DRN-3838904

The complaint

Mr P complains that American Express Services Europe Limited declined his claim for a refund under section 75 of the Consumer Credit Act 1974 in relation to his purchase of some graphics cards.

What happened

In September 2017 Mr P bought some graphics cards from a third party which I will call C. He wanted to use them for cryptocurrency mining. He paid €766.90 for them with his American Express credit card (which in sterling came to £701.28). One month later, C refunded him €548:30, or about 71% of what he had paid. Mr P says this refund includes £30 of shipping costs; if these are deducted then the refund comes to about 67%.

In October 2020 Mr P contacted American Express to ask for a full refund of his purchase under section 75, a law which (where it applies) makes the provider of credit liable for certain problems involving goods bought on credit. Mr P said the graphics cards' hash rate (performance) had been declining, and that they were not fit for the purpose he had bought them for. However, American Express told him that section 75 did not apply to his purchase, because his credit card payment had not been made directly to C; it had been made to his PayPal account, and then from there to C.

Being dissatisfied with that answer, Mr P brought this complaint to our service. Our investigator disagreed with American Express on the subject of whether section 75 applied: he said that the involvement of PayPal did not make a difference. But he still did not uphold this complaint, because he did not think that there was anything wrong with the graphics cards, or that C had misrepresented them. Mr P did not accept that opinion, and made detailed representations about why. He asked for an ombudsman's decision.

I wrote a provisional decision which read as follows.

What I've provisionally decided – and why

I've considered all the available evidence and arguments to decide what's fair and reasonable in the circumstances of this complaint.

In this case, I don't think it is actually necessary for me to decide whether section 75 applies, whether the graphics cards were defective, or whether C misrepresented them to Mr P. That is because even if I were to decide these points in Mr P's favour, I would not require American Express to refund him more than it already has.

As I've said, the refund was made only one month after the purchase, so it was not paid for the same reason that Mr P is asking for a refund now. Nevertheless, if I upheld this complaint I would not require American Express to refund the entire purchase price. That is because although he is disappointed with the performance of the product, he nevertheless used it successfully for over three years before raising a complaint. Section 24(8) of the Consumer Credit Act 2015 says that any refund to a consumer may be reduced by an amount to take into account the use the consumer has had of the goods since they were

delivered. I think it is fair to apply that rule here, and to say that a reduction of one third of the original price would have been a fair reduction for use.

I have considered whether I should apply that rule to the net price Mr P had effectively paid after deducting the refund, and then to ignore the original price. If the refund had been smaller, then I might have done that. But as Mr P has bought these goods for about one third of their original price, and they had lasted for longer than the warranty period before he reported that he was dissatisfied with them, I think it is reasonable for me to say that he has not paid too much for the use he has had of them. For that reason, I would not have required American Express to do anything.

I am currently not minded to uphold this complaint.

Responses to my provisional decision

Mr P did not accept my provisional decision. He made the following points:

- The partial refund already received had been for another issue, and not related to durability.
- He had bought six graphics cards, and had been refunded for two of them, which he had returned. He had paid for them with two credit cards, but the refund had been made to one of them, the American Express account. This complaint is about the four other cards.
- He had not used the cards for three years as I had stated, but for a bit less than two and a half years, as he had packed them away in preparation for moving house, and then the move had been delayed.
- That was not a reasonable length of time for the cards to last. He had expected the cards to last for five to six years. The cards had not been durable, and this had been a defect at the point of sale. He would not have bought them if he had known about this.

American Express did not reply.

My findings

Since the refund in 2017 did not relate to the graphics cards Mr P is complaining about now, but to cards he no longer has, I agree that it should not affect the outcome of this complaint.

However, I am not persuaded that the graphics cards were defective at the point of sale, or that they were misrepresented. I will explain why.

The graphics cards were Nvidia GeForce GTX 1060 6Gb cards. These were launched in 2016 and, as I've said, purchased by Mr P in 2017. He says (and I accept) that when he began using them, their performance or hash rate was around 24 or 25 MH/s (megahashes per second), but that by 2020 this had declined to 22 MH/s, a rate which he described as unacceptable.

The reason for this, putting it as simply as I can, is that over time, the DAG file (software which is indispensable for mining cryptocurrency) incrementally increased in size until it eventually became too large for the TLB (hardware pertaining to each graphics card's memory) to cope with. This resulted in a significant decline in the speed at which the cards could operate, as measured by the hash rate. There is nothing the purchaser can do about this. As this was inevitably going to happen at some point, Mr P says that the cards were not designed to be durable (particularly since it took less than two and a half years).

