

Update of the Higher Education Price Index (HEPI): 2016 - 2018

Commissioned report for Universities South Africa (USAf)

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Executive summary

The Higher Education Price Index (HEPI) originated in response to concerns that the spending patterns of universities differ substantially from those of households and therefore the Consumer Price Index (CPI) might not accurately reflect cost increases at universities.

In South Africa, the first HEPI was developed by Unisa's Bureau of Market Research (BMR) for the time period 2004 – 2013. The HEPI provided Universities South Africa (USAf) with valuable input when engaging with government on subsidy increases. Given the proposed changes to the higher education funding framework, USAf commissioned the Bureau for Economic Research (BER) to expand the Headline HEPI and Student Accommodation HEPI for the time period 2016 – 2018.

Similar to the BMR, the BER also followed the International Labour Organisation's (ILO) internationally accepted guidelines for the compilation of price indices. According to the ILO, a price index is calculated by taking the average period-to-period price growth for different expenditure groups and using the average amount spent per expenditure group as weights. The BER used actual expenditure data supplied by the universities to USAf for the calculation of relative contributions (i.e. weights) of each expenditure group. A unique price index was assigned to all the main expenditure categories. As a final step, the HEPI was calculated by multiplying the price growth of each expenditure item with their respective weights and then summing the results. The BER found that the Headline HEPI was more or less in line with CPI in 2016. In 2017 and 2018, the HEPI was respectively 0.7 and 1.5% pts higher than headline inflation.

Given that the HEPI is strictly a price index that does not take volume changes into account, the Finance Executives' Forum (FEF) expressed the need for a Higher Education Volume Index (HEVI) and a Higher Education Budget Index (HEBI). The BER used the number of students enrolled as a proxy for the volume of higher education output and found that the Headline HEBI was 7.3%, 7.7% and 8.7% for 2016, 2017 and 2018 respectively. Going forward, the HEBI can be used as a guideline when calculating the total expenditure requirements that are necessary to offset the effect of BOTH price and volume increases, assuming that productivity remains the same.

The Student Accommodation HEPI was 0.3, 0.4 and 0.8 percentage points (% pts) higher than headline inflation for all three years. This implies that the HEPI was 6.6%, 5.7% and 5.4% for 2016, 2017 and 2018 respectively. The Student Accommodation HEBI was 7.6% and 6.5% in 2016 and 2017 respectively. Student numbers jumped by 6.2% y-o-y in 2018 which resulted in a HEBI of 12% in 2018.

Introduction and objective¹

The Board of Directors (the Vice-Chancellors of the public universities of South Africa) of the then Higher Education South Africa (HESA) and its Finance Executives' Forum (FEF) requested in 2012 that a Higher Education Price Index (HEPI) be developed. This was in response to their concerns regarding the disparity between the rise of operating costs compared to government subsidies and the rise in student fees. The general opinion held at that stage was that inflation, as calculated by the Consumer Price Index (CPI), was lower than actual cost increases in higher education. The Bureau of Market Research (BMR) at Unisa was contracted to develop the first HEPI for South African public universities. The BMR calculated the HEPI for the period 2004-2013 and their findings did indeed show that increases in the cost of higher education were higher than inflation at the time. The BMR's findings implied that if CPI were to be used to determine government subsidies (as well as other nominal operational funds), the real purchasing power of these funds will decline over time and it would become financially unsustainable to deliver the same level of output/service as before.

USAf initially requested the Bureau for Economic Research (BER) to expand the HEPI for the time period 2014 – 2016, using the original dataset. However, after the BER had conducted the first round of calculations, the FEF expressed concern about the length of the questionnaire and the subsequent accuracy of the data. Furthermore, the original dataset didn't make a distinction between council controlled (unrestricted) and restricted funds. With the help of some members of the FEF, the BER redesigned the data template and universities were asked to submit expenditure data for 2016 to 2018. This was done for both headline and residence spending.

The FEF furthermore requested the BER to develop a Higher Education Budget Index (HEBI) that takes changes in volumes into account as this would be a more accurate indicator of total budgetary requirements.

The purpose of this report is to show the results of the HEPI and HEBI for 2016 to 2018. The results will be presented separately for headline and residence spending. As a follow up report, the results for 2019 will be calculated next year.

Background

What is the purpose of a price index?

According to the International Labour Organisation (ILO), a price index can be defined as an index that reflects the rate at which prices for goods and services change from one period to the next (ILO, 2004). A price index therefore allows one to make valid comparisons of the price of goods and services over time. For example, comparing the cost of petrol today with the cost of petrol in 1950 is not an "apples to apples" comparison because the purchasing power of the rand is not the same today as it was in 1950. It is

¹ The BER would like to acknowledge and thank the Deputy Director of the BER and survey methodology expert, George Kershoff for his valuable inputs during this process. We would also like to acknowledge and thank the members of the Finance Executives' Forum (FEF), as well as the Finance Executives at Stellenbosch University (SU) for being a sounding board and providing a reality check.

therefore important to adjust the historical data for inflation by means of a price index (Gillen & Robe, 2011).

One of the most widely used and best-known examples of a price index is Statistics South Africa's Consumer Price Index (CPI). The CPI measures the general level of price changes of **consumer** goods and services that **households** use. This is done by measuring the cost of buying a fixed basket of consumer goods and services of the same quality and characteristics over time (Statistics South Africa, 2017).

