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A Concept of Death in Genus *Pan*: Implications for Human Evolution

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Abstract

An understanding of what death and dying entail is termed a concept of death (CoD), and the human CoD is often viewed as one of the characteristics that distinguishes our species. In this research, I identified an analogous understanding of death and dying in our closest living relatives—genus *Pan*. Linguistic frameworks designed for studying the CoD in human children look for evidence of understanding of several facets of death. I adapted these frameworks for the non-verbal *Pan* species, systematically analysing written and video recordings of chimpanzee and bonobo behaviours surrounding death within these new behavioural frameworks. I identified compelling evidence for the comprehension of several aspects of death, and thus for the presence of a human-like CoD in chimpanzees and bonobos. This has implications for our own evolutionary story and raises questions about what makes humans 'human'.

Keywords: Biological anthropology; evolutionary anthropology; evolutionary biology; primatology; genus *Pan*; thanatology; primate mortuary behaviour; concept of death.

A concept of death in genus *Pan*: Implications for human evolution

The human understanding of death has long been viewed as one of the characteristics that helps distinguish our species (Gonçalves & Biro, 2018). This understanding of what death and dying entail is termed the concept of death (CoD), and opinions vary regarding the extent of the CoD in the broader animal kingdom (Anderson, 2016; Gonçalves & Biro, 2018; Monsó & Osuna-Mascaró, 2020). During childhood, humans develop a complex CoD that involves comprehending both the biological nature of death and its more metaphysical aspects (Kenyon, 2001; Speece & Brent, 1984, 1992). The critical evolutionary question is how early in our lineage this CoD evolved—whether it is restricted to modern humans, genus *Homo*, or more widely present in primates. Suppose we had reason to believe that the CoD evolved early in our evolutionary lineage. This could help contextualise early hominin behaviours, offer alternate meanings to findings in the fossil record, and spur a rethink of pre-*sapiens* burials. Possible cases of pre-*sapiens* deliberate burials are currently disputed; however, the earlier in our lineage that the CoD evolved, the higher the likelihood that possible burials or corpse disposals in extinct species of genus *Homo* may have represented intentional funerary practises. The fossil record is not often well-suited to behavioural research; hence the most logical step from a comparative evolutionary perspective is to study our closest living relatives—the two living members of the genus *Pan*. Suppose a human-like CoD is present in the chimpanzee (*Pan troglodytes*) and the bonobo (*Pan paniscus*). In that case, it is probable that the CoD was also possessed by the last common ancestor of chimpanzees, bonobos, and humans (CHLCA), as well as early hominins (de Waal, 2019; Gruber & Clay, 2016; Suddendorf, 2004). In this paper, I thus investigate the extent of a human-like CoD in *Pan*, using a framework adapted from studies on the development of the CoD in human children to analyse *Pan* mortuary behaviours.

Chimpanzee and bonobo sociality and behavioural flexibility

It is necessary to understand the nature of *Pan* sociality and relationships, since this may be intimately related to the CoD. The chimpanzee and the bonobo are morphologically and physiologically very similar (de Waal, 1995). They both form large multi-male and multi-female social groups with specific home territories (Boesch *et al.*, 2008; Stanford, 1998). All members of genus *Pan* are highly interested in genitals, with conspecific interactions often involving genital inspection, smelling, and grooming (de Waal, 1995, 2019; Stanford, 1998; van Lawick-Goodall, 1968). Their interest in genitals is second only to their interest in faces (van Lawick-Goodall, 1968; van Leeuwen *et al.*, 2016). Chimpanzees and bonobos share fission-fusion social systems, where subgroups split up to forage or travel during the day and re-join at night (Aureli *et al.*, 2008; Furuichi, 2011). Males may also move around on their own outside subgroups (van Lawick-Goodall, 1968). The everyday relationships of chimpanzees and bonobos often reach a depth of 'bondedness' found only in reproductive pairbonds in other social birds and mammals (Dunbar & Shultz, 2007).

However, some social behaviours differ substantially between the two species (Gruber & Clay, 2016; Pruetz *et al.*, 2017). Chimpanzees form patriarchal groups led by a single alpha male (de Waal, 1995, 2019). The male hierarchy within these groups is dynamic and competitive (de Waal, 2019), whereas, in the secondary female hierarchy, age is most powerful (Foerster *et al.*, 2007). Sometimes the highest-ranked female can outrank the lowest-ranked male, but this is extremely unusual (de Waal, 1995; van Lawick-Goodall, 1968). Violence and aggression are common in chimpanzee groups (Hare *et al.*, 2012; Pruetz *et al.*, 2017)—expressed both intracommunity, via dominance displays and other hierarchy maintenance (de Waal, 1995; van Leeuwen *et al.*, 2016), and intercommunity, via boundary patrols and coalitionary attacks (Boesch *et al.*, 2008; de Waal, 1995; Pruetz *et al.*, 2017). Whilst males are highly territorial (Boesch *et al.*, 2008), females leave their natal group as they near sexual maturation (de Waal, 1995; Stanford, 1998). The strongest bonds in chimpanzee troops are consequently between males (de Waal, 1995; Pepper *et al.*, 1999).

Bonobos have a more tolerant society. Whilst aggression and violence still occur, incidents are rarer and less severe (de Waal, 1995; Furuichi, 2011; Hare *et al.*, 2012). Instead, bonobos use socio-sexual behaviour to resolve conflicts (de Waal, 1995; Hare *et al.*, 2007; Stanford, 1998). Bonobo societies are matriarchal—an alpha female leads the group, and the oldest females are generally the highest ranked (de Waal, 1995; Furuichi, 2011). Male status is strongly influenced by their mother's status (Furuichi, 2011; Takeshi, 1997; de Waal, 1995). With mothers forming the core of bonobo society, the strongest bonds are between unrelated females and male-male bonds are weak (de Waal, 1995).

