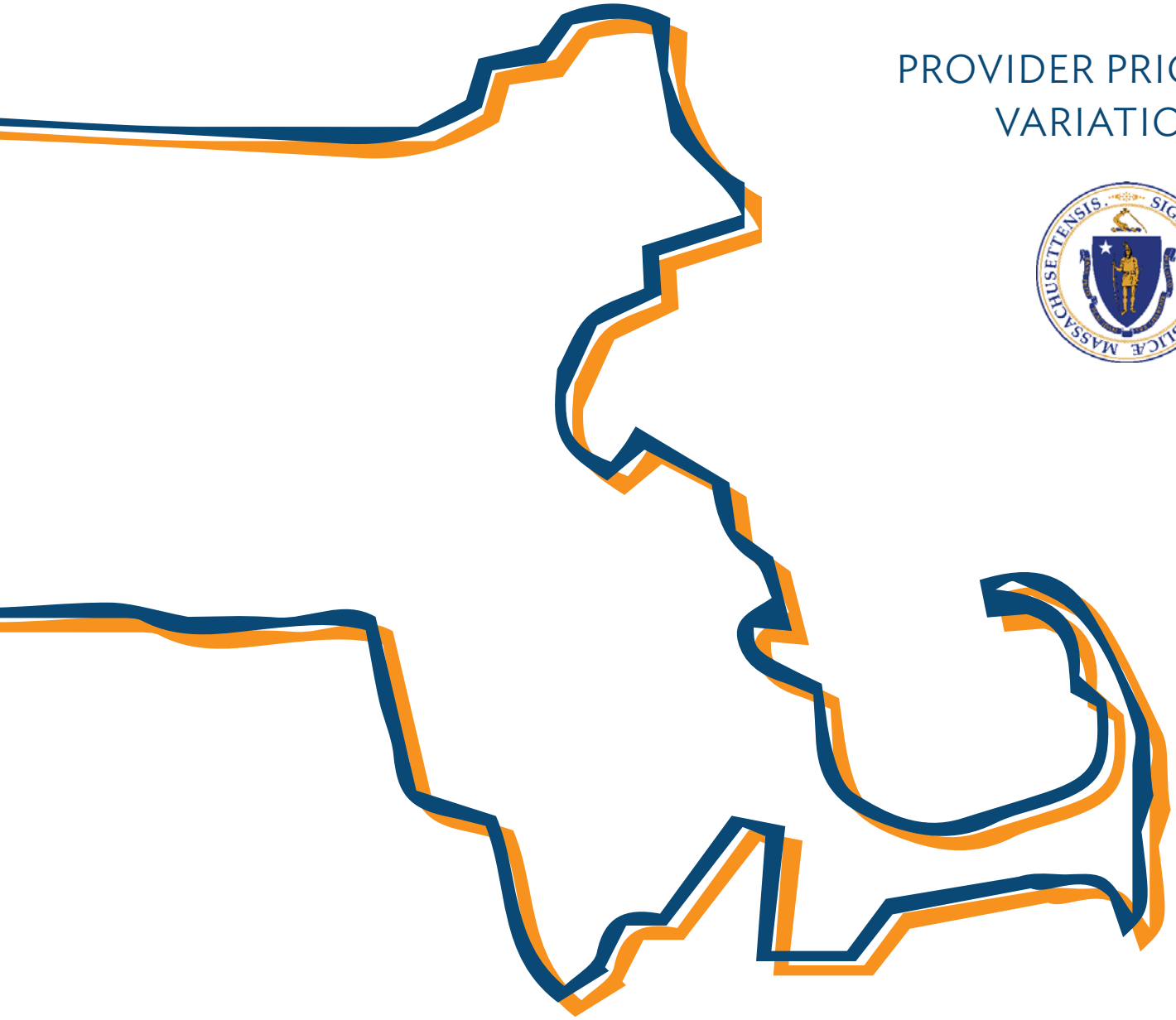
COMMONWEALTH OF MASSACHUSETTS
HEALTH POLICY COMMISSION

2015 COST TRENDS REPORT

PROVIDER PRICE VARIATION



Executive Summary

Massachusetts has been a national leader in ensuring access to high quality care and, with the passage of Chapter 224 of the Acts of 2012, the Commonwealth took steps to lead the nation in slowing the growth of healthcare costs. However, significant and persistent variation in provider prices for the same sets of services that is not tied to value threatens both of these goals of healthcare access and affordability. While some variation in prices may be warranted to support activities that are beneficial to the Commonwealth (e.g., provision of specialized services or physician training), work by multiple state agencies over the last six years has documented significant variation in provider prices that is not tied to measurable differences in quality, complexity, or other common measures of value. This unwarranted price variation, combined with the large share of patient volume at higher-priced providers, results in increased healthcare spending. It also perpetuates inequities in the distribution of healthcare resources that threaten the viability of lower-priced, high quality providers.

In this Special Report, the Health Policy Commission (HPC) builds on its past research and work by the Massachusetts Attorney General's Office (AGO) and the Center for Health Information and Analysis (CHIA), and demonstrates that the prices that different healthcare providers receive for the same sets of services vary significantly,[1] price variation is not decreasing over time, and the combination of price variation and the large share of patient volume at higher-priced providers drives higher healthcare spending. We also report on the results of a rigorous analysis of the factors associated with inpatient hospital prices, finding that a substantial amount of price variation reflects the leverage of certain providers to negotiate higher prices with commercial insurers, rather than value-based factors such as higher quality of care.

Why do Provider Prices Vary? How Commercial Health Care Prices are Set

Commercial prices for healthcare services (including fee-for-service prices, global budgets, and other units of payment) and other contract terms are established through negotiations between payers and providers. The results of these negotiations are influenced by the bargaining leverage of the negotiating parties. Market structure, such as high market share, can create bargaining leverage that impacts payer-provider contract negotiations because a payer network that excludes "important" providers will be less marketable to purchasers (employers and consumers). If a provider has a substantial market presence such that there are few or no effective substitutes for that provider in its market, the potential cost to a payer of excluding the provider from that payer's network will be high. The provider may use that leverage to command higher, supracompetitive prices (and other favorable contract terms) from the payer, and the payer may be motivated to agree to such terms in order to keep that "important" provider in its network. On the other hand, providers who have less market leverage may be motivated to agree to lower prices (and less favorable contract terms) to stay in the payer network to ensure needed patient volume. In both cases, the prices may not reflect the relative quality of the different providers, or other indicia of value. This differential pricing is generally not transparent to consumers (e.g., through differences in premiums or patient cost-sharing).

SUMMARY OF FINDINGS

1. Provider prices vary extensively for the same sets of services. Since 2010, multiple state agencies have documented extensive variation in both hospital and physician prices in Massachusetts for the same sets of services; the highest-priced hospitals and physician groups have been found to have prices two to four times those of the lowest-priced hospitals and physician groups among the three largest commercial payers, with higher variation among some smaller payers. Prices vary both among all hospitals and among cohorts of hospitals with similar characteristics; for example, relative price percentiles vary by more than 70 points among community hospitals. Prices also vary across different payment methods, including both fee-for-service prices and alternatives such as global budgets. Spending for episodes of care also varies extensively, driven by differences in price.

2. Provider price variation has not diminished over time. The HPC has found that neither hospital nor physician prices are converging. Both the extent of variation and the distribution of hospital prices have been generally consistent since 2010, and the variation in physician prices has increased somewhat since 2009. The price positions of individual hospitals and physician groups relative to the market tend to be consistent over time, particularly for providers at the top and the bottom of the relative price distribution.

3. Unwarranted price variation contributes to higher healthcare spending due both to the prices and to the large share of volume at higher-priced providers. Price variation has a significant impact on total spending not only because some providers receive far higher prices than others for the same sets of services, but also because the providers with high prices tend to have high volume. For the three major commercial payers, hospitals with the highest inpatient relative prices had approximately six to eight times as many inpatient stays as hospitals with the lowest relative prices, and approximately 18 to 23 times as much inpatient revenue, adjusting for differences in the number of hospitals. This share of inpatient volume and revenue at the highest-priced hospitals increased from 2010 to 2014 for two of the three major payers. Volume and revenue is also concentrated among the highest-priced hospitals for outpatient services; the highest-priced hospitals had two to four times as many outpatient visits and four to eight times as much outpatient revenue as hospitals in the lowest-priced group.

4. Higher hospital prices are not generally associated with higher quality or other common measures of value; market leverage continues to be a significant driver of higher prices. Past research has found that higher prices are not generally associated with factors that are often believed to add measurable value for consumers (e.g., quality or patient acuity). The HPC used a new, multivariate analysis to further explore the relationship between inpatient hospital prices and various potential explanatory factors. Using this rigorous methodology, the HPC found that, holding all other factors constant, including case mix (i.e., patient acuity):

- Less competition is associated with higher prices
- Membership in certain hospital systems affects prices, with membership in some systems predicting higher prices and membership in other systems predicting lower prices
- Large system size is associated with higher prices
- Provision of higher-intensity services and status as a teaching hospital are associated with higher prices
- Higher prices are not generally associated with measures of higher quality of care or hospital costs
- Higher shares of patients covered by public payers are associated with lower commercial prices

Additional HPC analysis suggests that where policymakers have defined value-based factors on which provider prices may vary, such as in Maryland, some variation still occurs, but the extent of this variation on value-based factors is substantially less than the variation in Massachusetts.

5. Unwarranted price variation is unlikely to diminish over time absent direct policy action to address the issue. Massachusetts has undertaken significant healthcare market reforms that have increased the transparency of provider price variation and may have prevented further increases in variation over time. However, there has not been meaningful progress in reducing unwarranted variation in provider prices over the past six years, and current reforms do not hold significant promise for meaningfully reducing this variation.

In light of these findings and the lack of evidence that the market is rectifying this dysfunction on its own through new payment and care delivery models or insurance product designs, the HPC recommends direct policy action to address unwarranted provider price variation in the Commonwealth. Following the release of this report, the HPC will promptly convene stakeholders to present and discuss specific, data-driven policy options for consideration by the legislature, other policy makers, and market participants. The HPC looks forward to working with these stakeholders to reduce unwarranted price variation in support of more sustainable and equitable healthcare system.

Findings

Provider prices vary extensively for the same sets of services

Prices vary extensively across different payment methods, including both fee-for-service prices and alternatives such as global budgets.