Mr P also says that a similar problem developed with another kind of graphics card made by

a different manufacturer. That other manufacturer developed a fix for that issue, but Nvidia didn't. He argues that Nvidia ought to have foreseen that this problem would occur sooner or later, and so should either have taken steps to pre-empt it or should never have marketed it as suitable for crypto mining. (When he raised that matter with Nvidia in 2020, it told him that it could not assist him, and referred him to a forum for developers who were discussing the issue. I have looked at that forum and have seen a message from Nvidia saying that they do not plan on doing anything about it.)

My opinion about all of this is as follows.

Firstly, I have seen a number of websites[1] which say that the standard hash rate of these cards at the point of sale is actually around 18 or 19 MH/s. This rate can be increased to 22 MH/s or higher by overclocking – that is, improving their performance by increasing their clock rate to a higher rate than the manufacturer's design. So Mr P must have achieved his much higher hash rate by overclocking the cards.

There is nothing necessarily wrong with overclocking, and many websites recommend it for a variety of reasons. However, the reduction of Mr P's hash rate from 24 or 25 MH/s to 22 MH/s, viewed against a standard (not overclocked) hash rate of around 18 MH/s, does not amount to a defect in and of itself. The cards are still performing much better than the manufacturer designed them to.

Nevertheless, that point alone is not fatal to Mr P's complaint. The decline of the hash rate over time is still probative evidence of the alleged defect, as it could indicate that the hash rate would still have declined whether they were overclocked or not. That is, without overclocking, the hash rate might have declined from 18 or 19 MH/s in 2017 to around 16 MH/s in 2020. So this point is not necessarily determinative of Mr P's case.

However, I am not persuaded that a decrease of two or three MH/s is as disastrous as Mr P suggests it is. It is a decline in performance by, at most, 12% after over two years' of continuous use. That is not insignificant, but I still think it is relatively minor. And the detrimental effect is entirely off-set by the overclocking, since the current overclocked hash rate is still better than it would have been without overclocking.

That links to my second topic. It is not possible to know very far in advance of time how much computing power will be needed for crypto mining to be profitable, as that will change from time to time. Just because it ceases to be profitable one day does not necessarily mean that the hardware was unfit for purpose all along. It is still mining. It may not be mining profitably, but that does not mean the graphics cards were defective at the point of sale.

Thirdly, the decline in the hash rate is not solely because of something internal to the graphics cards. There is an external influence. As I've said already, the issue is that the size of the DAG file has gradually increased over time, until it became too big for the cards to handle efficiently. But the size of the DAG file necessarily and unavoidably increases as a function of the process of crypto mining becoming more complicated over time. So this increasing complexity adversely affects the hash rate. This makes it difficult to infer that the declining hash rate means there is a defect in the graphics card. It is happening because each graphics card is having to do more than it had to at the outset.

This was always going to result in the DAG file becoming too big eventually. I agree that this

[1] For example https://wccftech.com/nvidia-geforce-gtx-1060-cryptocurrency-mining-65w-detailed/ https://www.legitreviews.com/silent-ethereum-mining-evga-geforce-gtx-1060-22-mhs_195529 https://www.pyramidreviews.com/bitcoin-mining/gtx-1060-mining-speed-hash-rate-tweaks-and-adjustments/

was foreseeable by the manufacturer. But it was also foreseeable by anyone who bought it. It was necessary for consumers to buy a product which had not only the capacity to mine cryptocurrency at the time of purchase, but also with the additional capacity to continue doing so in the years to come. Every graphics card, not just Nvidia's, will become obsolete at some point (whether it is used for mining or just for gaming). So what was suitable for a given purpose in 2017 will not always continue to be suitable. I accept that Mr P believed that the cards would last him for five or six years. But just because he turned out to be wrong about that does not necessarily mean that they were defective. On the balance of probabilities, I am not persuaded that they were.

I shared a draft of the above findings with Mr P. He did not accept them. He made the following submissions in response:

- I had raised new points which had not been argued by the bank;
- I had confused DAG file size with the memory limitations of the cards themselves and an (alleged) defect in the TLB size;
- The real problem is an inherent flaw in the design of the cards, which took two years to manifest and was triggered by the increase in the size of the DAG file;
- That design flaw is the limited size of the TLB buffer, according to an online article[2];
- This defect would still have affected the cards even if he had only used them for gaming, and not for mining;
- Nvidia has acknowledged that there is a problem;
- It is legitimate to compare Nvidia's cards with cards made by another manufacturer which don't have this issue;
- Without this defect – which was of course present at the point of sale – if the cards had operated at normal hash rates then he could have continued mining for about six years;
- A 12% drop in performance is not acceptable, and performance would have dropped by 20% by 2022;
- He had expected to get at least six years of use out of the cards, instead of two, and therefore he should get a refund of 67% of what he had paid for them.