The subcomponents of the concept of death

The presence of the CoD in non-human animals is often contested due to a lack of a consistent definition (Gonçalves & Carvalho, 2019; Monsó & Osuna-Mascaró, 2020; Pettitt, 2018). Therefore, for my research into genus *Pan*, I was specifically looking for a human-like CoD, defined as an understanding that the body and mind have permanently ceased to function and that this state is an unpredictable phenomenon that eventually affects all living things (Kenyon, 2001). When studying the CoD in children, researchers assess understanding using the subcomponents of: 1) non-functionality (death entails the cessation of bodily and mental functions); 2) irreversibility (once an organism is dead, it cannot be returned to life); 3) universality (death happens to, and only to, living things); 4) inevitability (death happens to all living things); 5) personal mortality (death will happen to me); 6) causality (what causes death); and 7) unpredictability (that the timing of death cannot be known in advance) (Kenyon, 2001; Longbottom & Slaughter, 2018; Slaughter, 2005). Inevitability and mortality can be considered sub-aspects of universality (Speece & Brent, 1984, 1992), as the idea that death is universal to all living things inherently implies the inclusion of oneself and the

exclusion of inanimate objects. Causality and unpredictability can be viewed as a step further than the fundamental CoD (Piaget, 1923), since to comprehend the causes of death and their unpredictability, an organism must already understand death as a basic concept.

Therefore, I collapsed inevitability and mortality into the universality component and excluded causality and unpredictability. I thus looked for evidence in genus *Pan* of just three subcomponents, defined as follows: non-functionality, being the understanding that death results in the complete cessation of bodily and mental functions; irreversibility, being the understanding that once an organism is dead, it cannot be returned to life; and universality, being the understanding that death also happens to all, and only, other living things—including oneself. In children, the acquisitional timing of the CoD can differ significantly, as the subcomponents are discrete and can develop in various orders (Speece & Brent, 1984, 1992). However, the most common developmental order is universality first, followed by non-functionality and irreversibility. Since the subcomponents are discrete, it is reasonable that some, but not all, may be present in *Pan*.

Research into the CoD in children relies on interviews and language development (Kenyon, 2001; Piaget, 1923). Non-functionality is considered acquired when variations of the question 'Can a dead thing do *x*?' are answered with 'No.' *X* may be any defining feature of life, from physical actions such as breathing or walking to invisible aspects such as thinking or feeling (Speece & Brent, 1984, 1992). Irreversibility is considered acquired when children answer 'No' to questions such as 'Can a dead person come back to life?', and answer the question '*How* can you make dead things come back to life?' with some variation of 'You cannot' (Piaget, 1923; Speece & Brent, 1984, 1992). Universality is considered acquired when children answer 'Yes' to questions regarding the death of other living things, such as 'Will *x* die one day?'—*x* may be the child, a person, an animal, or a plant (Piaget, 1923; Speece & Brent, 1984, 1992). That this previous research has relied on language is a significant obstacle when researching the CoD in non-human animals (Anderson, 2016), and I therefore needed to define non-linguistic behavioural equivalents.

Behavioural indicators of the concept of death

Non-linguistic behavioural indicators of non-functionality include treating the body in ways one would not if they were alive. *Pan* mothers often carry dead infants for extended periods after death (Biro *et al.*, 2010; Goldsborough *et al.*, 2020; Lonsdorf *et al.*, 2020; Watts, 2020). If they were to carry dead infants in atypical positions or treat them in a way that could have caused injury when alive, this indicates understanding of non-functionality. Cannibalism after death is a similar indicator, as no records exist of *Pan* cannibalising living conspecifics.

Deliberate checks for functionality also indicate understanding of non-functionality. These checks include actions that would have prompted responses if the deceased were merely sleeping, such as shaking or hitting the body, or checks for sensory cues of life, such as searching for breath or scent, as chimpanzees and bonobos rely more heavily on olfactory cues than humans (de Waal, 2019; van Leeuwen *et al.*, 2016). An organism's understanding of non-functionality must match its understanding of functionality, i.e., a chimpanzee cannot be expected to check for lack of brain activity, as they do not understand this to be a part of functionality.

Irreversibility can be seen via reactions to information received when searching for functionality. If, after inspecting a body, an individual then exhibits a strong emotional response (e.g., distress calls or physical agitation), this may indicate that they understand the deceased will never return to life. Stopping efforts to

wake or revive the body after receiving no response also indicates an understanding that the state of death, unlike sleep, is irreversible. Burial or other deliberate disposal of the body indicates similar understanding.

Behavioural indicators of universality are harder to identify, as universality is less about an organism's immediate reaction to a death, which can be externally observed, and more about an internal transference of death's implications to future situations. Universality can be indicated if an organism reacts to heterospecifics differently once dead, as this demonstrates an understanding that non-functionality and irreversibility apply universally—not just to conspecifics. Universality can also be seen when grief and fear of death are transferred to other relationships (Speece & Brent, 1984, 1992), resulting in individuals who have experienced death taking extra care of remaining loved ones—including being overly protective of other children or exhibiting increased caution in situations that previously resulted in death.

To assess the extent of the CoD in *Pan*, I utilised these behavioural equivalents of the traditional subcomponents of the CoD for my guiding framework, as summarised in Table 1. I looked for recorded examples of these behaviours in chimpanzee and bonobo mortuary contexts. As I could not directly observe a community reacting to death, I was restricted to data from previous research. I collated various records of *Pan* mortuary behaviours from the existing published literature, both descriptions and videos of behaviour surrounding death. I obtained descriptions from primary research articles and preliminary reports, and videos from associated supplementary materials. Using solely anecdotal descriptions ran the risk of my research being influenced by others' biases; by utilising raw videos and making my own observations, I reduced possible bias and was able to notice behaviours that previous researchers had overlooked. Many of the videos were originally published for a different purpose—often the behaviours most relevant for my analysis occurred in the background and were not noted or discussed in the associated article. I systematically analysed these articles and videos with regard to my subcomponents, noting examples that fulfilled the requirements for the CoD.