Extensive variation in both hospital and physician fee-for-service prices has been documented for six years

Extensive variation in provider prices for the same sets of services has been consistently documented in the Commonwealth since 2010. For example, the AGO's seminal 2010 Examination of Health Care Cost Trends and Cost Drivers report found that the highest-priced hospitals in 2008 had prices almost two times those of the lowest-priced hospitals for one of the three major commercial payers in Massachusetts,[i] and for the other two payers, payments to the highest-priced hospitals were three to four times those of the lowest-priced hospitals even after adjustments for factors such as volume, product mix, and service mix. Similarly, the highest-priced physician groups had prices and adjusted payments that were approximately two to three times those of the lowest-priced groups.[2] The AGO reported similar variation for 2009 in its 2011 report.[ii] Also in 2011, the Division of Health Care Finance and Policy (DHCFP) (the predecessor to CHIA) studied variation in payments for 14 selected diagnosis-related groups (DRGs),[iii] and found a 3- to 29-fold variation in prices paid to hospitals in 2009.[3]

To monitor this variation in prices, the Legislature mandated development of a "relative price" measure to compare prices paid to different providers within a payer's network (see **Sidebar: Relative Price**).[4]

Relative Price

The Legislature directed DHCFP (now CHIA) to develop a method to measure price variation within payer networks. The relative price metric shows variation by comparing provider prices to the average price paid in the network. For example, a hospital with a relative price of 1.10 is paid 10% more than the network average, while a hospital with a relative price of .90 is paid 10% less than the average. Relative price is calculated separately by payer for different types of providers (hospitals, physicians, community health centers, etc.), and hospital relative price is comprised of separate inpatient and outpatient relative price metrics. The relative price calculations are structured to control for quantity and types of services provided, as well as the different types of insurance products (e.g., HMO, PPO) offered by the payer. In addition, the calculation for inpatient relative price incorporates the number of case-mix-adjusted discharges from each hospital, which means that inpatient relative price controls for case mix, the most widely used hospital-level measure of patient acuity. CHIA calculates relative price by payer for all Massachusetts hospitals and for the top 30 physician groups based on share of total payments by each payer (all other physician groups are reported together in the aggregate). In 2012, the top 30 groups represented 87.9% to 99.9% of all physician payments by these three major commercial payers. CHIA also calculates relative price percentiles, which define each provider's price ranking within a payer's network. For example, a hospital in the 80th percentile of inpatient relative price has higher inpatient relative price than 80% of hospitals. Relative price percentiles use the same scale for all payers, so the relative position of the provider may be compared between payers or combined across payers into a composite relative price percentile.

i In this report, we focus on variation among commercial payers rather than, for example, among Medicaid Managed Care plans. Among commercial payers, we often report results for Blue Cross Blue Shield of Massachusetts, Harvard Pilgrim Health Plan, and Tufts Health Plan, the three largest commercial payers in Massachusetts. These three payers account for 67% of the commercial market by enrollment. Ctr. for Health Info. & Analysis, Annual Report on the Performance of the Massachusetts Health Care System, at 6 (Sept. 2014), *available at* http://www.chiamass.gov/assets/chia-annual-report-2014.zip (last visited Jan. 13, 2016).

ii AGO 2011 Report, *supra* endnote 1, at 15 (finding that all three major payers paid their highest-priced hospital more than two and a half times the prices of their lowest-priced hospital, and two payers paid their highest-priced hospital over four times the prices of the lowest-priced hospitals; for physicians, one payer paid their highest-priced physician group almost two and a half times the prices of their lowest-priced group, and two payers paid their highest-priced group over three times the prices of their lowest-priced group).

iii DRGs are "a classification system that groups similar clinical conditions (diagnoses) and the procedures furnished by the hospital during [an inpatient hospital] stay." DRG assignment is determined by "the beneficiary's principal diagnosis and up to 24 secondary diagnoses." Ctrs. for Medicare & Medicaid Servs., Acute Care Hospital Inpatient Prospective Payment System, at 2 (Apr. 2013), *available at* https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/downloads/AcutePaymtSysfctsht.pdf (last visited Jan. 12, 2016).

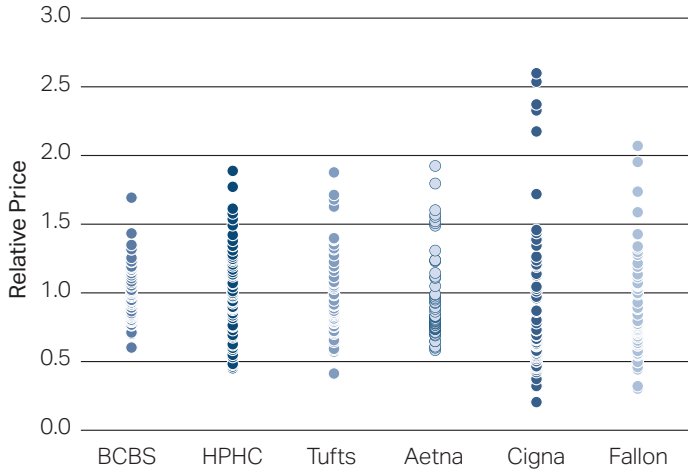
Using the relative price metric, CHIA found extensive variation in both hospital and physician prices for the same sets of services in its 2012 and 2013 reports.[5] **Exhibit 1** shows the ratios of the highest-to-lowest relative price for hospitals[iv] and physicians that CHIA reported for the three major commercial payers in Massachusetts, Blue Cross Blue Shield of Massachusetts (BCBS), Harvard Pilgrim Health Care (HPHC), and Tufts Health Plan (THP).

Exhibit 1: CHIA 2012 and 2013 Report Findings: Ratios of Highest to Lowest Relative Price

	Hospital Price Variation		Physician Group Price Variation	
	2010	2011	2009	2010
BCBS	2.73	2.88	2.56	2.64
HPHC	3.05	3.08	2.67	2.83
THP	3.58	3.70	2.85	2.77

CHIA continued to find wide variation in prices for hospitals and physician groups in 2012 and 2013.[6] While the statistics cited above only show variation across the three major commercial payers in Massachusetts, hospital prices varied across all commercial payer networks in Massachusetts, as shown in **Exhibit 2**. In fact, CHIA has found that variation tends to be higher for commercial payers with a smaller Massachusetts presence,[7] meaning that the results above and in the remainder of this report that focus on these three largest commercial payers likely *understate* the full extent and consequences of price variation.

Exhibit 2: Distribution of Acute Hospital Inpatient Relative Prices by Payer (2013)



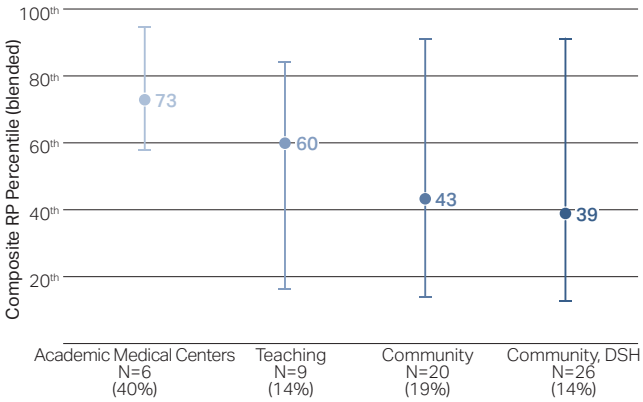
Source: CHIA Relative Price Databook (2015).[8]

iv This Report uses the term "hospital relative price" or "relative price for hospitals" to refer to CHIA's blended hospital relative price metric, which combines the hospital inpatient and hospital outpatient relative price metrics.

The HPC has also found wide variation in prices for hospitals. As described in the next section, we found that in 2014, the highest-priced hospitals were paid 2.71 to 3.36 times the prices of the lowest-priced hospitals for the three major commercial payers.[v]

CHIA found that hospital prices varied not only across all hospitals but also within hospital cohorts. CHIA defines four cohorts of general acute care hospitals: academic medical centers (AMCs), teaching hospitals, community hospitals, and community-Disproportionate Share Hospitals (community-DSH).[vi] While AMC and teaching hospital median relative price percentiles (see **Sidebar: Relative Price**) (73rd percentile and 60th percentile, respectively) were above those of community and community-DSH median relative price percentiles (43rd percentile and 39th percentile, respectively), **Exhibit 3** shows wide variation in price within each cohort. Even among the six AMCs, relative price percentiles varied by as much as 30 points, while for the other, larger cohorts relative price percentiles varied by more than 60 to more than 70 points.

Exhibit 3: Acute Hospital Composite Relative Price Percentile by Hospital Cohort (2013)



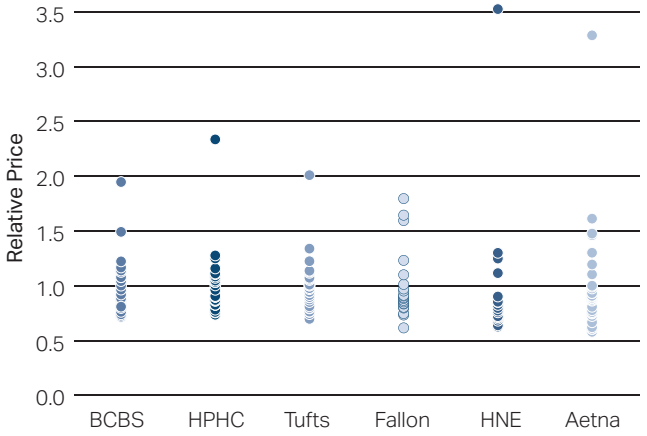
Source: CHIA Relative Price Databook (2015).[9]

v The HPC calculated these ratios based on data for only those hospitals reported by each payer in all data years from 2010 to 2014. For this reason, our results may vary from calculations based on those hospitals reported by each payer in data year 2014.

vi AMCs are defined as principal teaching hospitals for their respective medical schools with case mix intensity greater than 5% above the statewide average, extensive research programs, and extensive resources for tertiary and quaternary care. Teaching hospitals are non-AMC hospitals that report at least 25 full-time equivalent medical school residents per 100 inpatient beds. Non-teaching hospitals are broken into two cohorts: community hospitals (those with a public payer mix of less than 63%) and community-DSH hospitals (those with a public payer mix of 63% or more). In addition, all hospitals, not just community hospitals, with a public payer mix of 63% or more are defined as DSH. Ctr. For Health Info. & Analysis, Massachusetts Hospital Profiles Technical Appendix: Data Through Fiscal Year 2014, at E-6 (Nov. 2015), *available at* http://www.chiamass.gov/assets/docs/r/hospital-profiles/2014/FY14-Profiles-Tech-Appendix-Final.pdf (last visited Jan. 11, 2016).

As shown in **Exhibit 4,** CHIA found that physician prices similarly varied among all commercial payers, with some of the smaller payers showing even higher levels of variation.

Exhibit 4: Distribution of Physician Group Relative Prices by Payer (2012)



Source: CHIA Relative Price Databook (2015).[10]

The HPC also found variation in prices for physician groups. As described in the next section, we found that in 2013, the highest-priced physician groups were paid 2.62 to 3.32 times the prices of the lowest-priced groups for the three major commercial payers.[vii]

Variation is also extensive in global budgets and episode spending

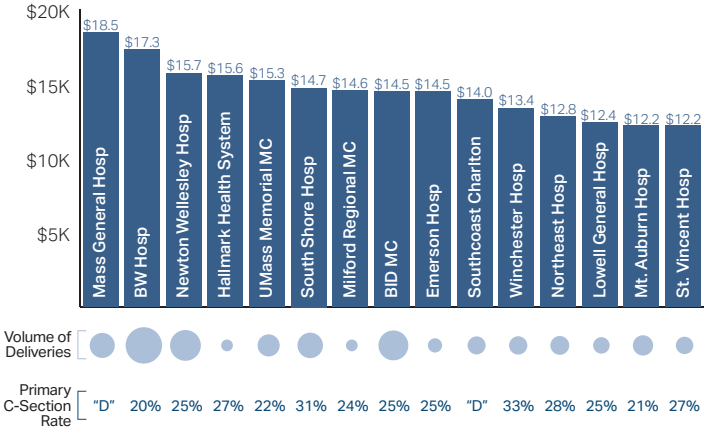
While the findings above focus on variation in fee-for-service unit prices, this variation in fee-for-service rates also translates into widely divergent resources available to provider organizations to care for HMO and Point of Service patients under risk contracts because global budgets are generally based on historic spending, embedding past price differentials. Like fee-for-service prices, resources available under risk contracts, including budgets and non-budgetary incentives, are negotiated. In 2013, the AGO found significant variation in health status adjusted budgets available to providers under risk contracts with each of the three major commercial payers to care for patients of comparable health. Across each payer's risk contracts, the provider groups with the highest effective budgets (all payments pursuant to the risk contract, including health status adjusted budget and non-budgetary incentives such as quality and infrastructure payments) had negotiated total resources 27% to 62% higher than the groups with the lowest effective budgets to care for comparable populations.[11] In 2015, the AGO reported that this variation had persisted, finding that for one major commercial payer's risk contracts in 2013, the provider with the highest effective budget had an effective budget that was 37% larger than the provider with the lowest effective budget to care for comparable patient populations; risk contracts for the other two major payers showed a similar pattern.[12]

Alternative payment methods, such as global budgets, can perpetuate price disparities because they are generally based on historic spending.