The reasoning behind the development of the HEPI was that the spending patterns of universities tend to differ substantially from those of households and therefore the CPI may not be an accurate indicator of cost changes for universities. Dr D. Kent Halstead developed the first Higher Education Price Index (HEPI) for the US Department of Health, Education and Welfare in 1975. Halstead argued that universities needed a new price index which more accurately reflected their spending patterns. He believes that the HEPI is "far superior to substitute proxy indexes such as the Consumer Price Index or the gross national product (GNP) explicit deflator which are intended for entirely different purposes" (Gillen & Robe, 2011).

The HEPI-basket is therefore specifically designed to accurately reflect the actual expenditure patterns of universities (Gillen & Robe, 2011). Essentially, the HEPI aims to measure the change in the cost of providing education per student, by tracking the unit cost changes of the resources or inputs which universities require to provide education (Gillen & Robe, 2011).

The use of the HEPI

In order to maintain the **same level** of quality and real output, universities need to adjust their expenditure in line with price changes. HEPIs are very useful for the purpose of determining what increase in expenditure is necessary to merely offset the effect of inflation when buying the **same resources** used in previous years. However, it is important to point out that other effects, such as the enrolment of more students, investment in new buildings or equipment or the addition of new programmes should be taken into account when estimating/calculating **total expenditure requirements** (Halstead, 1975).

In South Africa, the HEPI provides USAf with useful information when engaging with government and other relevant stakeholders on funding/subsidy increases. Specifically, to determine the level of government subsidy increases, universities need to ensure that they have the necessary funding per student to cover the expenditure required to maintain the same quality of education (van Aardt & Olivier, 2014).

However, in reality, university budgets are not only driven by price changes, but also by volume changes. For example, budgets will change along with the salary per worker, as well as the number of workers. As mentioned above, **the HEPI is strictly a price index**. This implies that the HEPI expresses the price of one unit of higher education over time, regardless of how many units are produced or consumed. As a result, the FEF expressed the need for a Higher Education Volume Index (HEVI) and a Higher Education Budget Index (HEBI) – this will be explained and unpacked in more detail later.

Recent changes in South Africa's higher education sector

It is important to keep the recent changes in the South African higher education sector in mind when developing the HEPI for the period 2016 to 2018, as recent events may have affected spending and budgeting at South Africa's public universities.

In 2015, students around South Africa began a protest movement in support of free higher education and an end to outsourcing to private companies. The #FeesMustFall protest quickly gained momentum and by October 2015 universities around the country were basically closed down by protesting students. The protests only ended when (then) President Jacob Zuma announced a 0% fee increase for 2016.

In mid-August 2016, the Council on Higher Education found that a 0% fee increase for 2017 would be financially unsustainable and suggested an inflation-related 'blanket increase' across all universities. Later that month, the Minister of Higher Education and Training at the time, Blade Nzimande, announced that fee increases for 2017 would be capped at 8%. Even though each university was given the freedom to determine its own fee increase, the universities decided to align themselves with the proposed 8% increase. This led to a revival of the #FeesMustFall protests.

Neither universities nor the National Treasury budgeted for the fee-increase freeze in 2016. Consequently, the #FeesMustFall protests created serious budgetary challenges. Universities received contributions from the Department of Higher Education and Training (DHET) to finance part of the shortfall. The balance of the shortfall had to be financed from other sources. For instance, at Stellenbosch University specifically, the balance of the shortfall was funded through a cut in certain institutional costs and a contribution from the Council's discretionary funds (Stellenbosch University, 2016). Some institutions had to use their third-stream income to offset the shortfalls. This implied that funds that are typically used for strategic initiatives or investment in niche areas were being used to fund normal operational expenditure (University of Cape Town, 2016).

During this period, universities' spending and budgeting were overshadowed by uncertainty about the future as they didn't know what student fee or government subsidy increases could be expected (Stellenbosch University, 2016). Consequently, some universities reduced their spending on maintenance and construction, while some big research universities placed moratoriums on the appointment of academic staff.

The fee-increase freeze in 2016 created a series of additional costs, including:

- An increase in security related expenditure in order to protect students, staff and university facilities during protests.
- According to the Minister of Higher Education and Training, Naledi Pandor, damage to laboratories, libraries and buildings during the student protests had cost universities more than R786m (Kahn, 2018).

As mentioned above, students, unions and contract workers also demanded an end to outsourcing. The insourcing of previously contracted ancillary staff, including cleaning, gardening, security, catering and transport staff saw a sharp increase in staff numbers at some institutions (University of Cape Town, 2016).

While it is beyond the scope of this analysis to dig into the financial impacts of the #FeesMustFall protests and consequent 0% fee increase, it is important to keep these developments in mind when looking at the expenditure data of universities during this period.

Methodology

UNISA's BMR developed the first HEPI, covering the period 2004 – 2013. Similar to the BMR, the BER also followed the internationally accepted ILO guidelines for the compilation of price indices. The ILO's recommendations date back to 1925 and, over the years, they have built up a reputation as the agency responsible for the establishment of international standards for price indices (ILO, 1999). The first manual on CPI methods was published in 1989. In 2004, the ILO published an expanded revision with the title *Consumer price index manual: theory and practice*. This is currently the most up-to-date manual on this topic and the ILO's guidelines are used worldwide.