Subcomponent	Verbal indicators in human children	Behavioural indicators in genus *Pan*
Non-functionality	Answering 'No' to a variation on 'Can a dead thing do *x*?'. *X* could be physical, like breathing or walking, or mental, like thinking or feeling (Speece & Brent, 1984, 1992).	Treating deceased bodies in ways they never would if alive; post-mortem cannibalism; deliberately checking for functionality and signs of life.
Irreversibility	Answering 'No' to questions such as 'Can a dead person come back to life?' and answering 'How can you make dead things come back to life?' with some variation of 'You cannot' (Piaget, 1923).	Stopping efforts to revive after receiving no response; strong emotional reactions to death; deliberate disposal of bodies.
Universality	Answering 'Yes' to questions regarding the death of other living things, such as 'Will *x* also die one day?'. *X* can be the child, another person, an animal, or a plant (Piaget, 1923; Speece & Brent, 1984, 1992).	Reacting to death in other species; showing increased caution and care for themselves or their loved ones.

Table 1: Summary of behavioural indicators of the concept of death in genus *Pan*

Chimpanzee and bonobo mortuary behaviours

Behaviours indicative of non-functionality

One behavioural indicator of non-functionality is treating bodies in a manner that one would not if they were alive. There are multiple instances of mothers carrying deceased infants in atypical positions. One female bonobo was recorded carrying her living infant ventrally; however, within hours of the infant's death, the mother began to carry the body dorsally and drag it along the ground (Fowler & Hohmann, 2010). Two chimpanzees with deceased infants transported them by gripping a limb and dragging or wedging the body between their neck and shoulder (Biro *et al.*, 2010). One mother also let juveniles drag the infant's body and play with it (Biro *et al.*, 2010). Other atypical carrying positions have included gripping the deceased infant in the mouth and slinging it over a shoulder or around the neck (Lonsdorf *et al.*, 2020; Watson & Matsuzawa, 2018). Post-mortem cannibalism, another example of treating dead bodies differently, also occurred after the bonobo infant's death: the alpha female led the group to feed on the body (Fowler & Hohmann, 2010). Other cases of post-mortem infant cannibalisation include a bonobo grooming and then eating her infant and a chimpanzee that partially cannibalised her infant before continuing to carry it for three days (Watson & Matsuzawa, 2018). Post-mortem cannibalism also occurred after a coalitionary attack on an adult male chimpanzee (Pruetz *et al.*, 2017).

Deliberately checking for functionality is also indicative of non-functionality, including checking for sensory cues that act as signs of life. A female chimpanzee inspected the bodies of a 9-year-old male and an infant by peering at the faces, sniffing the face and genitals, and touching the face and genitals before sniffing her hand (Cronin *et al.*, 2011; van Leeuwen *et al.*, 2016). Chimpanzees have also been recorded looking inside the mouths of deceased group members, including three chimpanzees prying open a closed mouth to inspect it thoroughly (Anderson *et al.*, 2010; de Waal, 2019).

Actions that would receive a response if the deceased were sleeping are another form of checking for functionality. These have been recorded in several forms: a male displayed over a body, hitting the ground with branches while vocalising (van Leeuwen *et al.*, 2016); after the previously mentioned coalitionary murder, a group member non-aggressively displayed, stamped, and pulled at the arms (Pruetz *et al.*, 2017); a young male lifted and shook the arm of a deceased group member then hit the torso when there was no response (Anderson *et al.*, 2010). Other groups have been recorded lifting limbs and dropping them (Biro *et al.*, 2010; de Waal, 2019). In all these cases, attempts to wake or revive the deceased stopped after receiving no response.

Behaviours indicative of irreversibility

Strong emotional responses after investigating the body of a conspecific, such as distress, are indicative of irreversibility. Cases of chimpanzees exhibiting distress after a death are numerous: one male made persistent 'wraaah' calls (a known sign of emotional distress), whimpered, watched the body for hours, and became agitated if others approached it (Teleki, 1973); a female who lost an infant refused to eat and rocked back and forth while screaming (de Waal, 2019); and, after a male failed to rouse a female he was bonded with, he screamed, tore at his hair, tried to prevent the body's removal, and spent days moaning and crying (Fiore, 2013). One of the most famous chimpanzee deaths is that of 8-year-old Flint (Fiore, 2013). After the death of his mother, Flo, whom he was unusually dependent on, he sank into a deep depression, eventually curling up and dying in the same spot where she died (Goodall, 1971). Some chimpanzee reactions to deaths of conspecifics are gentler, though still emotional: one female carefully groomed the bodies of a 9-year-old male and an infant for long after the rest of the group had lost interest, gently cleaning the male's teeth with a stem of grass (Cronin *et al.*, 2011; van Leeuwen *et al.*, 2016); after the death of her mother a female kept protective vigil over the body all night, while other females groomed it (de Waal, 2019); and, after the death

of an older female, her close friend and daughter groomed the body and kept vigil through the night—they also refused to eat for weeks post-death and exhibited disturbed sleep (Anderson *et al.*, 2010).

Behaviours indicative of universality

Behavioural indications of universality can be found in individuals' reactions to the deaths of heterospecifics. When a chimpanzee group found a dying baboon, they became agitated and made persistent 'wraaah' calls (Teleki, 1973; van Lawick-Goodall, 1968). The chimpanzees sniffed, stroked, and groomed the body. The same group reacted with fear and avoidance when being presented with a live python but, upon seeing it killed, immediately reapproached the area, letting their infants touch the dead snake (van Lawick-Goodall, 1968). A similar reaction was recorded when a viper entered a bonobo sanctuary (de Waal, 2019). The group was initially afraid, but, after the alpha female killed the snake, juveniles playfully dragged the body and opened its mouth to inspect the fangs.