Past reports have shown that provider groups with the highest global budgets can receive **20% to 40% more** than other provider groups to care for comparable populations.

The HPC has also found that spending levels for common episodes of care vary considerably. Episodes of care include all services across settings (professional, hospital, post-acute, etc.) associated with a procedure. For example, the HPC's 2015 Cost Trends Report shows that maternity episode spending varies from approximately $9,722 to $18,475 for low-risk pregnancies.[13] While spending by different providers on an episode of care could vary due to differences in prices, differences in utilization, or a combination of the two, the HPC has found that this variation is driven by variation in the price of the inpatient stay rather than variation in prenatal or postnatal utilization patterns.[viii]

Exhibit 5: Average Payments for Deliveries by Hospital



Source: HPC Cost Trends Report (2015).[14]
Note: "D" indicates that the hospital declined to voluntarily submit rates.

vii The HPC calculated these ratios based on data for only those physician groups reported by each payer in all data years from 2009 to 2013. For this reason, our results may vary from calculations based on those physician groups reported by each payer in data year 2013.

viii *See* HPC 2014 Cost Trends Report, *supra* endnote 1, at 23 (finding that average spending for hip replacements ranged from $26,200 at the least expensive hospital to $41,700 at the most expensive hospital, while knee replacements ranged from $22,300 to $38,000 and PCI episodes ranged from $25,600 to $34,800, driven primarily by differences in the price for the procedures rather than utilization of services before or after the procedures). The HPC also found variation in spending levels for outpatient laboratory tests. The HPC found that for ten common tests, prices at hospital outpatient departments varied considerably; prices at the 90th percentile were at least double the prices at the 10th percentile for all tests. *See* HPC 2015 Cost Trends Report, *supra* endnote 13.

Massachusetts is not unique in having extensive variation in commercial healthcare prices

Massachusetts is not alone in having substantial variation in provider prices for the same or similar services. A recent working paper from the National Bureau of Economic Research examined national commercial claims data for three of the largest national payers over four years, and found wide price variation both across and within regions. For example, the most expensive hospitals within each region had commercial prices that were, on average, twice those of the least expensive hospital in the region for MRIs of lower-limb joints, and across the country such prices varied by a factor of twelve.[15] The Blue Cross Blue Shield Association, a national association of independent Blue Cross and Blue Shield companies, has also investigated price variation for percutaneous coronary interventions and knee and hip replacements, finding significant variation in many Metropolitan Statistical Areas (MSAs), including the Boston-Worcester area.[16] Other New England states have also found evidence of this problem.[ix]

Recent research from the National Bureau of Economic Research on national claims data found that for MRIs of lower-limb joints, **prices varied by a factor of two within regions and a factor of twelve across regions.**

The presence of price variation in multiple markets across the country suggests that the market dynamics that drive extensive variation in provider prices for the same sets of services are not unique to Massachusetts. However, as discussed in more depth later in this report, evidence suggests that where policymakers have defined value-based factors on which provider prices may vary,[x] such as in Maryland through its all-payer rate setting program,[xi] some variation still occurs, but the extent of this variation on value-based factors is substantially less than the variation in Massachusetts. For example, according to the Blue Cross Blue Shield Association study described above, Maryland's Cumberland MSA experienced only 20% variation for knee replacements and 28% variation for hip replacements, compared to 185% and 313% variation, respectively, in the Boston-Worcester MSA.[17]

Variation has not diminished over time

Price variation for both hospitals and physician groups is not only extensive and well-documented over multiple years, but has also remained consistent or increased over time.

Variation in hospital prices has not diminished

The HPC found that from 2010 through 2014, the highest-priced hospitals have consistently received prices that are 2.5 to 3.4 times those of the lowest-priced hospitals for the same set of services. This pattern is shown in **Exhibit 6** for one major commercial payer; the other two major payer networks show a similar pattern. A recent report by the AGO found similar persistence of price variation over time among the AMC, teaching hospital, community hospital, and community-DSH hospital co-

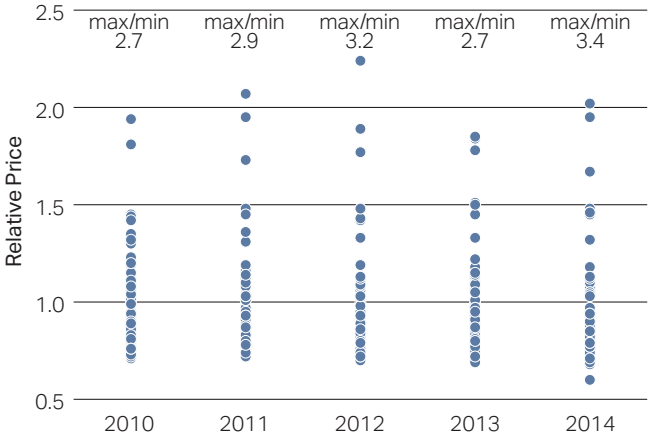
ix In 2009, New Hampshire experienced 117% variation in average inpatient and 113% variation in average outpatient hospital prices, after adjusting for case mix. Katherine London et al., Analysis Of Price Variation In New Hampshire Hospitals, Prepared For The New Hampshire Insurance Division, at 4-5 (Apr. 2012) [hereinafter New Hampshire Price Variation 2012], *available at* https://www.nh.gov/insurance/lah/documents/umms.pdf (last visited Jan. 11, 2016). In 2011 and 2012, Vermont's highest-paid hospital received 1.65 times the price of its lowest-priced hospital for inpatient services. Michael Del Trecco et al., Vermont Health Systems Payment Variation Report, Prepared For The Green Mountain Care Board, at 2 (June 2013), *available at* http://gmcboard.vermont.gov/sites/gmcboard/files/Variation_Jun03.pdf (last visited Jan. 11, 2016). In Rhode Island, the highest-priced hospital was paid more than twice what the lowest-priced hospital received for inpatient services, and nearly twice what the lowest-priced hospital received for outpatient services in 2010. Variation In Payment For Hospital Care In Rhode Island, Prepared For The Rhode Island Office Of The Health Insurance Commissioner And Rhode Island Executive Office Of Health And Human Services, at 15-16, (Dec. 2012) [hereinafter Rhode Island Payment Variation 2012], *available at* http://www.ohic.ri.gov/documents/Hospital-Payment-Study-Final-General-Dec-2012.pdf (last visited Jan. 11, 2016). Note that due to methodological differences, it is not possible to directly compare variation in Massachusetts to that in these other states.

x Chapter 224 of the Acts of 2012 directs the HPC, through a stakeholder process, to identify acceptable and unacceptable factors of provider price variation, and potentially to recommend maximum reasonable adjustments from network median rates for services or sets of services. Because Maryland has implemented a version of this policy, the HPC examines here the effect of such an approach on price variation.

xi Under Maryland's rate-setting system in effect until 2014, hospital prices could vary based on value-based factors defined through a robust regulatory process, including patient acuity, teaching status, hospital costs, and level of uncompensated care provided. It is important to note that limiting price variation to specific value-based factors was a consequence of Maryland's rate-setting scheme, but this policy does not necessitate rate-setting. Also, while Maryland has now transitioned to a system of hospital global budget revenue, this system still uses unit prices determined based on the factors noted above. *See* Maryland Health Services Cost Review Commission, http://www.hscrc.state.md.us/ (last visited Jan. 13, 2016).

horts.[xii] The distribution of hospitals around the network average price has also generally persisted over time.[xiii]

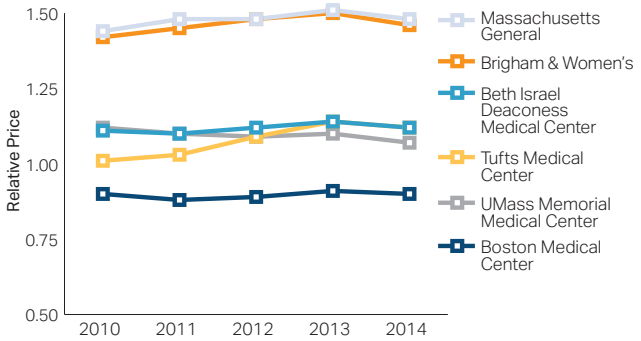
Exhibit 6: Hospital Relative Price Distribution (BCBS)



Source: CHIA Relative Price Databooks (2012 – 2015).[18]

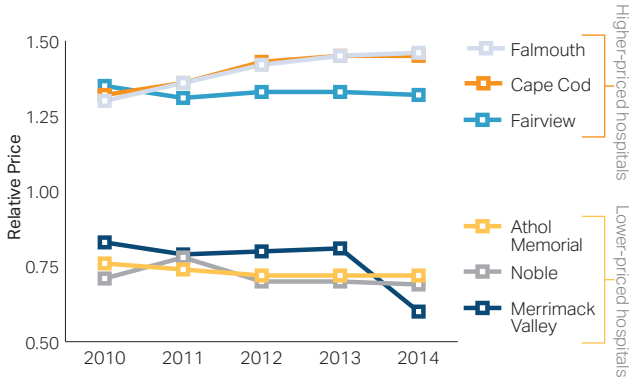
Further, the HPC has found that over time, a given hospital tends to receive prices that are at similar levels above or below the network average. That is, a hospital that received above-average prices in 2010 likely continued to receive higher prices through 2014, relative to other hospitals. In **Exhibit 7,** we show relative prices for the six AMCs[xiv] over time. In **Exhibit 8,** we show relative prices over time for the community hospitals with the highest and lowest relative prices.[xv]

Exhibit 7: Relative Prices for Academic Medical Centers (BCBS)



Source: CHIA Relative Price Databooks (2012 – 2015).[19]

Exhibit 8: Relative Prices for Highest- and Lowest-Priced Community Hospitals (BCBS)



Source: CHIA Relative Price Databooks (2012 – 2015).[20]

This consistency in price position, especially at the top and the bottom of the relative price distribution demonstrates the persistence of price variation in the Commonwealth. Note that these graphs show changes in *relative* price, not *absolute* price. For example, in the community hospital graph we see that in 2010, Fairview Hospital received prices 35% above the 2010 network average (relative price 1.35) while in 2014, Fairview Hospital received prices 32% above the 2014 network average (relative price 1.32). This does not mean that Fairview Hospital received slightly lower prices in 2014 than in 2010, but rather that their prices were slightly closer to the 2014 network average than to the 2010 network average.

xii The AGO found that for the three major commercial payers, there was no change in variation within the group of AMCs and slight to moderate decreases in variation for teaching hospitals. Two payers showed slight decreases in variation for community non-DSH hospitals and one showed a moderate increase, while two payers showed no change in variation for community-DSH hospitals and one showed a slight increase. AGO 2015 Report, *supra* endnote 1, at 20.

xiii Consistent with the relative price ranges used by CHIA in its 2015 report, the HPC analyzed the number of hospitals that received prices that were more than 20% below the network average; between the average and 20% below average; between the average and 20% above average; and higher than 20% above average from years 2010 to 2014. The HPC found that there was relatively little compression in price variation over time across the three major commercial payers. For example, 68.8% of hospitals in the BCBS network had inpatient relative prices within 20% of the network average in 2010 and 65.6% of hospitals in this range in 2014. If variation were decreasing, we would have expected to see the share of hospitals close to average price levels significantly increase over time rather than decrease as observed here. The change in the BCBS network reflects an increase in the proportion of hospitals receiving the lowest inpatient prices in the network.

xiv Note that in 2014, BCBS changed the way it reported relative price for Tufts Medical Center, Massachusetts General Hospital and Brigham and Women's Hospital; in previous years, BCBS reported a single relative price for both urban and suburban hospital campuses, and in 2014 instead reported separate relative prices for the urban and suburban campuses. The HPC blended the urban and suburban relative prices by computing an average relative price weighted by the revenue of each campus.