According to the ILO, a price index can be defined as an index that reflects the rate at which prices for goods and services change from one period to the next. A price index typically has a value of unity of 100 in a specific reference period, the values of the index for other time periods should reflect the average proportionate, or percentage change in prices relative to the reference period. A price index is typically calculated by taking the average **period-to-period price growth** for different expenditure groups and using the average amount spent per expenditure group as **weights** (ILO, 2004).

For the purpose of the HEPI, **weights** were derived from actual expenditure data supplied by the universities to USAf for 2016 – 2018 (the format of the data will be unpacked in more detail below). **Price growth statistics** to match each expenditure item were mostly obtained from independent data sources (Stats SA and the BER). Finally, the HEPI was calculated by multiplying the price growth of each expenditure item with their respective weights and then summing the results.

As mentioned above, the BER's approach was broadly in line with the methodology that the BMR used to calculate the Unisa Price Index (UPI) and the previous HEPI. The BER recalculated the weights based on the most recent university expenditure data and also assigned new price indices to all the expenditure groups.

Data sources and analysis

New data template

For the purpose of the previous HEPI, the BMR designed a detailed Higher Education Expenditure Template which was sent to all 26 USAf members for completion. The data set consisted of 50 main expenditure categories which were further sub-divided into 139 detailed expenditure items. Initially, USAf continued to use the BMR's template for the collection of the 2014 – 2016 data. However, after the first round of calculations and results by the BER, the FEF expressed their concerns about the length of the template and the subsequent accuracy of the data that was submitted. Furthermore, the original template didn't make a

distinction between council controlled (unrestricted)² and restricted funds³. This implied that the cost of specifically funded activities (such as contributions to the National Student Financial Aid Scheme (NSFAS)) could not be filtered out from university funded activities. The BER and the FEF agreed that, for the purpose of the HEPI, one should only include council controlled/unrestricted expenditure data in the calculations. Consequently, we agreed to redesign and simplify the original template with the help of a task team from the FEF.

The number of expenditure categories was reduced to the top 90% of expenditure items (based on the original 2016 dataset) in order to help with submission compliance. All the other expenditure categories were lumped together into an *all other expenses* category. The templates were redesigned separately for headline and residence expenditure due to the differences in the main expenditure categories. The draft template was sent to the task team for revision. After we had incorporated their comments, the headline spending categories were reduced to 22 (including the *all other expenses* category) (see Table 1). The template, furthermore, instructed universities to split their headline spending into council controlled and restricted funds. Data was collected for 2016, 2017 and 2018.

Table 1: Headline spending: main expenditure categories

Expenditure categories
Salaries
Employer contributions
Bursaries
Depreciation - land and buildings
Depreciation - other (excl. land and buildings)
Municipal services
Transport (excl. travel and subsistence)
Travel and subsistence – local
Travel and subsistence - foreign
Research
Repairs and maintenance
Rental
Consultants
Books and journals
Security
Information technology (IT) services
Cafeteria purchases
Cleaning and pest control
Laboratory costs
Consumables
Training and conferences
All other expenses
Total expenses (as per Income Statement)

² Referring to funds, mainly from government and tuition, which are not earmarked for very specific purposes.

³ Referring to funds, mainly from donations and contracts, which are earmarked for very specific purposes, mostly research.

With regard to the inclusion of depreciation as an expenditure category, Universities UK believe that depreciation is not a reflection of current costs and therefore it is excluded from the UK Higher Education Pay and Prices Index (HEPPI) calculation (Universities UK, 2009). Neither Stats SA's CPI nor PPI provide a specific index for depreciation. However, in practice, depreciation is a capital cost which gradually becomes a current expenditure. To prevent the total depletion of this capital, new capital should be purchased on a continuous basis. Therefore, depreciation can almost be seen as a smoothing of expenditure on capital over time. Also, the depreciation of mostly equipment constitutes a large enough portion of university expenditure, validating a reason to include it.

The residence template was simplified to 13 expenditure categories (including an *all other expenses* category) (see Table 2).

Table 2: Residence spending: main expenditure categories

Expenditure categories
Rental
Salaries
Cafeteria purchases
Municipal services
Repairs and maintenance
Cleaning and pest control
Security
Special budget fund
Transport (excl.travel and subsistence)
Travel and subsistence – local
Travel and subsistence – foreign
Vehicle fleet operating expenses
All other expenses
Total expenses (as per Income Statement)

USAf collected the expenditure data on behalf of the BER and received completed templates from 19 of 26 members – a 73% response rate. Please refer to Table 3 for a list of universities that provided USAf with expenditure statistics for 2016 to 2018.