Another behaviour indicative of universality is changing one's behaviours towards others or oneself after experiencing death. I found no concrete examples of this, but there are two cases where unusual behaviours were exhibited. In the aforementioned case of Flo and Flint, Flint was unusually attached to his mother at such a late age due to her actions after her infant, Flame, died (Goodall, 1971). After Flame's death, Flo started babying 6-year-old Flint—carrying him on her back and sharing her food and night nest with him. In a different case, when a female chimpanzee carrying a recently deceased infant came across the body of a male group member, she swiftly moved away from the body to sit alone, clutching the body of her dead infant tighter to her chest (van Leeuwen *et al.*, 2016). However, there is also a potential counterexample where no change was shown when expected: after seeing a member of his group fall from a tree and break his neck, a chimpanzee almost fell from a tree in a similar manner when vines gave way beneath him (Teleki, 1973). He showed no extra caution when climbing, despite the death of his conspecific just hours earlier.

Discussion

Behavioural evidence for the concept of death in genus

There is abundant evidence for aspects of the CoD in *Pan*, specifically the non-functionality and irreversibility subcomponents. Both bonobos and chimpanzees demonstrated non-functionality by carrying deceased infants in atypical positions on six occasions and cannibalising bodies on four occasions. These atypical carrying positions—held in the mouth, wedged between the neck and shoulder, slung across the neck or shoulder, and dragged along the ground—were not seen when carrying sick, injured, or experimentally anesthetised infants (Lonsdorf *et al.*, 2020; Watson & Matsuzawa, 2018). This implies an understanding that death is a uniquely non-functional state. During cannibalism, only small pieces of flesh were eaten, implying that it was not for sustenance—a reasonable alternative hypothesis. Chimpanzees also demonstrated non-functionality via deliberate checks for functionality. They visually, physically, and olfactorily inspected faces, mouths, and genitals of dead conspecifics on six occasions; lifted and dropped limbs on three occasions; and displayed, vocalised at faces, and hit torsos on three occasions. The line blurs here between non-functionality and irreversibility—behavioural indicators of irreversibility include strong emotional responses after inspecting a body, which have been observed on at least ten occasions. However, it is difficult to differentiate between violence towards a body due to emotion and violence as an attempt to acquire information about the state of death. Nevertheless, even if these actions are not performed with the

intention of investigating non-functionality, the faces and genitals that *Pan* attend to in life would be a rich source of information regarding the state of death (Cronin *et al.*, 2011).

Irreversibility is also demonstrated by stopping efforts to revive a body after receiving no response. In no case have displays, hitting, or vocalising continued for any significant period after failing to receive a response. Individuals that investigate bodies longest tend to be adolescents and juveniles, whereas those who have encountered death before, such as older group members (Cronin *et al.* 2011; van Leeuwen *et al.*, 2016), investigate bodies for shorter amounts of time. This suggests that the CoD in *Pan* is learnt rather than innate—the implication being that the *Pan* CoD is closer in nature to the human CoD, which is learnt through experience and teaching (Kenyon, 2001; Speece & Brent, 1984, 1992), than the partial CoD of species such as ants, which is instinctual and automatic (Fashing & Nguyen, 2011; Monsó & Osuna-Mascaró, 2020). There are no recorded cases of burial or deliberate disposal of bodies, which would have been a third indicator of irreversibility. One behavioural indicator that I did not anticipate when creating my framework, but encountered during analysis, was expressions of alarm when dead bodies act in a way expected only of the living. In the coalitionary killing (Pruetz *et al.*, 2017), researchers buried the corpse after the group moved away. Upon returning to the area and finding the body gone, the group made frequent, nervous alarm calls—as if they feared the absence of the body. Their fear indicates an understanding that the dead cannot independently move position or location, and that this non-functionality is irreversible, with no return to movement to be expected. This emphasises that the troop construed the deceased's lack of responsiveness as a permanent, rather than temporary, state.

The cases of post-mortem cannibalism (Fowler & Hohmann, 2010; Pruetz et al., 2017; Watson & Matsuzawa, 2018) also demonstrate irreversibility. These behaviours suggest an understanding of the permanent nature of death, as no cases of ante-mortem cannibalism have been recorded in genus *Pan*—even in cases of long-term unresponsiveness and loss of consciousness. This strengthens the case for a CoD, as these actions cannot be explained as simply responses to the unexpected cessation of movement, but are reactions that make sense if, and only if, the individual construes the situation as permanent and irreversible.

The final subcomponent, universality, has not been satisfactorily demonstrated. Behavioural universality indicators include exhibiting understanding that non-functionality and irreversibility apply equally to heterospecifics and conspecifics. There is one case each for chimpanzees and bonobos where their fearful reactions to a snake changed once it died and was no longer a threat, and there is a single case of chimpanzees reacting with distress to the death of a baboon. The baboon incident is notable since baboons are common prey for chimpanzees, so their death should not logically be distressing. It is possible that upon encountering the dying baboon outside of a predatory context, the chimpanzees were reminded of the deaths of conspecifics—if so, this would be a case of universality. The second group of behaviours indicative of universality, including taking extra care of loved ones or oneself after a death, has only two possible examples, both in chimpanzees, and one possible counterexample. However, the counterexample, where the chimpanzee demonstrated no increase in caution after a conspecific fell to his death, may not be what it seemed. The human observers did not directly observe the moment when the deceased fell—they were alerted to the incident by his landing and inferred what must have occurred. The other chimpanzee may have been in a similar situation, where he did not observe the exact moment or manner of death.