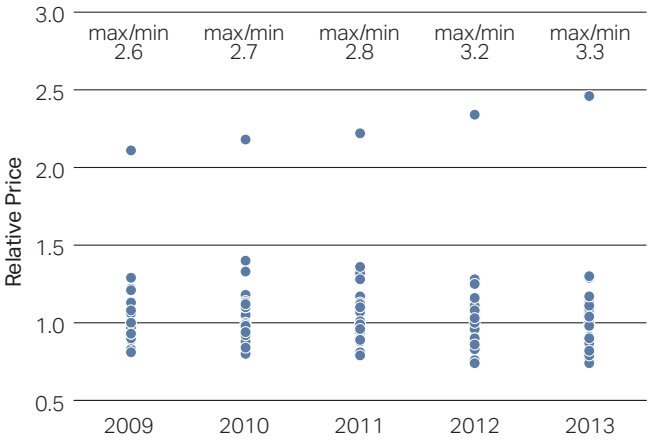
xv The HPC's analysis included only general acute care community hospitals for which the payer reported data in all five years to allow consistent comparison. However, the island hospitals Martha's Vineyard Hospital and Nantucket Cottage Hospital were excluded as low volume coupled with unique patient flow patterns resulting from their locations on islands make comparisons difficult between these hospitals and other Massachusetts hospitals.

Variation in physician prices has increased somewhat over time

The HPC has found that variation in physician prices increased somewhat from 2009 to 2013 for the three major commercial payers. In 2009, they paid their highest-priced physician groups prices that were 2.49 to 2.80 times what they paid their lowest-priced physician groups. By 2013, these payers paid their highest-priced groups prices that were 2.62 to 3.32 times what they paid their lowest-priced groups. This trend is displayed in **Exhibit 9** for one major payer; the other two showed similar trends.[xvi] This trend is driven primarily by increasingly higher prices provided to the highest-priced physician group (physicians affiliated with Children's Hospital Boston) relative to each payer's network average. However, even excluding this group, we find that price variation among physician groups increased for two of the three major payers (e.g., from a ratio of 1.59 in 2009 to 1.75 in 2013 for HPHC).

Again, within these upper and lower bounds, the relative distributions of physician groups around the network average price have persisted.

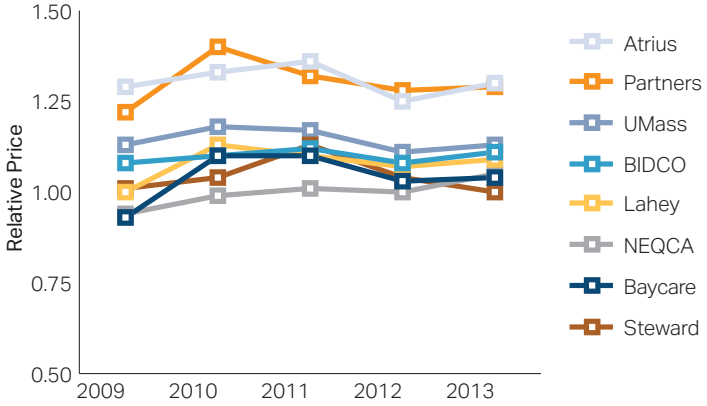
Exhibit 9: Physician Group Relative Price Distribution (HPHC)



Source: CHIA Relative Price Databooks (2012 – 2015).[21]

As with Massachusetts hospitals, there is also little change in each physician group's relative price from year to year. Groups that received high relative prices in 2009 tended to continue receiving higher relative prices in 2012, while those that received below-average prices in 2009 tended to continue receiving lower prices in 2012. **Exhibit 10** illustrates, for eight major physician networks statewide, the persistence of physician groups' price positions relative to the network average.[xvii]

Exhibit 10: Physician Group Relative Prices (HPHC)



Source: CHIA Relative Price Databooks (2012 – 2015).[22]

Again, this graph shows changes in *relative* price, not *absolute* price. Here, for example, Atrius received prices in 2009 that were 29% above the 2009 network average and in 2013 received prices that were about 30% above the 2013 network average, but this does not mean that Atrius received approximately the same prices in 2013 as in 2009; rather, that Atrius' maintained its price position relative to the network average during this time.

xvi The HPC analysis includes only physician groups for which payers reported relative price in all five years to allow consistent comparison.

xvii These physician networks are: Atrius Health (Atrius), Baycare Health Partners (Baycare), Beth Israel Deaconess Care Organization (BIDCO), Lahey Clinical Performance Network (Lahey), New England Quality Care Alliance (NEQCA), Partners Community Physician Organization (Partners), Steward Medical Group (Steward), and UMass Memorial Medical Group (UMass). Physicians affiliated with Children's Hospital Boston are not included in this chart. We note, however, that throughout this five-year period, Children's was consistently the highest-priced physician group, with relative prices above 2.0 in all five years.

Unwarranted price variation contributes to higher healthcare spending

This substantial variation in provider prices can have significant implications for healthcare spending. Broadly speaking, healthcare spending is comprised of two factors: utilization (total number of services as well as the mix of services that patients receive) and price (each provider's individual rates as well as mix of providers that patients utilize for care). There is strong evidence, documented by DHCFP/CHIA, the AGO, and the HPC, that higher prices explain the vast majority of recent increases in Massachusetts healthcare spending.[23] Past research by the HPC and others has also shown that the higher prices that some providers receive are generally not offset by savings from improved care delivery or reduced utilization.[xviii]

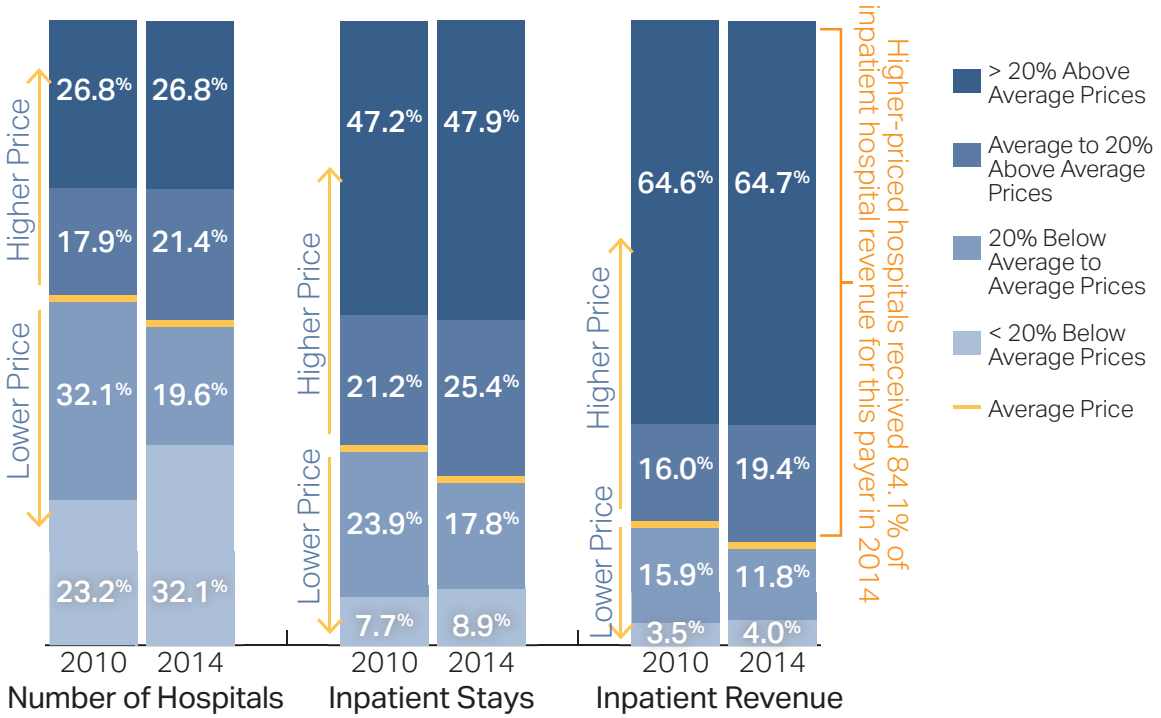
In 2014, hospitals with inpatient prices more than 20% above the network averages for the three major payers had approximately **six to eight times** as many inpatient stays and approximately **18 to 23 times** as much inpatient revenue as hospitals with inpatient prices lower than 20% below the network average.

However, price increases impact spending differently depending on a provider's initial price level and patient volume. Price variation has a significant impact on total spending not only because some providers receive far higher prices than others for the same set of services, but also because the providers with high prices also tend to have high volume. For the three major commercial payers, a similar number of hospitals receive inpatient relative prices that are more than 20% above the network average (the highest-priced group) as receive inpatient relative prices that are lower than 20% below the network average (the lowest-priced group). However, hospitals in the highest-priced group had approximately six to eight times as many inpatient stays in 2014 as hospitals in the lowest-priced group, and approximately 18 to 23 times as much inpatient revenue as the lowest-priced group, after adjusting for the difference in the number of hospitals in these groups. As shown in the chart below, the highest-priced hospitals have consistently greater volume and revenue than hospitals with the lowest prices; even when the proportion of hospitals in the lowest price category increases, their total share of volume and revenue remains a small fraction of the total.[xix]

xviii As discussed in the HPC's 2014 and 2015 Cost Trends Reports, higher spending for joint replacement, percutaneous coronary interventions, and maternity care (driven largely by differences in price) are not associated with better patient outcomes, strongly suggesting that price differences are also not offset by improved outcomes. *See* HPC 2014 Cost Trends Report, *supra* endnote 1; HPC 2015 Cost Trends Report, *supra* endnote 13. Some researchers have also acknowledged that while an efficient organization can reduce the volume of services provided compared to the average by perhaps 20 percent, variation in spending driven by higher prices is far greater than 20 percent in most markets or, "put more pithily, higher prices eat decreased volume for lunch." *See* Robert Berenson, *Acknowledging the Elephant: Moving Market Power and Prices to the Center of Health Policy,* Health Affairs Blog, (June 3, 2014), *available at* http://healthaffairs.org/blog/2014/06/03/acknowledging-the-elephant-moving-market-power-and-prices-to-the-center-of-health-policy/ (last visited Jan. 11, 2016).

xix The shares of volume and revenue among the highest-priced hospitals increased somewhat from 2010 to 2014 for BCBS and THP. In 2010, hospitals in BCBS's highest-priced group had approximately 5.5 times the inpatient stays and just under 16 times the inpatient revenue of hospitals in the lowest-priced group, compared to approximately seven times the stays and 23 times the revenue in 2014. In 2010, hospitals in THP's highest-priced group had just over five times the inpatient stays and nearly 16 times the inpatient revenue of hospitals in the lowest-priced group, compared to approximately 6.5 times the stays and 19 times the revenue in 2014. For HPHC, the concentration of inpatient stays at the highest-priced hospitals remained consistent (approximately 7.5 times the number of inpatient stays at the highest-priced group compared to the lowest-priced in both 2010 and 2014) and revenue concentrated at the highest-priced providers slightly decreased (from approximately 20 times the revenue to approximately 18 times the revenue concentrated in the highest-priced hospitals compared to the lowest-priced).