Table 3: List of universities that submitted expenditure data for 2016 - 2018

University	
Nelson Mandela University	NMU
University of Zululand	UZL
University of Cape Town	UCT
University of the Witwatersrand	Wits
University of Pretoria	UP
Central University of Technology, Free State	CUT
University of Mpumalanga	UMP
University of KwaZulu-Natal	UKZN
North-West University	NWU
University of Johannesburg	UJ
Rhodes University	RU

University	
University of the Free State	UFS
Durban University of Technology	DUT
Tshwane University of Technology	TUT
Stellenbosch University	SU
University of South Africa	UNISA
Sol Plaatje University	SPU
University of the Western Cape	UWC
Vaal University of Technology	VUT

As shown in Table 3, the majority of South Africa's provinces are represented, with the exception of Limpopo. The sample furthermore includes a number of research intensive universities (for example, the University of the Witwatersrand (Wits), the University of Cape Town (UCT), the University of Pretoria (UP)), universities of technology (for example, Vaal University of Technology (VUT) and Tshwane University of Technology), as well as historically disadvantaged universities (for example, University of the Western Cape (UWC). It can therefore be concluded that the samples are representative enough of the public universities in South Africa. It is also important to point out that the University of South Africa (Unisa) also submitted their financial data for 2016 to 2018. Previously, they did not submit financial data for 2014 to 2016. Given that they are the largest university in South Africa in terms of enrolment (and their expenditure represents the biggest share of total headline expenditure), their inclusion pulled the basket weight of salaries higher by roughly 1 percentage point. Importantly though, this only had a marginal impact on the final HEPI result.

Headline spending

It should be noted that the five largest universities in terms of unrestricted headline spending, namely Unisa, UP, UJ, Wits and UKZN represented almost 50% of spending in all three years (2016 – 2018). Their spending patterns therefore had a relatively big impact on the total spending compared to the remaining 14 universities. It was also interesting to note that the ranking of universities differed according to unrestricted versus restricted spending. The top 5 universities in terms of restricted expenditure (SU, UCT, UP, Wits and UKZN) represented almost 75% of spending.

In our opinion, the data received in the new template was of significantly better quality than the data submitted in the previous longer template. There was quite a lot of reporting inconsistencies in the previous data set. For example, the year-on-year movements in the total salary bills per university showed sharp drops or increases (in some instances more than 100%) for some institutions. In the new dataset, there is more consistency per spending category over time. This can likely be ascribed to the fact that the new data template had fewer spending categories and was therefore less tedious to complete.

Residence spending

The top 5 universities in terms of residence spending namely, UCT, UP, UKZN, NWU and Wits represented more than 50% of total spending in all three years. This implies that spending at these universities had a relatively big impact on total residence spending (and consequently on the weights), compared to the rest of the universities.

Weights

Headline spending

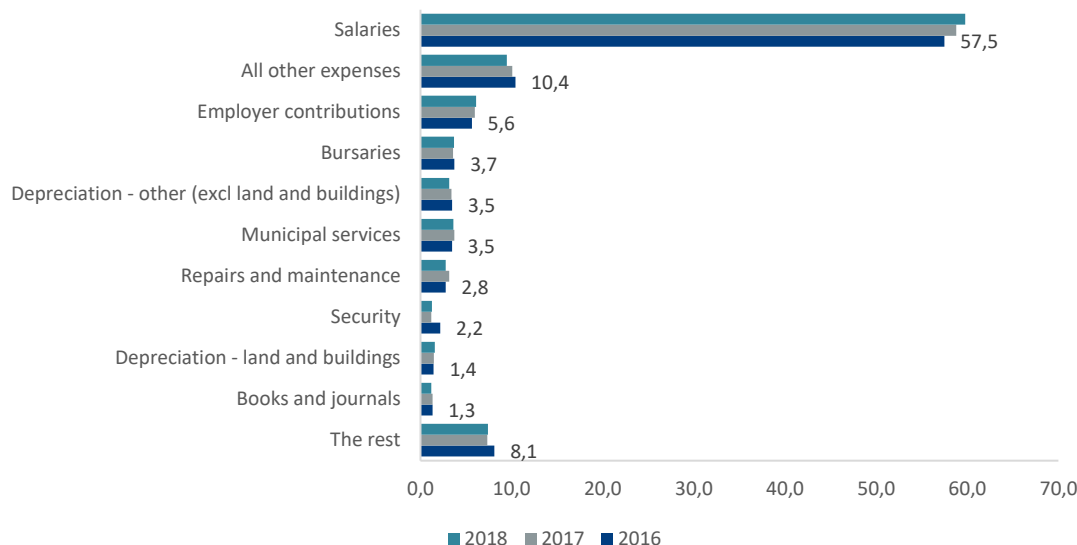
South African universities vary significantly in size and composition. Some universities focus on research output and postgraduate studies and consequently spend a lot of money on the maintenance of laboratories, libraries and technology (Stellenbosch University, 2016), whereas teaching-intensive universities focus heavily on student services, teaching facilities, etc. This implies that spending patterns across universities will differ substantially. A high-level analysis of the expenditure data clearly showed that not all universities consume goods and services in the same proportions, neither do they all consume the same goods and services. For example, some universities did not spend any money on bursaries during the time period under consideration, whereas other universities spent up to 9% of their total budget on bursaries. It was therefore decided to calculate the weights based on the estimated total expenditure for 2016 - 2018 of all universities that provided USAf with detailed expenditure statistics (rather than average expenditure).