Overall, it is reasonable to conclude that genus *Pan* possesses the CoD. However, it appears to fall short of the level of CoD seen in modern humans, with only non-functionality and irreversibility satisfactorily demonstrated. This is unexpected, as universality is the first of the three subcomponents to develop in

children (Kenyon, 2001). It is possible that universality may be present in *Pan* and simply absent from this data due to its nature being extremely difficult to perceive via behaviour alone.

The social and emotional origins of the Pan *concept of death*

In human children, the extent of the exhibited CoD varies according to the strength of the child's relationship with the deceased (Speece & Brent, 1984, 1992). A similar phenomenon appeared in this research, as the individuals most affected by each death were those emotionally closest to the deceased. In the falling death, the individual who made 'wraaah' calls, whimpered, and became agitated if others approached the body was a close friend of the deceased (Teleki, 1973). In the coalitionary murder, the group member who displayed, vocalised, pulled at the body, and refused to participate in cannibalism, was one of only two individuals who had previously engaged in affiliative behaviour with the deceased (Pruetz *et al.*, 2017). The 9-year-old who died of illness was a highly social individual who roamed between subgroups—accordingly, most of the group was interested in and protective of the body (van Leeuwen *et al.*, 2016). Even then, the two most affected were his closest male friend, who displayed over the body, forced access to it, and visited more than any other male, and his adopted aunt, who groomed the body, cleaned his teeth, and kept vigil once others had left.

Conversely, after the death of a female chimpanzee who was low-ranked and socially peripheral, the only group member to spend significant time near the body, and the only female to handle the body at all, was her daughter (Stewart *et al.*, 2012). Infants are also socially peripheral, not yet having formed relationships outside of their mother—unsurprisingly, in cases of infant death, only the mothers had noticeable emotional responses to the death (Biro *et al.*, 2010; Cronin *et al.*, 2011; de Waal, 2019). Overall, individuals' reactions to death vary by the closeness of their living relationship to the deceased. Mortuary behaviours in *Pan* are a translation of the bonds created in life.

The *Pan* CoD also appears to be more of an emotional reaction than categorisable behaviour. Several cases blur the lines between subcomponents, but the common factor is that group members are distressed, upset, or unsettled. Frans de Waal (2019) coined the term *anthropodenial* for when researchers reject similarities between humans and our close relatives to keep humans on an evolutionary pedestal. Many scholars criticise anthropomorphism (Gruber & Clay, 2016), but I believe anthropodenial is worse. If two closely related taxa act similarly under similar circumstances, then it is reasonable to believe they are similarly driven. Therefore, I describe this emotional response to death as grief, and the behaviours that stem from it, such as grooming and keeping vigil, as mourning. In humans, grief is a feeling of sorrow caused by distress over a loss (Fiore, 2013; Gonçalves & Carvalho, 2019), with mourning then being the suite of social behaviours exhibited in response to that grief (Gonçalves & Carvalho, 2019). As the *Pan* CoD appears rooted in grief and mourning, it is reasonable to call it an emotionally and socially driven phenomenon.

As I am looking at a human-like CoD from an evolutionary perspective, the next step is to theorise the evolutionary function of a socially and emotionally driven CoD. I believe it most likely evolved as a social adaptation. Death impacts society by severing social bonds and thus creates a rupture in the social fabric: the most social animals have the most mourners as they had numerous strong bonds in life. The CoD evolved because it is needed as a social stabiliser. If a species develops the ability to understand death, they can feel grief. If a species can feel grief, then they can begin to mourn. If a species can mourn, they can more quickly recategorise the living to dead, reform the social structure, and shape a new dominance network after death has left a hole in the hierarchy. A human-like CoD would therefore be an adaptation to protect against

destabilisations caused by death. The more social and communal a species, the more effort must be put into protecting against social destabilisation—thus a human-like CoD is more likely to evolve. Chimpanzees and bonobos, like humans, are highly social animals to whom a defined hierarchy is vital for stability. If *Pan* indeed has the human-like CoD that they appear to have in this research, and if that CoD evolved for the reasons hypothesised, then it is reasonable to say that our early hominin ancestors most likely possessed such a CoD too.

Conclusion and directions for further research

Genus *Pan* has a complex CoD, including a cogent understanding of the biological subcomponents of non-functionality and irreversibility and at least some degree of understanding of the more metaphysical subcomponent of universality. They may, however, understand more of universality than it appears, as behaviour struggles to accurately reveal emotion—and emotion appears to be the main driver of the *Pan* CoD. That is the principal limitation of this work. However, if a human-like CoD is indeed a social adaptation to sustain complex hierarchies and protect large group sizes against destabilisation, then it is reasonable to conclude that both *Pan* and early hominins had a significant understanding of death.

There are some avenues of future research that may bring us closer to a definite answer. One behaviour that should be watched for is whether, after losing an infant, a mother treats her future infants with increased care and is more protective and watchful. If so, then this would indicate a more robust understanding of universality. We can also watch for the effects of social destabilisation in other parallel settings that do not invoke grief. Suppose grief and mourning are, in fact, adaptations for stability. In that case, one might expect to see the hierarchy restabilise slower if individuals were removed from the group in ways other than death, such as peaceful emigrations from the natal group or transfers to other zoos or sanctuaries. One pitfall that future researchers need to be wary of is preconceived notions of the "correct" reaction an individual should have to death. Harris (2018), for example, proposes an experiment where vocal recordings of deceased individuals are played to a chimpanzee troop. Harris theorises that, if the troop truly understood the irreversibility of the death state, then they should exhibit consternation and fear upon hearing the voice of their dead conspecific, and not excitement or relief at their supposed return. Putting aside the unethical nature of deliberately subjecting individuals to potential distress, this proposal is founded in a belief that the "correct" reaction to apparent resurrection should be negative, when, even within *Homo sapiens*, various historical and extant religions have believed that resurrection is both possible and positive (Habermas, 1989; Lehtipuu, 2015). Future work also needs to focus more heavily on bonobos, as bonobo reactions to death are largely missing from the literature. This means that we have been defining a genus by the behaviour of one species, which may be skewing the findings (Gruber & Clay, 2016). There is copious research potential in this still-developing field of evolutionary primate thanatology.