Exhibit 11: Distribution of Inpatient Volume and Revenue at Higher- and Lower-Priced Providers (THP)



Source: CHIA 2010[24] and 2014[25] Raw Relative Price Data.[xx]

The HPC found similar patterns for hospital outpatient services. Hospitals with the highest outpatient relative price had approximately two to four times as many outpatient visits[xxi] in 2012 as hospitals in the lowest-priced group, and approximately four to eight times as much outpatient revenue in 2012 as hospitals in the lowest-priced group, after adjusting for the difference in the number of hospitals in these groups.[xxii,xxiii]

In 2012, hospitals with outpatient prices higher than 20% above the network averages for the three major payers had approximately **two to four times** as many outpatient visits and approximately **four to eight times** as much outpatient revenue as hospitals with prices lower than 20% below the network average.

xx These findings are consistent with 2015 CHIA findings that across all commercial payers, higher-priced hospitals received 86% of total inpatient payments. CHIA 2015 Price Variation Report, *supra* endnote 1, at 3.

xxi The HPC counted outpatient hospital visits utilizing claims data in the All-Payer Claims Database by identifying claims associated with inpatient facilities but not associated with DRGs or admissions dates, and combining claim lines with the same patient identifier, service date, and provider identifier into a single outpatient visit. In other words, a single outpatient visit is a set of services provided to the same patient, on the same day, at the same hospital. Due to data constraints, we only analyzed outpatient visits using 2012 claims data.

xxii We lack comparative data on outpatient visits for multiple years, but in analyzing revenue distribution over time, we find only moderate change in revenue distribution. Hospitals with the highest relative price for BCBS went from having approximately 9 times the revenue of those with the lowest relative price in 2010 to approximately 7 times in 2014. Hospitals with the highest relative price for HPHC had approximately 3 times the revenue of those with the lowest relative price in both 2010 and 2014. Hospitals with the highest relative price for THP went from having approximately 6 times the revenue of those with the lowest relative price to approximately 5 times.

xxiii We lack data on physician volume, but do find that for the three major commercial payers, physician groups with higher prices also receive a high share of revenue, and that this share has increased over time. In 2013, physician groups with above-average relative price received 66% to 80% of physician group revenue, up from 26% to 78% in 2009, while groups with the highest relative prices received 21% to 53% of revenue, up from 18% to 26% of revenue in 2009.

Higher hospital prices are not generally associated with higher value

Past reports have found a relationship between higher prices and market leverage, but have not generally found higher prices to be associated with higher quality, patient acuity, or DSH status

Prior research by the Massachusetts AGO, CHIA, and the HPC has demonstrated that the higher prices that some providers receive are not explained by better quality, higher patient acuity, or other factors that provide benefit to the Commonwealth. In 2010, for example, the AGO found no connection between hospital price and the quality of care delivered or how sick the patients served were; however, it did find an association between hospital market share and price, suggesting that hospitals seeing more patients were able to negotiate higher rates with commercial payers.[26] Further research presented by the AGO in 2015 found almost no correlation between price and quality measures for hospitals or physicians.[xxiv] A 2011 Special Commission on Provider Price Reform similarly found no statistically significant relationship between quality of care and price for any commercial payer, and only a weak correlation between patient acuity and price for one payer's inpatient prices, with no significant correlation for other payers.[27] The Special Commission found that DSH hospitals tended to have lower prices,[28] and CHIA also found that DSH hospitals had lower prices while AMCs and teaching hospitals had higher prices.[29]

The HPC's rigorous multivariate analysis shows that a substantial portion of hospital price variation is associated with market structure, and is not generally associated with higher quality

The HPC used rigorous multivariate analyses, employing 16 different model variations, to further explore the relationship between inpatient hospital prices and various factors, isolating the independent associations between each factor and price. That is, the analysis of each factor holds all other factors constant, so that we can estimate the effect of, for example, hospital system size, separately from any other factor. We analyzed the relationship of price position both to factors indicative of measurably higher value for which we might be willing to pay higher prices (e.g., higher quality of care) and factors that are not generally indicative of value (e.g., the level of competition a hospital faces).[xxv] See the Technical Note for more details on methods.

The HPC found that, consistent with past findings, 2013 inpatient hospital prices in Massachusetts were tied to the level of competition a hospital faced and the hospital system with which it was affiliated. We also found that teaching status and provision of more tertiary services also played a role. We found that measures of quality and local income levels, both of which might justify higher prices, were not generally associated with price. In addition, caring for more public-payer patients was actually associated with *lower* prices, suggesting that rather than higher commercial prices offsetting lower payment rates from public payers as some providers contend, hospitals serving higher proportions of Medicare and Medicaid patients are also disadvantaged by generally lower commercial prices. The results of our analysis are detailed below.

Less competition is associated with higher prices

The HPC found that, consistent with past work and national research, less competition (as measured by the number of community or teaching hospitals with overlapping service areas) was associated with higher prices,

xxiv AGO 2015 Report, *supra* endnote 1, at 21. The report found no correlation between hospital price and quality performance as measured by Mass-DAC cardiac procedure outcomes, AHRQ quality indicators, patient experience scores (HCAHPS), mortality and readmission rates, and a process measure composite; there was a slightly positive correlation with the AHRQ IQI 90 Mortality Composite for Select Conditions. The report also found no relationship between physician group relative price and physician quality performance as measured by 2012 HEDIS Adult and Pediatric Clinical Quality Measures and 2013 Adult and Pediatric Patient Experience Survey Measures (CG-CAHPS).

xxv The HPC conducted a multivariate regression analysis, analyzing the determinants of a hospital's inpatient relative price percentile using Ordinary Least Squares regressions, with standard errors clustered at hospital system level. The inpatient relative price measure underlying the inpatient relative price percentile is calculated to hold payer-level case mix constant. As a measure of quality, we used either the 2013 PSI-90 or the 2013 Total Performance Score. Other variables include: whether a hospital is a community, teaching, or AMC hospital; mean household income by zip code in a hospital's service area; the share of a hospital's inpatient services that are tertiary; the share of a hospital's discharges paid for by MassHealth, Commonwealth Care, or Health Safety Net; the share of a hospital's discharges that are paid for by Medicare; the number of community and teaching hospitals with service areas that overlap with a hospital's service area; whether a community or teaching hospital has a service area that overlaps with the service area of an AMC; the system to which a hospital belongs; and the number of staffed beds in the system to which a hospital belongs. Our results were robust across eight model specifications using our baseline methodology (Ordinary Least Squares). We also ran these eight specifications using a different methodology, a generalized linear model with a logit link, to further explore the sensitivity of our model. This methodology yielded qualitatively similar results for all variables. However in three model specifications, worse PSI-90 scores were associated with lower price. See the Technical Note for more details on methods.

and more competition was associated with lower prices in Massachusetts. For example, a community or teaching hospital whose service area does not overlap with the service area of any other community or teaching hospital has a predicted relative price percentile 2.3 to 2.7 points higher than if it had two such competitors. In addition, where community or teaching hospital service areas overlap with those of AMCs, this competition effect was stronger.[xxvi] A community or teaching hospital that does not share its PSA with an AMC has a predicted relative price percentile 9.2 to 11.1 points higher than a similar hospital with at least one AMC competitor. These findings indicate that less competition is associated with higher prices, while more competition is associated with lower prices.

There is substantial empirical evidence to support the conclusion that healthcare markets with less competition and greater market concentration tend to have higher prices for services.[30] A 2006 study that reviewed 13 empirical studies found that significant increases in market concentration (i.e., significant reductions in competition), particularly in already-concentrated markets, increase providers' ability to leverage higher prices and other favorable contract terms from commercial payers. The authors explained that, "[s]tudies that examine consolidation among hospitals that are geographically close to one another consistently find that consolidation [i.e., removal of a competitor from the market] leads to price increases of 40 percent or more."[31] More recently, a working paper from the National Bureau of Economic Research examined 2007-2011 commercial claims data from UnitedHealth Care, Cigna, and Aetna, investigating the factors underlying hospital price variation within and across regions. The study found that hospital prices are positively associated with indicators of hospital market power; controlling for a range of other factors, hospital prices in monopoly markets were 15.3% higher than those in markets with four or more hospitals, while markets with two dominant hospitals had prices 6.4% higher than markets with four or more hospitals.[32] As one study author explained, "[t]he reason why health insurance for the privately insured is expensive is because the prices from hospitals with a lot of market power are higher."[33]

The size of hospital systems, and membership in certain hospital systems, affect prices

When system affiliation was analyzed by size of the system (as measured by staffed beds), the HPC found that adding staffed beds, at smaller system sizes, was associated with lower prices, suggesting that increased size could initially create some efficiency or cost savings. However, with increasing size, this efficiency slowed and, at larger system sizes, size was associated with higher prices, suggesting that any efficiency was offset by gains from market power allowing larger systems to negotiate *higher* prices. For example, holding all other factors equal, a hospital that is part of a system the size of Partners HealthCare System (Partners) has a predicted relative price percentile 13.1 points higher than the same hospital would have as part of an average-sized system.

The HPC also examined the effect of membership in specific hospital systems, compared with being unaffiliated with a system. This allows us to consider, controlling for a variety of other factors in the regression, the distinct effect of being in a specific system. These system effects included system size, but held all other factors constant (e.g., the number of competitors they face, whether they are a teaching hospital, their share of public-payer patients, and the proportion of their services that are tertiary). This allowed us to measure the effect of specific system affiliations, including both the size of that system and difficult-to-measure variables such as the impact of that system's brand. We found that in most cases, being part of a specific system had measurable and statistically significant effects on prices. Specifically, holding all of the factors listed above constant, hospitals in the Berkshire Health System, Cape Cod Healthcare, Partners,[xxvii] and Southcoast Health systems had higher prices than other factors would otherwise predict. Conversely, hospitals in the Baystate Health, Beth Israel Deaconess Medical Center, Circle Health, Heywood Healthcare, and Steward Health Care systems had lower prices than other factors would otherwise predict.

xxvi This suggests that AMCs are acting as effective substitutes to community and teaching hospitals in many markets, perhaps reflecting the degree to which patients are increasingly choosing to receive routine care at AMCs as highlighted in other research by the HPC. *See* Mass Health Policy Comm'n, 2013 Cost Trends Report: July 2014 Supplement, at 25-26 (July 2014), *available at* http://www.mass.gov/anf/docs/hpc/07012014-cost-trends-report.pdf (last visited Jan. 11, 2016).

xxvii This applies to hospitals that are *owned* by the Partners system. We included a separate variable for independently-owned hospitals for which Partners established contracts in 2013, and found that for these hospitals, the affiliation was associated with *lower* prices.

Provision of higher-intensity services and teaching status are associated with higher prices

The HPC also analyzed the proportion of each hospital's services that were higher intensity, or "tertiary."[xxviii] Even though our model held case mix (i.e., patient acuity) constant, we found that a higher proportion of tertiary services was associated with higher prices across all inpatient services.[xxix] For example, we found that holding all else equal, a community hospital with a relatively high share of tertiary services (at the 75th percentile among community hospitals) has a predicted relative price percentile 5 points higher than a community hospital with a relatively low share of tertiary services (at the 25th percentile).

Consistent with past research, the HPC also found that teaching status, compared to status as a community hospital, is significantly associated with higher price. A hospital's predicted relative price percentile is approximately 10 to 11 points higher if it is a teaching hospital rather than a community hospital, holding all else, including their share of tertiary services, equal. Although it is not clear empirically whether training and employing medical residents is a net financial cost or benefit to teaching hospitals,[34] payers such as Medicare often provide additional payments to teaching hospitals, reflecting the social benefits of training new physicians. Our analysis suggests that commercial payers also pay higher rates to teaching hospitals compared to community hospitals.[xxx]

Higher prices are not generally associated with measures of higher quality of care or indicia of higher hospital costs

We measured hospital quality using the Centers for Medicare & Medicaid Services (CMS) Total Performance Score, a nationally recognized and validated composite of multiple quality measures including Clinical Process of Care, Outcomes, Patient Experience, and Efficiency metrics.[35]

xxviii While we refer to these as "tertiary" DRGs, we also include high-intensity services that some may consider quaternary. For our purposes, tertiary DRGs were defined as DRGs that are in the top 10% of DRGs by case weight and are typically performed (at least 50% of discharges in 2011) at hospitals with an average case mix index of 1 or greater.

xxix Notably, AMC status was not associated with higher prices, likely because after controlling for provision of tertiary services, the fact that a hospital is an AMC does not play a large role in determining prices.

xxx Commercial payers also pay higher prices to AMC hospitals compared to community hospitals. Some of the AMC effect is measured in the regression model through the competition variable that measures whether a community or teaching hospital have an AMC hospital in their PSA. Some of the AMC effect is measured through the share of services that are tertiary. Holding these and all other factors constant, we found no additional difference between designation as a teaching hospital and designation as an AMC.