Unless otherwise stated, we will only consider unrestricted headline spending going forward (seeing that we only included unrestricted funding in our Headline HEPI calculations). The expenditure figures were used to calculate the relative percentage (%) contribution of each category to the total expenditure of all universities in a specific year. The percentage contributions were taken as **weights** of each category. Weights were derived for 2016, 2017 and 2018 respectively. Please refer to Appendix 1 for a detailed table of the weights for the respective years.

Figure 1 shows the relative contributions (i.e. weights) of the top 10 expenditure categories⁴, as well as the remaining 12 expenditure categories lumped together into a separate category (referred to as *The rest* in the figure below). As mentioned earlier, the new template only included spending categories for the top 90% of spending categories (based on the original 2016 dataset) – please refer back to Table 1. All the other expenditure categories were lumped together into an *all other expenses* category. As shown in Figure 1, the *all other expenses* category was the second biggest spending category and did indeed represent approximately 10% of total spending.

⁴ Please note that the top 10 expenditure categories are based on 2016 rankings. In 2017 and 2018, the rankings looked slightly different, but the top 10 remained the same.

Figure 1: Headline spending: weights for the main expenditure categories (2016 – 2018)



Source: BER calculations using USAf data set

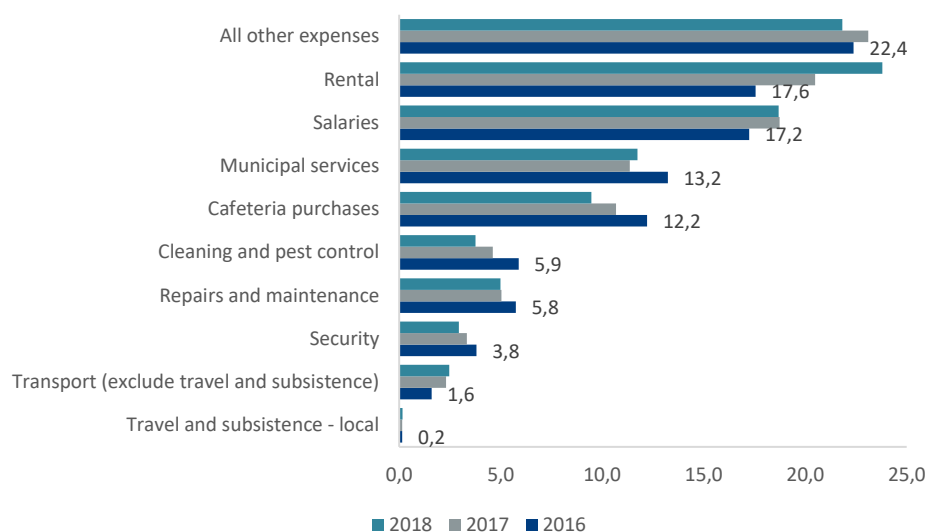
As one would expect, universities place a high premium on the expertise of their staff and the data shows that *salaries* and *employer contributions* (including contributions to pension funds, medical aid and UIF etc.) contributed to 62.1% of total spending in 2016. This proportion increased even further to 64.8% and 65.9% in 2017 and 2018 respectively. This implies that staff-related spending were the main drivers/causes of the HEPI in 2016-2018.

Residence spending

Student accommodation across South African universities differs in terms of the type of services they offer, as well as their ownership structure. For example, some residences have in-house cafeterias, whereas others don't offer any catering services, or they outsource catering to an external company. This implies that some universities don't spend any money on *cafeteria purchases*, whereas others spend a large proportion of their budget on this expenditure category – some up to 30% of total spending. In terms of ownership, some universities own the buildings and therefore do not spend anything on *rentals*, whereas other universities rent some or all of their residences. It can be concluded that spending patterns (i.e. the expenditure basket) across universities differ substantially. This implies that the price index per university will differ from the overall HEPI Student Accommodation – as is the case for the Headline HEPI.

Figure 2 shows the relative contributions (i.e. weights) of the main expenditure categories. Please refer to Appendix 2 for a detailed table of the student accommodation weights for 2016 – 2018.

Figure 2: Residence spending: weights for the main expenditure categories (2016 – 2018)



Source: BER calculations using USAf dataset

As explained earlier, the new data template was designed based on the top 90% of expenditure items in the original 2016 dataset. The remaining 10% were lumped together into an *all other expenses* category. However, as shown in Figure 2 above, it turned out that universities reported more than 20% of total expenditure under the *all other expenses* category in the new dataset. This implies that the new data template did not accurately cover all the main expenditure categories.

Together, expenditure on *rentals*, *salaries*, *cafeteria purchases* and *municipal services* made up more than 60% of total expenditure in all three years. This implies that spending on these categories had a relatively big impact on the HEPI Student Accommodation.

Price indices

The next step was to assign an appropriate price growth statistic to each expenditure group (see Table 4). With a few exceptions which will be explained in more detail below, most of the expenditure categories were matched with a price index from either Stats SA's PPI or CPI or the BER's Building Cost Index.