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List of tables

Table 1: Summary of behavioural indicators of the CoD in genus *Pan*

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Glossary

Affiliative behaviour: a behaviour or activity that builds unity within a group or bondedness between a pair.

Conspecific: an organism belonging to the same species.

Dominance display: behaviours designed to reinforce dominance over other individuals such as vocalising, beating the chest, or waving branches.

Genus *Homo*: the biological group that includes modern *Homo sapiens* (humans) and our closest extinct relatives.

Genus *Pan*: the biological group that includes the chimpanzee and bonobo but excludes other great apes, e.g., humans or gorillas.

Heterospecific: an organism belonging to a different species.

Hominin: the biological group that includes all modern and extinct humans and our ancestors, but excludes genus *Pan*.

Natal group: the group that an individual was born into, as opposed to one they join later in life via mating.

Taxa: any unit of biological classification, e.g., species, genus, family, order.

Thanatology: the scientific study of death.

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Period Pain: Student Perceptions of the Ongoing Stigma Surrounding Menstruation at the University of Warwick and Potential Interventions to Counter Such Stigma

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Abstract

With ongoing menstrual stigma maintaining a culture of silence and secrecy in academic institutions, this research seeks to reveal student perceptions of this stigma at the University of Warwick, and understand their suggestions for how the University can better support menstruating students. Drawing on findings from a focus group of six menstruating students at the University of Warwick, the paper suggests that menstrual stigma persists at the University, affecting students' wellbeing and academic performance. Participants expressed frustration at the lack of understanding of, or institutional support for, the difficulties of menstruation; including (but not limited to): debilitating pain, negative assumptions about the body, inaccessible menstrual products and inadequate hygiene facilities. However, certain students appear to be countering the cultural pressure to remain silent about menstruation, calling for the University to implement proactive measures to improve menstrual education, counter stigmatising assumptions and help menstruators mitigate the effects of pain and menstrual management. The research also calls attention to the elements of privilege present in such discourses, highlighting the need for further research into students' menstrual needs and potential institutional interventions, with a particular focus on the intersecting difficulties faced by marginalised students.

Keywords: Menstrual equity, menstrual stigma, gender inequality in higher education, period poverty, period pain

Introduction

Menstruation is more than a biological process: it is loaded with political, social, cultural, medical and religious meanings (Bobel, 2020; Medina-Perucha *et al.*, 2020). Despite recent progress towards gender equality, the topic of menstruation and how to deal with it is still surrounded by deeply entrenched shame and stigma, exacerbating ongoing inequalities in education, healthcare, and workplaces (Johnston-Robledo and Chrisler, 2013; Plan International UK, 2018; Sang *et al.*, 2021; Sommer *et al.*, 2021).

This stigma has led to menstruation being historically neglected in academic and professional settings, with research about menstruation remaining scarce and often dismissed by male-dominated research cultures (Bobel and Fahs, 2020 Bobel, 2020; Medina-Perucha *et al.*, 2020; Munro *et al.*, 2021). Despite increasing anecdotal evidence of period poverty, shame and stigma, there remains insufficient empirical evidence into the lived experiences of menstruators (Briggs, 2021; Munro *et al.*, 2021). The menstrual experiences and needs of university students specifically remain under-investigated, despite conditions of high stress and anxiety that can significantly affect their menstrual experiences, confidence and wellbeing (Munro *et al.,* 2021). In marginalising the experiences of menstruating students and staff, universities can inadvertently reinforce stigma, while negative mental and physical health effects remain unaddressed (Briggs, 2021).

Despite the dearth of academic investigation, in recent years menstrual activism aiming to challenge stigma has gained increasing media and political attention (Bobel, 2020; Medina-Perucha *et al.,* 2020; Plan International UK, 2018). At the University of Warwick, this has been led by Student Union officers, including myself, campaigning for free period product provision and gender-inclusive language since 2015 (Warwick SU, 2015; Warwick SU, 2022). This is an important step in increasing accessibility of menstrual products, with 1 in 7 girls in the UK having struggled to afford sanitary products (Plan International UK, 2018), and a lack of access to menstrual products at university campuses causing distress and disruption for students and staff (Bobel and Fahs, 2020; Sang *et al.*, 2021). However, scholars have suggested that campaigns for menstrual equity must go beyond period product provision to challenge ongoing menstrual taboos and consider how this impacts individuals' dignity and human rights (Briggs, 2021; Loughman *et al.*, 2020; McLaren and Padhee, 2021; Sang *et al.,* 2021). Moving beyond a focus product provision can link menstrual health across different domains to structural, social and cultural obstacles to gender equality (Bobel and Fahs, 2020; Loughman *et al.*, 2020; McLaren and Padhee, 2021).

Thus, this research attempts to link students' perception of current menstrual activism to ongoing menstrual stigma and potential university-level interventions. The University of Warwick provides an important location for this research as a leading Higher Education (HE) institution in the UK, with just under 30,000 students enrolled (University of Warwick, 2022). Despite the University's strategic commitment to equality and sustainability (University of Warwick, 2019), there remains no qualitative or quantitative research into the experiences of menstruating students on campus or their awareness of recent menstrual activism. In beginning to address this gap, this research contributes to the growing body of literature on menstrual equity, setting the scene for future research into student experiences, the effectiveness of menstrual activism, and potential policies to improve gender equality and student wellbeing at English university campuses. This highlights the essential role of intersectional academic research in informing appropriate and inclusive menstrual activism, and exposing 'some of the fundamentally problematic aspects of misogyny, sexism, racism, homophobia, and classism' that underpin current attitudes to menstruation (Bobel and Fahs, 2020: 1013).