As a sensitivity analysis, we also examined the PSI-90, a composite measure of a hospital's rate of complications. Across all eight models in which we used the more robust quality measure, Total Performance Score, we found no significant association between hospital quality and price. Similarly, in five out of eight model specifications in which we used PSI-90, a hospital's rate of complications was also not associated with price. In the three model specifications where we found any statistically significant association between any measure of quality and price, the relationship between a hospital's complication rate and price remained small.[xxxi]

Some hospitals operate in locations that have higher costs, particularly for labor. For this reason, the HPC also studied the relationship between price and the median income for the zip codes comprising each hospital's service area. We found that these area income levels were also not significantly associated with price, indicating that higher prices are likely not driven by a need to account for higher local labor costs.

A higher share of patients covered by public payers is associated with lower commercial prices

Generally, public payers (e.g., Medicare and MassHealth) reimburse providers at lower rates than commercial payers.[xxxii] Some providers identify these lower public rates as a valid reason for price variation and as justification for the higher commercial rates that they receive.

However, in our analyses, we found that the more public-payer patients a hospital has, the lower its commercial prices tend to be. Both higher shares of Medicare patients as well as higher shares of patients covered by state programs (MassHealth fee-for-service, MassHealth managed

xxxi In the three model specifications that found a relationship between price and PSI-90 complications rates, increasing (worsening) a hospital's PSI-90 by a full standard deviation (20%) above the mean decreased relative price percentile by about 3 points. (By comparison, the same reduction in relative price percentile is achieved by increasing the number of competitors that community and teaching hospitals face from zero to two, which represents only one third of the standard deviation of that variable.) In one of the three specifications showing statistical significance, the findings were also only significant at the 10% level.

xxxii For example, according to a survey of community hospitals by the American Hospital Association, in 2013 private insurers paid, on average, just over 140% of hospital costs per discharge while Medicaid and Medicare each paid just under 90% of costs, factoring in disproportionate share payments. *See* American Hospital Assoc., Trends Affecting Hospitals and Health Systems, Chartbook 4.6: Aggregate Hospital Payment-to-Cost Ratios for Private Payers, Medicare, and Medicaid, 1993 – 2013 (Apr. 2015), *available at* http://www.aha.org/research/reports/tw/chartbook/2015/chart4-6.pdf (last visited Jan. 13, 2016).

care, Commonwealth Care, and Health Safety Net) were associated with lower prices independently of each other, though we note that many DSH hospitals have *both* higher Medicare discharges *and* higher Medicaid and other state program discharges. We found that a hospital has a predicted relative price percentile 3.2 to 4.2 points lower if it has a share of Medicare discharges comparable to that of DSH hospitals (53.7%) versus if it has the average share of Medicare discharges of non-DSH hospitals (45.5%). Similarly, we found that a hospital has a predicted relative price percentile 1.3 to 1.8 points lower if it has a share of discharges paid by state programs comparable to that of DSH hospitals (21.6%) versus a share comparable to that of non-DSH hospitals (17.8%). If a hospital had shares of Medicaid and Medicare discharges that were much higher or lower than these averages, we would likewise expect the impact on pricing to be greater. This runs counter to the assertion by many providers that their higher commercial rates make up for lower reimbursement by public payers; rather, hospitals with less need to balance lower public payer payments (i.e., hospitals that serve fewer patients covered by public payers) are more likely to have higher commercial prices.

Some states like Maryland have limited variation to certain value-based factors; the extent of this value-based variation is significantly less than the variation in Massachusetts.

The presence of price variation in multiple markets across the country suggests that the market dynamics that drive extensive variation in provider prices for the same sets of services are not unique to Massachusetts. As detailed above, some of the wide variation in prices in Massachusetts is driven by factors, such as those relating to market structure, that do not reflect value for consumers or the Commonwealth. Again, this observation is not unique to Massachusetts. As discussed above, other New England states experience significant price variation. Like Massachusetts, other New England states experiencing significant price variation have also not found that higher prices are associated with objective measures of value. [xxxiii]

However, evidence suggests that where policymakers have defined value-based factors on which provider prices may vary,[xxxiv] such as in Maryland through its all-payer rate setting program, some variation still occurs, but the extent of this variation on value-based factors is substantially less than the variation in Massachusetts. By design, all price variation in Maryland is limited to objective measures of value, as determined through a regulatory process. These include case mix (patient acuity), reasonable hospital costs (as measured against peer hospitals), area wage variations, payer mix, and level of uncompensated care provided, as well as extra payments for graduate medical education and an incentive program to reward hospitals for quality performance.[36] While limiting price variation to these specific value-based factors was a consequence of Maryland's rate-setting scheme, such an approach does not require rate-setting.

To compare variation in Massachusetts with Maryland, the HPC compared variation in median charges by Maryland hospitals[xxxv] with variation in median payments to Massachusetts hospitals for 14 DRGs, broken out by the severity level of the inpatient stay.[xxxvi] **Exhibit 12** shows the

xxxiii In New Hampshire, higher inpatient prices were associated with higher occupancy rates, commercial cost per discharge (not case-mix-adjusted), and the percent of inpatient charges billed to Medicare, while higher outpatient prices were associated with higher commercial cost per case-mix-adjusted episode, the percent of outpatient charges billed to Medicare, and the percent of discharges billed to Medicare. Higher rates of Medicaid patients were associated with *lower* outpatient prices. New Hampshire Price Variation 2012, *supra* footnote ix, at 5-6. In Rhode Island, higher-cost hospitals tended to be paid more than hospitals with lower costs, and researchers found no link between quality and price. Rhode Island Payment Variation 2012, *supra* footnote ix, at 32-39.

xxxiv Chapter 224 of the Acts of 2012 directs the HPC, through a stakeholder process, to identify acceptable and unacceptable factors of provider price variation, and potentially to recommend maximum reasonable adjustments from network median rates for services or sets of services. Because Maryland has implemented a version of this policy, the HPC examines here the effect of such an approach on price variation.

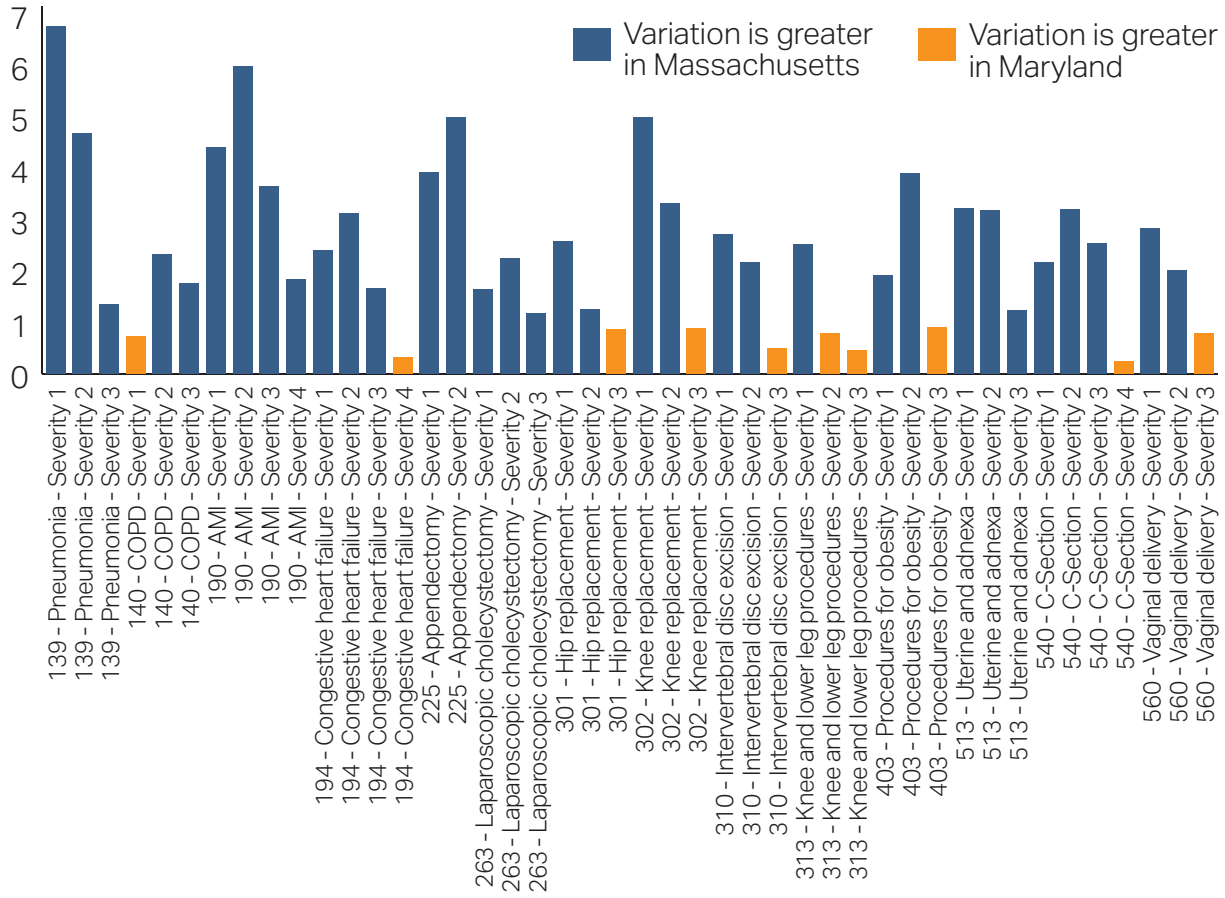
xxxv While median payment data were unavailable for Maryland hospitals, under Maryland's rate-setting system, hospital charges and hospital payments are comparable and, according to the Maryland Health Services Cost Review Commission (HSCRC), the variation in charges and payments in Maryland are approximately equal. The HPC is grateful for the assistance of the Maryland HSCRC in providing this data.

xxxvi Data on Massachusetts payments is from the DHCFP 2011 report discussed above, which studied payment variation for select DRGs. DHCFP 2011 Report, *supra* endnote 1, at 9. Both DHCFP and the Maryland HSCRC used APR-DRGs, which are divided into 4 severity levels. DHCFP reported on variation for 2 to 4 severity levels for each of 14 DRGs, and we compared these with Maryland data, for a total of 44 observations.

difference between price variation for specific diagnoses of a given complexity in Massachusetts versus Maryland in 2009. Blue bars indicate that Massachusetts variation was greater than Maryland variation (the ratio of Massachusetts variation to Maryland variation is over 100%), while orange bars indicate that Maryland variation was greater (the ratio of Massachusetts to Maryland variation is less than 100%).

As shown below, we found greater variation among payments to Massachusetts hospitals than among charges by Maryland hospitals for more than three quarters of severity-level DRGs. Further, for more than half of these DRGs, the variation among Massachusetts hospitals was more than twice the level of that in Maryland. For low-severity pneumonia (DRG 139), the extent of variation in Massachusetts was nearly seven times (700%) that of Maryland.

Exhibit 12: Ratio of Massachusetts Variation to Maryland Variation



Sources: DHCFP 2011 Report;[37] Maryland Health Services Cost Review Commission.[38]

Unwarranted price variation is unlikely to diminish over time absent direct policy action to address the issue

As described throughout this Special Report, variation in provider prices for the same sets of services continues to be significant, price variation is not decreasing over time, price variation drives increased healthcare spending, and much of variation in prices is not attributable to higher quality or other common measures of value, but rather to market leverage. These points underscore the necessity of rectifying this persistent issue.