Table 4: Price index per expenditure category (2016-2018)

Expenditure category	Price index	Source
Salaries	HE salary index	USAf
All other expenses	CPI Headline	Stats SA
Employer contributions	HE salary index	USAf
Bursaries	CPI Tertiary education	Stats SA
Depreciation - other (excl land and buildings)	PPI Metals, machinery, equipment and computing equipment	Stats SA
Municipal services	CPI Water and other services	Stats SA
Repairs and maintenance	CPI Maintenance and repair	Stats SA
Security	CPI for services	Stats SA
Depreciation - land and buildings	BER Building Cost Index	BER
Books and journals	Rand/Real US dollar	SARB & US BLS

Expenditure category	Price index	Source
Information technology (IT) services	CPI Postal services and telecommunication services	Stats SA
Cleaning and pest control	CPI Supplies and services	Stats SA
Consultants	Private sector wage rate	BER
Consumables	CPI Books, newspapers and stationery	Stats SA
Travel and subsistence - local	CPI Public transport	Stats SA
Rental	CPI Actual rentals for housing	Stats SA
Transport (exclude travel and subsistence)	CPI Public transport	Stats SA
Travel and subsistence - foreign	Rand/Real US dollar	SARB & US BLS
Laboratory costs	PPI Chemicals, rubber and plastic products	Stats SA
Training and conferences	CPI Tertiary education	Stats SA
Research	CPI Headline	Stats SA
Cafeteria purchases	CPI Food and non-alcoholic beverages	Stats SA

Source: USAf & BER

As mentioned above, the large weighting of staff-related expenditure, including salaries and employer contributions, implies that especially the Headline HEPI is very sensitive to price growth in staff costs. As such, this expenditure category requires special attention.

One of the main criticisms of HEPIs in general is that universities have direct control over the price of one of the main components (staff-related expenditure). This implies that universities can increase salaries in order to push up the HEPI (Gillen & Robe, 2011). It is therefore advisable to use independent data sources. In order to avoid the self-referential issue, the BER initially used Stats SA's Quarterly Employment Statistics⁵ (QES) as a reference price index for staff-related expenditure. However, an analysis of the Stats SA data suggested that gross earnings per employee might not accurately reflect reality. We consulted with finance executives at Stellenbosch University who confirmed this notion. It was therefore decided to request additional information in the new data template that would allow us to calculate average salary increases per year. Respondents were asked to indicate percentage increases in average total remuneration per employee (cost-to-company) for 2016, 2017 and 2018. This had to be supplied for academic and support staff separately, with subcategories for permanent and contract employees (please refer to Appendix 3 for an example of the additional questions). In all, four groups of employees were identified. Respondents also had to indicate the number of employees per category. This allowed us to calculate a weighted average for academic and non-academic salary increases per year (by using the number of employees of each university as the weight for its particular salary increase). A total salary increase was then calculated as the weighted average of the academic and non-academic increases, also using the number of employees per staff category as the weight (see Table 5 for the results).

⁵ Stats SA's Quarterly Employment Survey (QES) is a quarterly survey of approximately 20,000 VAT registered businesses, it excludes the agricultural sector.

Table 5: Headline spending: salary indices (2016 – 2018)

	2016	2017	2018
Higher education (HE) salary index: headline spending	6,8%	7,1%	6,7%
Academic salary index	6,6%	6,9%	6,7%
Non-academic salary index	6,8%	7,2%	6,7%
CPI	6.3%	5.3%	4.6%

Source: BER calculations using USAf data set

From Table 5 it can be seen that total salary increases were 0.5% pts higher than headline inflation in 2016. In 2017 and 2018 inflation moderated from its drought-induced 2016 print, however, salary increases were still 1.8 and 2.1% pts higher than CPI.

For residences a similar method was used, except that no difference was made between academic and non-academic staff (see Table 6 for results).

Table 6: Residence spending: salary index (2016 – 2018)

	2016	2017	2018
Higher education (HE) salary index: residence spending	7,4%	7,0%	7,2%
CPI	6.3%	5.3%	4.6%

Source: BER calculations using USAf data set

Table 6 shows that salary increases for residence staff were respectively 1.1, 1.7 and 2.6% pts higher than CPI in 2016, 2017 and 2018.

Given the broad nature of the *all other expenses* category, it was decided that headline CPI would be the most appropriate price index for this spending category.

Books and journals have a high “import component” and it would therefore be inaccurate to assign a local price index to it. The product of the rand/\$ exchange rate and US CPI was therefore used as the price index for international costs.

Consultants typically include specialists from a broad range of fields (such as doctors, engineers, actuaries, renewable energy experts). These specialists usually charge private sector rates, if not more, and therefore it was decided to use the private sector wage rate as estimated by the BER’s macroeconomic model as a reference price series for *consultants*.

Results

Headline spending

HEPI

The price indices shown in Table 4 were set to 100 in 2015 (as a base year). As a final step, the HEPI was calculated by multiplying the price growth of each expenditure category with their respective weights and then summing the results (see Table 7).