Regarding language, which is crucial in shaping dominant discourses and gender relations (Briggs, 2021), throughout this research, I use the non-gendered language of 'menstruators', recognising that not all women menstruate, and some men and non-binary individuals do (Bobel and Fahs, 2020).

Literature review

Shame and stigma

Menstruation remains a deeply stigmatised phenomenon across the world, including the UK (Johnston-Robledo and Chrisler, 2013; Plan International UK, 2018; Sommer *et al.,* 2021). Scholars have illustrated how this stigma manifests in varied ways, from secrecy and silence maintained through euphemisms (Gottlieb, 2020; Sang *et al.,* 2021; Sommer *et al.,* 2021) through societal pressure to follow a strict 'menstrual etiquette' (Briggs, 2021; Roberts, 2020) to common media portrayals of menstruating women as angry, irrational and emotional (Gottlieb, 2020; Johnston-Robledo and Chrisler, 2013; Roberts, 2020).

Johnston-Robledo and Chrisler (2013: 182) illustrate how menstruation fulfils Goffman's (2009) conceptualisation of stigma, as 'any stain or mark that sets some people apart from others […] that spoils their appearance or identity'. Menstruation is commonly portrayed as polluting or dirty, thanks to an

ideology of 'freshness' and 'cleanliness' perpetuated through advertisements, media and conversation (Allen *et al.*, 2011; Gottlieb, 2020; Jackson and Falmagne, 2013; Johnston-Robledo and Chrisler, 2013; Plan International UK, 2018). This is rooted in deeply engrained gender norms and discourses of 'womanhood' whereby menstruators are expected to meet unrealistic standards of femininity (Gottlieb, 2020; Jackson and Falmagne, 2013; Levitt and Barnack-Tavlaris, 2020; Roberts, 2020), so internalise the shame of experiencing a biological occurrence painted as impure or deviant (Briggs, 2021; Johnston-Robledo and Chrisler, 2013; Sang *et al.*, 2021).

The impacts of stigma

Although there remains a lack of academic research into the experience of menstruation, thanks to ongoing marginalisation and stigma in male-dominated HE institutions (Munro *et al.*, 2021; Sang *et al.*, 2021), the mental and physical effects of living under stigma or period poverty are being increasingly documented (Briggs, 2021; Plan International UK, 2018). Discourses of shame and silence have placed a double burden upon menstruators, who must both manage and hide menstruation in the public and private spheres (Sang *et al.*, 2021). This secrecy leads to disruption to daily life, anticipation of negative reactions and shaming, and increased physical and emotional labour (Plan International UK, 2018), which Sang *et al.* (2021: 1) conceptualise as 'blood work': 'managing painful and leaky bodies, accessing adequate facilities, stigma, and managing workload'.

As well as negative consequences on physical and reproductive health (Allen *et al.*, 2011; Bobel, 2020; Gottlieb, 2020*;* The Lancet Child & Adolescent Health, 2018), this 'blood work' has mental health implications including self-consciousness, lowered self-esteem, low mood, and social withdrawal (Briggs, 2021; Cardoso *et al.*, 2021; Johnston-Robledo and Chrisler, 2013; Plan International UK, 2018). Within HE settings and the accompanying stress, anxiety and social pressures, such impacts have been found to hinder educational performance – for example, through increasing self-exclusion from educational and social activities – and place undue pressure on menstruating individuals to operate 'as normal' despite negative symptoms (Plan International UK, 2018; Briggs, 2021; Munro *et al.*, 2021; Sang *et al.*, 2021).

These impacts are especially severe for marginalised individuals, including non-binary, transgender, culturally diverse and disabled students, or menstruators from low socio-economic backgrounds, who continue to be neglected in research (Gottlieb, 2020; Medina-Perucha *et al.*, 2020; Phillips-Howard, 2021). Current failures to include such intersections reflect 'the complexity of menstrual experience as at once biological and sociocultural' (Bobel and Fahs, 2020: 1013). Thus, stigma and its effects can widen existing gendered, classed and racialised health and educational inequalities, highlighting the importance of a critical and intersectional feminist lens to the topics of menstruation and period poverty (Briggs, 2021; Medina-Perucha *et al.*, 2020; Munro *et al.*, 2021; Sang *et al.*, 2021; Sommer *et al.,* 2021).

Menstrual activism and institutional interventions

Nonetheless, ongoing stigma has been increasingly challenged over recent years as menstrual activism gains greater media, corporate and political attention (Bobel, 2020; Bobel and Fahs, 2020; Plan International UK, 2018), and young people look to challenge gender norms and period poverty (Allen *et al.*, 2011; Johnston-Robledo and Chrisler, 2013). Such engagement draws upon the diverse history of menstrual activism, which has shifted focus over the decades – from challenging taboos to emphasising affordability of products and the experiences of those with marginalised identities (Bobel and Fahs, 2020).