The Commonwealth has instituted a multitude of reforms to directly combat rising healthcare costs and prevent worsening market dynamics, such as through Chapter 224 of the Acts of 2012 and Chapter 288 of the Acts of 2010. While some of these initiatives have increased transparency and may have prevented worsening of unwarranted provider price variation, none directly addressed *reducing* unwarranted price variation, and none currently hold significant promise for meaningfully reducing such variation.[xxxvii] For example, while the state's healthcare cost growth benchmark is an important tool to keep the growth in healthcare expenditures in line with growth of the state's economy, the benchmark focuses on year-over-year growth rather than the allocation of healthcare dollars within the healthcare system to different providers.[xxxviii] Early results show that the benchmark has not changed behavior in a manner that would reduce price disparities, such as by encouraging payers to reduce rate increases for higher-priced providers; even after the benchmark was in place in 2013, payers continued to negotiate higher increases for certain hospitals with already-higher inpatient prices.[xxxix] Similarly, while Chapter 224's encouragement of the adoption of alternative payment methods may hold promise for increasing providers' efficiency, the construction of global budgets thus far has been based on providers' historic spending levels, entrenching historically higher fee-for-service prices in larger global budgets as well. Further, while alternative payment methods should encourage providers to refer patients to lower-priced providers so as to reduce spending relative to their risk budgets, other market forces, including relationships between providers, have limited this effect. As a result, extensive variation remains in risk-adjusted global budgets for all three major payers.[xl]

Recognizing that price variation has not diminished to date, and that existing policy initiatives do not appear well suited to addressing the problem, it is unlikely that unwarranted provider price variation will diminish without additional direct policy action. This is particularly likely given the extent of the variation in the market. To illustrate the extent of price variation in our system, the HPC modeled the time it would take for the lowest-priced hospitals to reach the price level of the 75th percentile in 2013, with an aggressive assumption of annual 3.6% price increases.[xli] At this rate of increase, it would take 16 to 19 years for some hospitals to reach the prices of the 75th percentile in the three major payers' networks.

> Due to the extent of the price variation in the market for the same sets of services, it would take **19 years** for some hospitals to reach the prices of the 75th percentile in 2013, even if they received 3.6% annual price increases

xxxvii For example, the requirement under Chapter 288 of the Acts of 2010 for DHCFP (now CHIA) to collect data on relative price has significantly enhanced our understanding of price variation.

xxxviii If evaluations of provider spending growth under the benchmark were adjusted to account for baseline spending levels, more efficient providers with lower prices would have more room to grow than less efficient providers. *See* AGO 2015 Report, *supra* endnote 1, at 25-27.

xxxix AGO 2015 Report, *supra* endnote 1, at 25-27. These price increases for higher-priced providers may reduce the availability of price increases for lower-priced providers. For example, the AGO found that where increases in utilization and pharmaceutical spending are expected, permitting even small increases for higher-priced providers could result in little to no price increases available for lower-priced providers while staying under a benchmark rate of growth, assuming no changes to the size or health status of the population. Specifically, the AGO found that conservative estimates of 12.5% growth in pharmaceutical spending from 2014-2015 and 1% growth in utilization, would leave 0.8% growth ($142 million) available for price increases if the state were to meet the benchmark. In this scenario, if the higher-priced providers received 3% price increases, all other providers would have to accept a *price cut* of 0.3%, actually *increasing* price disparities over time.

xl For one major payer in 2013, some providers in risk contracts had approximately one third more resources (including health status adjusted budgets and non-budgetary payments) available to them than other providers on a risk adjusted basis to care for patients. AGO 2015 Report, *supra* endnote 1, at 20. This is a similar level of variation from the AGO's previous findings; in its 2013 report, the AGO found that in 2011 (BCBS and THP) and 2010 (HPHC), variation in health status adjusted budgets between the provider groups with the highest and lowest budgets ranged from approximately $93 per-member-per-month to approximately $220 per-member-per-month. AGO 2013 Report, *supra* endnote 1, at 21-27.

xli Note that the cost growth benchmark applies to all spending increases, not just price increases. This means that if providers were to receive 3.6% price increases in conjunction with any utilization increases in the Commonwealth (e.g., due to changes in the economy, changing demographics, new pharmaceuticals, etc.), it is likely that the Commonwealth would fail to meet the benchmark. Thus, it is highly unlikely that many providers can in fact receive 3.6% increases without threatening the Commonwealth's ability to meet the benchmark. For more discussion, see AGO 2015 Report, *supra* endnote 1, at 27.

Conclusions

Action is required to address unwarranted price variation and its impact on overall spending and the sustainability of lower-priced providers

Given the strong and consistent evidence of persistent unwarranted price variation in the Commonwealth, and evidence that the market has not made meaningful progress toward rectifying this dysfunction, the HPC recommends direct policy action to address unwarranted provider price variation.

To inform such action, the HPC will be undertaking additional research and analyses into different policy options and payment structures to fairly compensate providers for value and will be promptly convening stakeholders to begin discussing these specific, data-driven policy options for consideration by the legislature, other policy makers, and market participants in support of a more sustainable and equitable healthcare system.

Examples of policy options that should be the subject of additional analysis and discussion to determine whether they have potential to reduce unwarranted price variation without increasing overall healthcare spending include:

1. Policies to enhance healthcare market transparency and encourage consumers to use high-value providers for their care

As discussed in the HPC's 2015 Cost Trends Report, payers should continue to develop and improve value-oriented products to create incentives, such as financial rewards, for members to choose high-value services and providers. Payers should employ strategies such as using transparent, aligned methods to tier providers; increasing the cost differentials between preferred and non-preferred tiers to better reflect value-based differences among providers; improving educational and outreach efforts to help employers and employees better understand the insurance products and their benefits and tradeoffs; exploring limited network products that are associated with one or more high performing accountable care organizations (ACOs); providing cash-back rebates for choosing low-cost providers; and offering members incentives at the time of primary care provider (PCP) selection, with the level of incentives tied to differences in the total cost of care associated with the selected PCP.

Payers should also continue to improve price and quality information available to members. Information, coupled with incentives and choice, is an essential element of a well-functioning market for health care. Massachusetts has already taken steps to greatly increase the amount of price information available to consumers. However, as recent reports have demonstrated, the state needs to make more progress to ensure availability and accuracy of price estimates from both providers and payers.[39] Patient difficulty in finding price information and general confusion about the relationship between healthcare spending and quality also indicates a need for continued discussion of how to make prices for services more readily available and accessible to patients. The Commonwealth should take steps to ensure compliance with existing laws requiring price transparency, and payers should prioritize making usable cost and quality information available to members and linking such information with opportunities and incentives to make high-value choices.

Reference pricing (in combination with bundled payments where appropriate)[xlii] may also be a valuable tool to support enhanced consumer engagement. As described in HPC's 2014 Cost Trends Report, reference pricing is a cost-sharing structure under which "the employer or insurer pays a predetermined amount for a particular service or procedure and the consumer is generally responsible for the remainder of the cost (in addition to any copayments or coinsurance amounts). The predetermined amount, or 'reference price,' is often based on a pre-identified low-cost provider or a median price in a market area. Reference pricing is most applicable in situations where consumers seek a well-defined, discrete service that is

xlii For details on the potential opportunities of combining reference pricing and bundled payments, *see* François de Brantes et al., Reference Pricing and Bundled Payments: A Match to Change Markets, Health Care Incentives Improvement Institute & Catalyst for Payment Reform (Oct. 2013), *available at* http://www.catalyzepaymentreform.org/images/documents/matchtochangemarkets.pdf (last visited Jan. 11, 2016).

planned in advance and offered by a number of providers in a region at varying prices."[40] The HPC encourages payers and purchasers to develop reference pricing plan designs for appropriate services.

2. Limits on provider charges for emergency out-of-network services and those delivered by out-of-network providers located within in-network facilities

As discussed in the HPC's 2015 Cost Trends Report, out-of-network charges for emergency services and services provided by out-of-network providers located in in-network facilities ("surprise billing") can create difficulties for consumers as well as impacts on market competition. Many providers, and particularly those with significant emergency volume and certain hospital-based providers, have leverage to demand that payers agree to high negotiated rates in part because these providers can demand payment of "charges" for all members who receive emergency out-of-network care[xliii] or care from out-of-network physicians located at in-network facilities in the absence of a contract. As stated in the 2015 Cost Trends Report, the HPC recommends certain safeguards for consumers related to out-of-network emergency services and surprise billing. However, as a policy approach to changing provider price variation, the HPC also notes that limits on out-of-network payments can reduce the degree to which hospitals with high emergency volume can leverage their high charges to negotiate higher in-network rates. Some have found that in Medicare Advantage plans, which have limitations on emergency department and out-of-network charges, payment rates vary relatively little and remain close to Medicare fee-for-service rates.[41]

3. Transitioning away from using providers' historic spending as the basis for global budgets and other enhancements to alternative payment methodologies

The Commonwealth should consider requiring global budgets to be based on factors other than historic spending, which "bakes in" past price variation. For example, in its Next Generation ACO model, Medicare will include components of regional and national spending in developing ACO budgets, in conjunction with changes to the shared savings model that allow for providers to take on more risk.[42] A transition over time away from historic spending benchmarks would enable past price variation to decrease over time and reduce resource inequities associated with the current approach.

The Commonwealth can also work to enhance the functioning of global budgets through the development of bundled payments. Global budgets frequently provide greater incentives to PCPs than to specialists and other types of providers; bundled payments can complement a global budget as an effective means to incentivize specialists, hospitals, and post-acute care (PAC) providers to redesign care to align with value. Bundled payments link reimbursement for a clinically discrete episode (such as a knee replacement or a birth) across specialty, hospital and PAC settings. If more specialist, hospital, and PAC services were paid for by bundled payments or other non-fee-for-service methodologies, those providers would have a greater incentive to control spending for these services. To the extent that specialists, hospitals, and PAC providers may care for patients attributed to other provider organizations, bundled payments may also be important in creating incentives to control spending for those patients.

4. Policies to directly limit price variation

The Commonwealth should also consider policies to directly limit the extent of variation in prices paid to providers for the same sets of services. As described above, in states like Maryland that limit variation in prices to specific measures of value, variation in prices is generally less than in Massachusetts and, by definition, has been limited to those circumstances where variation reflects value. Similarly, the 2011 Special Commission on Provider Price Reform recommended that an expert panel identify maximum reasonable adjustments to median prices, based on value-based factors. To address price variation in the short-term, the Special Commission also recommended that the Legislature adopt the policy that in cases where a provider requests a price above the plan median and the payer rejects the request, the provider can either accept a price equal to the network median, accept its price from the previous year, or ask an independent panel to sign off on the higher requested amount based on its quality. Policymakers could consider these or other policy options, including requiring payers to identify the degree to which specific factors underlie network price variation as part of annual insurance rate review, or limiting the permitted level of variation to the amount of variation currently accounted for by objective measures of value.

The HPC looks forward to developing analyses and convening stakeholders over the coming weeks to discuss these and other specific, data-driven policy options to reduce unwarranted price variation in support of a more sustainable and equitable healthcare system.

xliii Carriers (i.e., commercial payers) are required to pay a reasonable amount toward emergency out-of-network services but are not required to pay full charges; if a carrier does not cover the full charges, providers are permitted to bill the consumer for the remainder of the charge. M.G.L. c. 176G §5(f). In some cases, carriers do pay full charges to protect consumers from this "balance billing."

TECHNICAL NOTE: MULTIVARIATE REGRESSION ANALYSIS METHODOLOGY

To measure price, we used 2013 inpatient relative price percentile. Unlike relative price, which is not comparable for different payers, the relative price percentile allowed us to compare relative prices across payers, which enabled us to include all hospitals and payers in one regression, observing the inpatient relative price percentile for each hospital-payer pair. The inpatient relative price measure underlying the inpatient relative price percentile is calculated to hold payer-level case mix constant. While case mix may not capture the severity of the most acute patients, it is the best metric available to capture hospital-level patient acuity.

The unit of observation in each regression was the unique combination of hospital and payer, for all hospital-payer combinations available. Each observation in the regression represented the relative price percentile of a given hospital for a given payer. For eight of our model specifications, we had data for 60 hospitals and 14 payers, yielding a total of 593 hospital-payer observations, and for the other eight specifications we had data for 53 hospitals and 14 payers, yielding a total of 533 hospital-payer observations.

