of the economics literature suggests that allowing health care providers—especially health care providers that are constrained in terms of capacity—to enter or expand puts downward pressure on health care prices and reduces expenditures on health care services.

185. The DoN program asked that we evaluate how the Proposed Integrated Care Clinics might change utilization of relatively higher- and lower-priced health care providers, and to assess the effect of any changes in utilization on health care expenditures in Massachusetts. We present our estimates of the effect of the Proposed Integrated Care Clinics on health care expenditures using two approaches. First, we measure the impact of the Proposed Integrated Care Clinics on the cost of health care services for only those patients who would switch to receiving care at the Proposed Integrated Care Clinics. Second, we measure the impact of the Proposed Integrated Care Clinics on the cost of health care services for all patients who received the relevant service (*i.e.*, including

both the patients who would switch to the Proposed Integrated Care Clinics and the patients who would not change their health care provider). The second approach produces substantially smaller estimates of the cost impact of the Proposed Integrated Care Clinics because the choices of most patients would be unaffected by the entry of the Proposed Integrated Care Clinics. For each Proposed Integrated Care Clinic, we provide these estimates separately for each service line addressed in the DoN application and also combined across all service lines.[211]

186.   For each of the three Proposed Integrated Care Clinics and each of the three service lines at the Proposed Integrated Care Clinics (*i.e.*, outpatient CT scans, outpatient MR scans, and outpatient surgical services) we calculate the cost impact using differing assumptions regarding (i) which health care providers the Proposed Integrated Care Clinics will attract patients from and (ii) what prices MGB will negotiate for care provided at the Proposed Integrated Care Clinics. We summarize the range of estimated cost impacts in Figure ICC32 below; while our estimates of the cost impact vary across service lines, Proposed Integrated Care Clinic location, and method, we uniformly predict that the Proposed Integrated Care Clinics will decrease expenditures on health care services. These estimates of the cost impact of the Proposed Integrated Care Clinics are based on current price differences between health care providers in Massachusetts and do not account for any downward pressure on prices that might result from MGB's proposed expansion.

187.   The first two columns of Figure ICC32 show the low and high end of our range of estimates of the change in expenditures for patients who switch to each of the Proposed Integrated Care Clinics. As shown in the figure, for each patient who switches to a Proposed Integrated Care Clinic, the decrease in expenditures ranges between 10 percent (Woburn outpatient surgical services) and 39 percent (Westborough and Westwood outpatient surgical services), with the weighted average decrease across all service lines for each Proposed Integrated Care Clinic ranging from 16 percent to 37 percent. The last two columns of the figure show the low and high end of our range of estimates of the change in cost expenditures across all patients (*i.e.,* those patients who switch to

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[211] To calculate the changes in expenditures across all service lines reported in Figure ICC32, we weight the expenditure impact for each service line by the total allowed amounts for that service line. We calculate these allowed amounts using the APCD and Medicare Claims data for patients residing in the Proposed Clinics' service areas. These weights are used to measure the contribution of each service line to the total cost impact of the proposed project in order to give more weight to the cost impact associated with service lines with higher health care expenditures and less weight to service lines with lower health care expenditures.

the Proposed Integrated Care Clinics and those patients who do not switch health care providers), the decrease in expenditures range between 0.0 percent (Westborough and Woburn outpatient surgical services) and 0.7 percent (Westwood outpatient MR scans and Woburn outpatient CT scans), with the weighted average decrease across all service lines for each Proposed Integrated Care Clinic ranging from 0.1 percent to 0.3 percent.

Figure ICC32

Clinic / Service Line	Change in Spending Per Switch to ICC (Low Est.)	Change in Spending Per Switch to ICC (High Est.)	Change in Spending Overall (Low Est.)	Change in Spending Overall (High Est.)
A. Westborough Clinic				
Outpatient CT Scans	-25%	-35%	-0.1%	-0.2%
Outpatient MR Scans	-13%	-34%	-0.1%	-0.3%
Outpatient Surgical Procs.	-12%	-39%	-0.0%	-0.1%
Across All Services Lines	*-16%*	*-37%*	*-0.1%*	*-0.2%*
B. Westwood Clinic				
Outpatient CT Scans	-28%	-35%	-0.4%	-0.6%
Outpatient MR Scans	-23%	-34%	-0.5%	-0.7%
Outpatient Surgical Procs.	-17%	-39%	-0.1%	-0.2%
Across All Services Lines	*-22%*	*-36%*	*-0.2%*	*-0.3%*
C. Woburn Clinic				
Outpatient CT Scans	-24%	-36%	-0.4%	-0.7%
Outpatient MR Scans	-21%	-35%	-0.3%	-0.6%
Outpatient Surgical Procs.	-10%	-35%	-0.0%	-0.2%
Across All Services Lines	*-19%*	*-35%*	*-0.1%*	*-0.3%*

188.   In summary, we predict a small overall **decrease** in health care expenditures across the service lines associated with the Proposed Integrated Care Clinics of at least 0.1 percent for the Westborough Clinic, at least 0.2 percent for the Westwood Clinic, and at least 0.1 percent for the Woburn Clinic. In addition, the economics literature predicts that allowing capacity-constrained providers such as MGB to expand puts downward pressure on health care prices. For these reasons, we believe that the proposed project is consistent with the Commonwealth of Massachusetts' health care cost-containment goals.