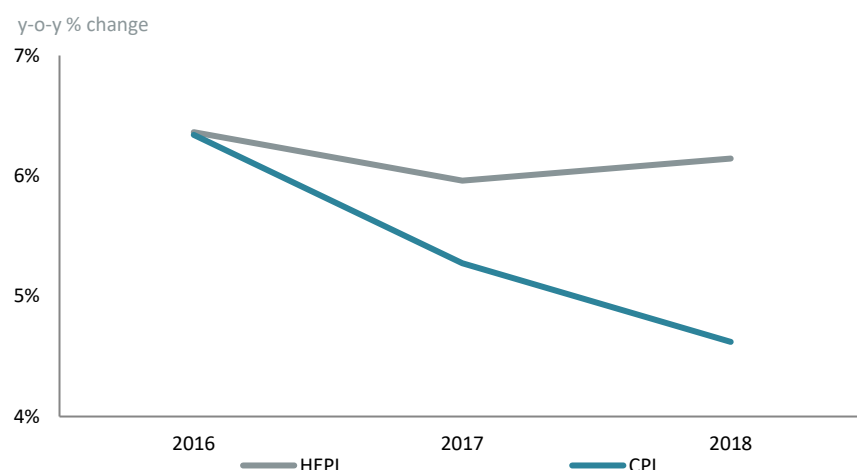
Table 7: Headline spending: comparison between the HEPI and CPI (2016 – 2018)

Year	HEPI	CPI
Index		
2015	100,0	100,0
2016	106,4	106,3
2017	112,7	111,9
2018	119,7	117,1
y-o-y % change		
2015		4,6%
2016	6,4%	6,3%
2017	6,0%	5,3%
2018	6,1%	4,6%

Source: BER calculations using USAf data set

In 2016, the CPI rebounded to 6.3% (from 4.6% previously) due to drought induced higher food prices. This implies that the HEPI was more or less in line with the CPI in 2016 (see Figure 3). For 2017 and 2018, the HEPI was respectively 0.7 and 1.5 percentage points (% pts) higher than CPI (as CPI moderated from the 2016 high).

Figure 3: Headline spending: comparison between HEPI and CPI (2016 – 2018)



The HEPI is a useful tool when calculating what expenditure increases are necessary to simply offset the effect of price increases when buying the same inputs used in previous years. However, these figures do not take other effects such as an improvement in the product offering (education) and/or higher student numbers into account.

HEVI & HEBI

As mentioned above, universities need to adjust their expenditure in line with price changes (as calculated by the HEPI) if they would like to maintain the **same level** of quality and real output. However, volume changes should also be taken into account when estimating **total budgetary requirements**.

Volume can be measured either at the production side (number of workers) or on the consumption side (number of students). Other possible measures of real output include the number of degrees issued or the number of research papers published. Ideally, a volume index should correlate well with budget increases.

We opted to use the number of students enrolled as a measure of the volume of higher education output as this number is objective and easy to measure. We included a question in our survey to obtain the number of full time equivalent (FTE) students. The annual percentage increase in the total number of FTEs was used to calculate a Higher Education Volume Index (HEVI) (see Table 8). Budget provisions are calculated by taking the price of an item multiplied by the number of items needed. As a final step, we calculated the Higher Education Budget Index (HEBI) as the product of the HEPI and HEVI.

Table 8: Headline HEPI, HEVI and HEBI (2016 – 2018)

Year	HEPI	HEVI	HEBI
Index			
2015	100,0	100,0	100,0
2016	106,4	100,9	107,3
2017	112,7	102,6	115,6
2018	119,7	105,0	125,6
y-o-y % change			
2016	6,4%	0,9%	7,3%
2017	6,0%	1,6%	7,7%
2018	6,1%	2,4%	8,7%

Source: BER calculations using USAf data set

The BER found that the HEBI was 7.3%, 7.7% and 8.7% for 2016, 2017 and 2018 respectively. Going forward, the HEBI can be a useful tool in assisting universities to calculate total expenditure requirements that are necessary to offset the effect of BOTH spending and volume increases, assuming that productivity remains the same.

Residence spending

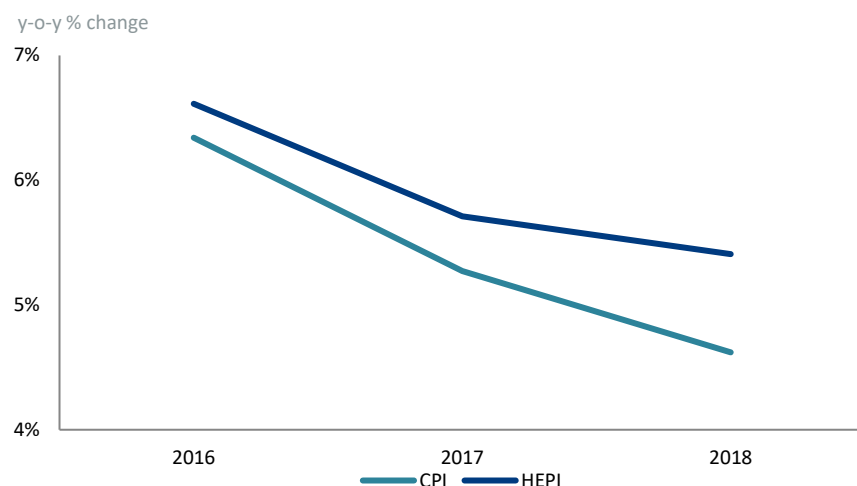
HEPI

Although the HEPI for residences moved in the same direction as CPI, it was slightly higher (0.3, 0.4 and 0.8% pts) than headline inflation for all three years (see Table 9 and Figure 4).