I realise that Nvidia has acknowledged that the problem exists, but it has not gone so far as to concede that it is a fault. So I have still had to consider the evidence and decide for myself whether the cards were faulty at the point of sale.

Proceedings before the Financial Ombudsman Service are not adversarial, as in a court, where each party pleads its case and presents its evidence, and then the court reaches a verdict based only on what has been pleaded and led in evidence. Rather, our proceedings are inquisitorial, which means that I can consider evidence and arguments which have not been advanced by the parties. So I can consider points which have not been raised by American Express – although everything that I said in my provisional decision was still related to the bank's defence that the cards were not defective.

I accept that if the limited size of the TLB buffer amounts to a defect, as alleged, then the cards would have been defective at the point of sale, notwithstanding that the problem did not become apparent until a couple of years later.

The message Nvidia left on the developers' forum reads as follows:

> *"We've confirmed that the performance drop is due to the size of the DAG exceeding the total on-chip TLB capacity … As a result, there is an*

[2] https://cryptoage.com/en/2824-the-reason-for-the-hashrate-drop-in-mining-on-nvidia-pascal-video-cards-gtx-1070,-gtx-1080,-gtx-1080-ti.html (June 2022)

> *increased number of TLB misses, which affects performance. Because the TLB is a fixed capacity hardware resource … we don't believe there are any software optimizations that could reduce the TLB miss rate.*"[3]

So although the issue described here concerns the TLB capacity, the problem is still triggered by the DAG file reaching a certain size.

As I explained in the fourth topic set out in my provisional decision, the DAG file was always going to reach a size at which the cards would cease to function properly one day. But Mr P's point is that this was not supposed to happen because of anything to do with the TLB, but rather because of another limiting factor – the 6Gb of memory on each card. Once the DAG file size reached 6Gb – the cards' maximum capacity – then it could not get any larger. Mr P estimated that this would happen after about six years, and he has no problem with that. But instead, the TLB acted as another limiting factor which made its effect felt much earlier, and before the DAG file could reach the size the cards had been built to accommodate. And that would clearly be a fault, because it would mean that the cards would never reach their intended potential of 6Gb, due to a stricter limiting factor intervening.

As I have said, Mr P provided a link to an online article on the subject, which I have read. It is titled *"The reason for the hashrate drop in mining on Nvidia Pascal video cards (GTX 1070, GTX 1080, GTX 1080 Ti)."* However, the second paragraph says:

> *"It is worth noting that the hashrate decreases not only for the GTX 1070 video card, but also for the GTX 1080 and GTX 1080 Ti, although not so catastrophically. More interestingly,* ***no such problems were seen with the GTX 1060*** *and GTX 1070 Ti from the same 1000 series."* (Emphasis added.)

Since Mr P's cards were GTX 1060 cards, this article does not prove that his cards were affected by this problem. Neither does the Nvidia message I have quoted above, which was a response to a question posed specifically about GTX 1070 and 1080 cards.

That is not to say that Mr P has not been experiencing a decline in the hash rate of his GTX 1060 cards (and I accept that he has), only that the TLB is not necessarily the cause.

Another article[4] explains that a decline in the hash rate is to be expected when crypto mining with a GTX 1060 card, due to a different reason: insufficient VRAM memory in the card's GPU, which is the problem I described in my provisional decision. (That article then goes on to discuss TLB problems, but separately.)

So on the balance of probabilities, I am not persuaded that the issue is that the TLB was defective, but rather that the DAG file increased in size faster than Mr P had expected, which affected performance. And I am not persuaded that that is a fault which was present at the point of sale.

I am therefore unable to say that American Express erred in its response to Mr P's section 75 claim.

My final decision

My decision is that I do not uphold this complaint.

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[3] https://forums.developer.nvidia.com/t/blockchain-drivers/110847/14

[4] https://www.techpowerup.com/234482/eth-mining-lower-vram-gpus-to-be-rendered-unprofitable-in-time?cp=2 (This mentions a GTX 1060 card with only 3 Gb of memory, but I expect that a 6 Gb card would be no different.)

Under the rules of the Financial Ombudsman Service, I'm required to ask Mr P to accept or reject my decision before 9 August 2023.

Richard Wood
Ombudsman