To analyze the determinants of a hospital's average inpatient price percentile we relied on Ordinary Least Squares (OLS) regressions, with standard errors clustered at the hospital system level. Hospitals for which other systems negotiate commercial rates (namely, Partners negotiating for Emerson Hospital, Hallmark Health, and Cambridge Health Alliance in 2013) were clustered with the system's corporately affiliated hospitals. Results were also robust to an alternate clustering at the hospital, rather than system, level. To recognize the fact that relative price percentile, which is the dependent variable in the regression models, is bounded between zero and 100, we explored the sensitivity of our baseline, OLS regression methodology using a generalized linear model (GLM) with a Logistic distribution, which explicitly accounts for this bounding.

Variables

2013 Total Performance Score or 2013 PSI-90: These variables were used to measure hospital quality. Total Performance Score is a composite measure, developed and validated by CMS. It includes: a Clinical Process of Care domain, consisting of eight clinical process measures; a Patient Experience of Care domain, consisting of eight measures derived from the HCAHPS Survey; an Outcomes domain, consisting of three mortality measures, one Agency for Healthcare Research and Quality (AHRQ) Patient Safety Measure (PSI-90), and three healthcare-associated infections measures; and an Efficiency domain, consisting of one Medicare Spending per Beneficiary measure. The Clinical Process of Care domain accounts for 10% of a hospital's Total Performance Score, the Patient Experience of Care domain accounts for 20%, the Outcome domain accounts for 40%, and the Efficiency domain accounts for 25%.[43]

Although Total Performance Score provides a more comprehensive measure of quality, it was not available for all of the hospitals in our sample. Therefore, we used the PSI-90 as a sensitivity to check for changes to the model when all hospitals in our sample were included. The PSI-90 is an AHRQ composite of eleven measures of hospital complications.[44]

Mean zip code-level household income in hospital primary service area (PSA): This variable is based on the 2008 IRS-reported income for all zip codes making up a hospital's PSA, as defined using HPC's PSA methodology.[45] The IRS reports adjusted gross income by zip code, as well as the number of tax return filers. For each zip code, we calculated the mean income per filer. For each hospital PSA we then calculated the mean of these zip code means, weighted by number of filers. The hospital PSA data were calculated at a more granular level than the relative price data for certain hospitals with multiple campuses: for these hospitals, we calculated a weighted average of the mean zip code income, weighted by the total discharges for each campus.

Status as a community, teaching, AMC, or specialty hospital: This measure was a binary indicator variable for whether the hospital is a community hospital (including Community-DSH), teaching hospital, AMC, or specialty hospital.

Share of services that are tertiary: This variable represented the share of the hospital's discharges that are associated with tertiary DRG codes, based on 2013 discharge

data from the Massachusetts Health Data Consortium (MHDC). Tertiary DRGs were defined as those in the top 10% of DRGs by case weight which are disproportionately performed (at least 50% of discharges in 2011) at hospitals with an average case mix index of 1 or greater. For each hospital in the regression, we calculated the share of 2013 discharges associated with these tertiary DRG codes based on 2013 discharge data. The discharge data were at a more granular level than the relative price data for certain hospitals with multiple campuses: for these hospitals, we calculated the weighted average share of DRGs that were tertiary, weighted by total discharges at each campus.

Share of discharges paid for by state public payers: This variable represented the share of the hospital's discharges paid for by public, non-Medicare payers, based on 2013 discharge data from the MHDC. Specifically, it included discharges for which Medicaid Managed Care, Medicaid, Commonwealth Care, Health Safety Net, and Free Care, were identified as the payer in 2013 discharge data. For this calculation, we simply calculated the share of discharges in 2013 associated with one of these payers. The discharge data were at a more granular level than the relative price data for certain hospitals with multiple campuses: for these hospitals, we calculated the weighted average share of discharges associated with these payers, weighted by total discharges at each campus.

Share of Medicare discharges: This variable represented the share of the hospital's discharges covered by Medicare, based on 2013 discharge data from the MHDC. The discharge data were at a more granular level than the relative price data for certain hospitals with multiple campuses: for these hospitals, we calculated the weighted average share of discharges covered by Medicare, weighted by total discharges at each campus.

Number of community and teaching hospitals with overlapping PSAs: This variable measured local competition. For hospitals that were designated community or teaching hospitals, we calculated the number of other (unaffiliated) community or teaching hospitals with any overlapping PSA zip codes. For AMCs and specialty hospitals, this variable took on a value of 0. We also calculated a "Number of Competitors Squared" measure that allowed for diminishing marginal returns to competition. For each hospital's PSA, we counted each additional hospital with at least one zip code in the focal hospital's PSA. The hospital PSAs were calculated at a more granular level than the relative price data for certain hospitals with multiple campuses: for these hospitals, we calculated the weighted average number of competitors, weighted by total discharges at each campus.

AMC or specialty hospital with overlapping PSA: This variable measured the strength of AMC and specialty competition. For each hospital's PSA, we evaluated whether there was an AMC or specialty hospital with at least one PSA zip code in the focal hospital's PSA. This took the form of a binary indicator variable. The hospital PSAs were calculated at a more granular level than the relative price data for certain hospitals with multiple campuses: for these hospitals, we calculate the weighted average of this flag, weighting by total discharges at each campus.

System fixed effect: This variable measured individual system price differences. For systems with contracting affiliations, we separated the corporately affiliated hospitals from those with which the system has only a contracting affiliation. We used a binary indicator variable to identify whether the hospital is in the designated system. The reference category was unaffiliated hospitals.

Staffed beds in system: This variable measured the system size (and the square thereof), calculated as the sum of the total staffed beds in the entire system for the system to which the hospital belongs, based on staffed bed counts in the CHIA's 2013 Acute Hospital Databook. For systems with contracting affiliations, we separated the corporately affiliated hospitals from those with which the system has only a contracting affiliation and treated those hospitals with a contracting affiliation as unaffiliated (through a corporate relationship).

"Cluster" System: This variable did not appear in the regression, but is used to cluster the standard errors in the regression. This means that we allowed for the unmeasured variation ("error") to vary in similar ways within a system. Similar to the fixed effect variables, this variable represented the system for each variable. Unlike the ones used to create the fixed effect, this variable grouped corporately affiliated hospitals and contractually affiliated hospitals together, to allow unobserved error to be correlated for hospitals for which a single system negotiates.

Sensitivities

We checked the sensitivity of our results by:

1. Including or excluding a variable indicating the presence of an AMC in the PSA of the hospital, which served to measure the competitive pressure that the AMC's presence exercises on a hospital's prices.

2. Measuring the impact of system on price by using either a measure of the size of the system (i.e., total staffed beds within the system) or system fixed effects. This generated a total of four different model specifications for the model using the PSI-90 as a measure of hospitals' quality, and four different model specifications for the model using Total Performance Score as a proxy for quality.
3. Using a GLM with a Logistic distribution. The GLM model accounts for the fact that the dependent variable is bounded between 1 and 100.

We used 16 specifications in total (8 OLS and 8 GLM). For specifications using the PSI-90, we had 593 hospital-payer observations; for specifications using the Total Performance Score, we had 533 observations.

Results

The OLS and GLM regressions yielded very similar results. In both models, we found that the following variables had a statistically significant relationship with relative price percentile:

1. Number of community and teaching hospitals with overlapping PSAs: Fewer community and teaching hospitals with overlapping PSAs was associated with higher relative price percentiles at focal community and teaching hospitals.
2. AMC or specialty hospital with overlapping PSA: The presence of an AMC or specialty hospital with an overlapping PSA was associated with a lower relative price percentile for focal community or teaching hospitals.
3. Staffed beds in system: For smaller systems, more total staffed beds was associated with lower relative price percentiles, while at larger system sizes, more total staffed beds was associated with higher relative price percentiles.
4. System fixed effect: For several systems, membership in the system was associated with higher relative price percentiles (Berkshire, Cape Cod, Partners, Southcoast), while for several other systems, membership in the system was associated with lower relative price percentiles (Baystate, Beth Israel Deaconess, Circle Health, Heywood, and Steward). Note that specifications including system fixed effects did not also include the variable for staffed beds in the system. Therefore, the system fixed effects include system size differences, and system size is not held constant.
5. Status as a community, teaching, AMC, or specialty hospital: Compared with community hospitals, teaching hospital status was associated with higher relative price percentiles, while AMC and specialty status were not significant.
6. Share of services that are tertiary: Higher proportions of tertiary services were associated with higher relative price percentiles.
7. Share of state public payer discharges: Higher shares of a hospital's discharges that were paid for by safety net payers were associated with lower relative price percentiles.
8. Share of Medicare discharges: Higher shares of a hospital's discharges that were paid for by Medicare were associated with lower relative price percentiles.

In both models, we found that the following variables did not have statistically significant relationships with relative price percentile:

1. Total Performance Score
2. Median household income in PSA

In addition, with respect to the quality measure PSI-90, none of the OLS regressions yielded a statistically significant result. However, three of the GLM model specifications found a statistically significant relationship to price (in two cases at the five percent level and in one case at the ten percent level), suggesting that hospitals with lower complication rates are positioned higher in the price distribution.

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Amy Katzen, Project Manager for Market Performance, and Megan Wulff, Senior Manager for Market Performance, prepared this report under the direction of Kate Scarborough Mills, Policy Director for Market Performance, with guidance from Executive Director David Seltz, Dr. Stuart Altman, Board Chair, Dr. Wendy Everett, Vice Chair, Dr. David Cutler, Chair of the HPC's Cost Trends and Market Performance Committee, and Dr. Paul Hattis, Chair of the HPC's Community Health Care Investment and Consumer Involvement Committee. Other commissioners provided feedback and recommendations.

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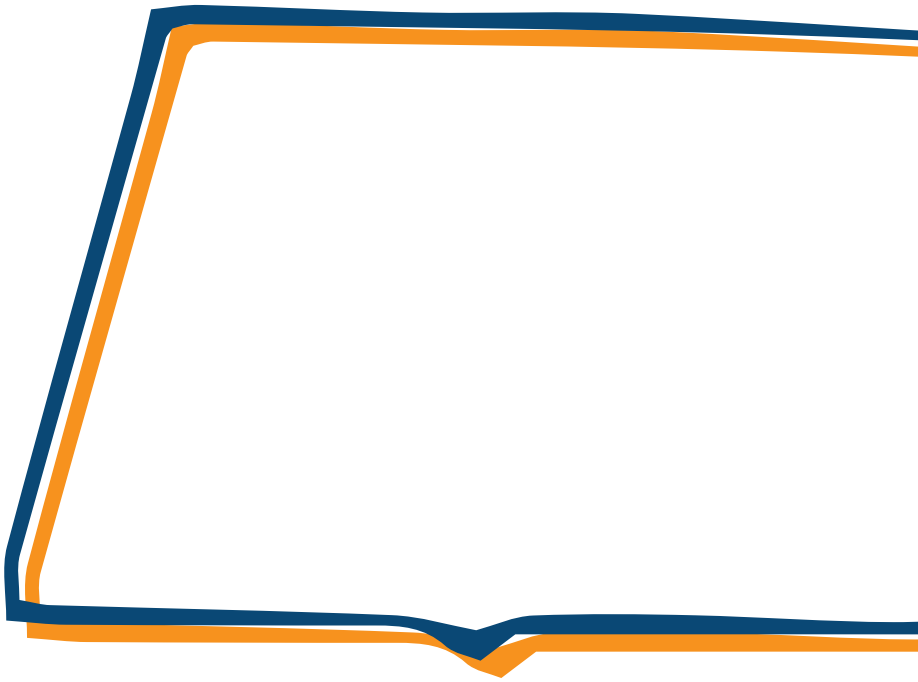

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