Table 9: Residence spending: comparison between HEPI & CPI (2016 – 2018)

Year	HEPI	CPI
Index		
2015	100,0	100,0
2016	106,6	106,3
2017	112,7	111,9
2018	118,8	117,1
y-o-y % change		
2015		4.6%
2016	6,6%	6,3%
2017	5,7%	5,3%
2018	5,4%	4,6%

Figure 4: Residence spending: comparison between HEPI & CPI (2016 – 2018)



HEVI & HEBI

We applied the same methodology as above to calculate the volume and budget indices for residences. The BER found that the HEBI was 7.6% and 6.5% in 2016 and 2017 respectively. Student numbers (i.e. our proxy for volumes) jumped by 6.2% y-o-y in 2018 (see Table 11). Both DUT and UKZN reported large increases in student numbers in residences in this specific year. The relatively large uptick in volumes resulted in a HEBI of 12% in 2018.

Table 10: Student accommodation HEPI, HEVI and HEBI (2016 – 2018)

Year	HEPI	HEVI	HEBI
Index			
2015	100,0	100,0	100,0
2016	106,6	100,9	107,6
2017	112,7	101,6	114,6
2018	118,8	108,0	128,3
y-o-y % change			
2016	6,6%	0,9%	7,6%
2017	5,7%	0,7%	6,5%
2018	5,4%	6,2%	12,0%

Source: BER calculations using USAf data set

Concluding remarks

In general, the main objective of the HEPI is to accurately track unit price increases of universities. The HEPI is therefore a useful tool in assisting universities to calculate the funding increases required to remain **financially sustainable** while maintaining **current** standards and activities. However, as pointed out by Halstead when he originally designed the first HEPI in 1975, other factors such as the enrolment of more students, investment in new buildings or equipment or the addition of new programmes should also be taken into account when estimating **total expenditure requirements**.

The BER's analysis of the new dataset found that the Headline HEPI was more or less in line with CPI in 2016. In 2017 and 2018, CPI moderated from the 2016 drought-induced high and the HEPI was

respectively 0.7 and 1.5% pts higher than headline inflation. It is important to point out that these numbers will only enable universities to maintain current levels of output as it does not provide for volume changes. As a result, the FEF expressed the need for a Higher Education Volume Index (HEVI) and a Higher Education Budget Index (HEBI). The BER used the number of students enrolled as a proxy for the volume of higher education output and found that the HEBI was 7.3%, 7.7% and 8.7% for 2016, 2017 and 2018 respectively.

For residences, the HEPI moved in the same direction, but was slightly higher than CPI for all three years under consideration. In 2016 and 2017, the HEBI was 7.6% and 6.5% respectively. In 2018, volumes were boosted by a sharp jump in student numbers which resulted in a HEBI of 12%.

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Appendix 1

Table 11: Headline spending: weights (2016-2018)

	2016	2017	2018
Salaries	57,5	58,8	59,8
All other expenses	10,4	10,1	9,5
Employer contributions	5,6	6,0	6,1
Bursaries	3,7	3,6	3,7
Depreciation - other (excl land and buildings)	3,5	3,4	3,2
Municipal services	3,5	3,7	3,6
Repairs and maintenance	2,8	3,2	2,8
Security	2,2	1,2	1,3
Depreciation - land and buildings	1,4	1,5	1,6
Books and journals	1,3	1,3	1,2
Information technology (IT) services	1,3	1,2	1,2
Cleaning and pest control	1,2	0,9	0,7
Consultants	1,2	0,9	1,1
Consumables	1,0	1,0	1,0
Travel and subsistence - local	0,7	0,7	0,7
Rental	0,6	0,5	0,6
Transport (exclude travel and subsistence)	0,5	0,6	0,6
Travel and subsistence - foreign	0,5	0,5	0,6
Laboratory costs	0,4	0,3	0,3
Training and conferences	0,3	0,4	0,4
Research	0,3	0,3	0,3
Cafeteria purchases	0,1	0,1	0,1

Source: BER calculations using the USAf data set

Appendix 2

Table 12: Residence spending: Weights (2016 – 2018)

	2016	2017	2018
All other expenses	22,4	23,1	21,8
Rental	17,6	20,5	23,8
Salaries	17,2	18,7	18,7
Municipal services	13,2	11,4	11,7
Cafeteria purchases	12,2	10,7	9,5
Cleaning and pest control	5,9	4,6	3,8
Repairs and maintenance	5,8	5,0	5,0
Security	3,8	3,3	2,9
Transport (excludes travel and subsistence)	1,6	2,3	2,5
Travel and subsistence - local	0,2	0,2	0,2
Vehicle fleet operating expenses	0,1	0,1	0,1
Travel and subsistence - foreign	0,0	0,1	0,0
Special budget fund	0,0	0,0	0,0

Appendix 3

	2016	2017	2018
Number of permanent academic employees			
<i>Percentage increase in average total remuneration per employee (ctc⁶)</i>			
Number of contract academic employees			
<i>Percentage increase in average total remuneration per employee (ctc)</i>			
Number of permanent support employees			
<i>Percentage increase in average total remuneration per employee (ctc)</i>			
Number of contract support employees			
<i>Percentage increase in average total remuneration per employee (ctc)</i>			
Number of insourced employees			

⁶ Cost-to-company - referring to total employment cost which include salary, benefits and pension



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