Yet interventions that focus on product provision alone have been criticised by activists for medicalising menstruation and failing to challenge social and cultural stigma, gender discrimination, marginalisation or inequality (McLaren and Padhee, 2021; Roberts, 2020). This overemphasis on product provision has been criticised as a neoliberal 'solution' to periods as a 'problem', which 'betrays [menstrual activism's] feminist roots' (Bobel and Fahs, 2020: 1009), raising questions regarding the compatibility of product provision with feminist approaches to menstrual stigma. Here, a sexual-reproductive-rights approach to menstrual health has been advanced, focusing more broadly on sociocultural stigma, menstruators' agency and the psychosocial experience of menstruation (Bobel and Fahs, 2020; McLaren and Padhee, 2021). Fighting for improved menstrual health as a right may be more effective in challenging structural inequalities than focusing on 'fixing' perceived deficiencies (Bobel and Fahs, 2020; Briggs, 2021; Hennegan, 2017; McLaren and Padhee, 2021). This involves systematically challenging the stigma surrounding menstruation to erode 'culturally rooted taboos' (Gottlieb, 2020: 152; Johnston-Robledo and Chrisler, 2013; Levitt and Barnack-Tavlaris, 2020).

In educational institutions, scholars and activists suggest implementing research-informed structural changes that support menstruators' specific menstrual needs, including modifications to hygiene infrastructure and gender policies that currently disadvantage menstruating students (Munro *et al.*, 2021; Plan International UK, 2018; Sang *et al.*, 2021). However, as Munro *et al.* (2021: 22) point out, 'further research is necessary to appropriately inform design and implementation of these interventions, particularly with students from culturally diverse backgrounds, and those identifying as non-binary or transgender'. Understanding menstruators' diverse lived experiences and needs is essential to expose and act against patriarchal oppression, through research-led activism (Bobel, 2020). As Bobel illustrates:

> a dearth of attention to a fundamental reality and indeed a vital sign is not only a profound knowledge gap, it is an exposure of the power of misogyny and stigma to suppress knowledge production. And when we lack knowledge, we cannot effectively act to effect change.
> — Bobel (2020: 1)

Methodology

The aim of this study was therefore to understand student experiences of menstrual stigma and discuss ideas of how to tackle this in a university context. Following my own campaign to provide free period products across the University of Warwick campus, I also wanted to see how effective students believe period product provision to be, following criticism that such an approach fails to adequately respond to ongoing stigma (Bobel and Fahs, 2020; McLaren and Padhee, 2021; Roberts, 2020).

A critical, intersectional feminist approach was taken throughout, to understand how menstruation 'unites the personal and the political, the intimate and the public' (Bobel, 2020: 3). This can provide an important insight into how gender politics and ongoing stigma in HE reflects and reproduces existing gender inequalities (Bobel and Fahs, 2020; Briggs, 2021). This feminist research methodology has been explained as:

> An understanding that gender inequality exists, a commitment to political change through research, a concern with the subjective, lived experiences of participants, an emphasis on knowledge building as a relational process, which requires researcher reflexivity, and an acknowledgement of the positionality of the researcher and the power dynamics between researcher and the researched, all of which influence the knowledge produced.
> — Craddock (2020: 10)

Following these principles, and to generate a deeper understanding of participants' experiences and ideas regarding potential interventions against menstrual stigma, qualitative research methodology was chosen, comprising of a focus group of six menstruators studying at the University of Warwick. This group provided a supportive and intimate environment where participants could build upon each other's comments while yielding a manageable amount of data within the time and resource constraints of the project (Haenssgen, 2019). Due to health and logistical restrictions, the discussion took place online, and thus careful attention was paid to non-verbal cues that may be lost through online interactions. The sample was recruited from my own menstrual activist campaign and the Warwick Anti-Sexism Society, and included one non-binary participant, one post-graduate participant and one participant of colour. Thus, participants had a variety of experiences of menstruation and were aware of current menstrual interventions on campus. Pseudonymised names and demographics of participants can be seen in *Figure 1.*

Pseudonym	Pronouns	Level of study	Ethnicity
Claire	She/her	UG	White British
Nicole	She/her	UG	White British
Pip	They/them	UG	White British
Phoebe	She/her	UG	White British
Sabine	She/her	UG	White Other
Samira	She/her	PG	British Indian

Figure 1: Participant list and demographics

The discussion followed a loose topic guide and set of questions (see *Appendix A*) generated from the literature review, but was mainly guided by participants. Following the ethical research procedures of my faculty, the discussion was recorded online, transcribed (to include hesitations, repetitions, or other notable non-verbal cues), and coded according to themes derived from the initial topic guide and several iterations of analysis (see *Appendix B*). These results have been analysed in relation to current literature below.

With awareness of my own position as a menstruating woman within the university, reflexivity and sensitivity were central to the data collection and analysis. Remaining conscious of my privilege as a white, cisgender woman who has not struggled severe effects of stigma or period poverty was important in being sensitive to the diverse experiences discussed, and to minimise uneven power relations (Briggs, 2021; Craddock, 2020).

Results

The results of the focus group demonstrate how the stigma surrounding menstruation is ever-present for University of Warwick students, with participants going beyond discussions of shame to express frustration at poor understanding of menstruation, the difficulty of dealing with its effects, and the perceived failures of current policies.

Understanding the complex experiences of menstruation

The group generally acknowledged that there is still a stigma surrounding menstruation, although they felt that this was more prevalent among different age groups and non-menstruators than between menstruators themselves. Participants' comfort discussing their periods at university was linked to informal support systems (usually involving peers such as best friends and housemates, or wider networks including supportive members of staff or period product schemes) for both information and practical support. However, participants remained conscious of several groups they feel less comfortable discussing periods with, including family members, international students from different cultures, non-menstruators or people who may judge their gender identity. Pip stated that 'it's interesting from a trans perspective, there are certain people who I feel very comfortable talking about my period with […] and certain people who I'm just like, I don't want you to know what's going on'. This discomfort highlights how disclosure of menstruation can pose a risk to individuals with marginalised identities who may feel excluded or endangered (Levitt and Barnack-Tavlaris, 2020; Munro *et al.* 2021).

When discussing stigma, many participants focused on a lack of non-menstruators' understanding and avoidance of the topic of menstruation. For example, Samira said, 'I think it's hard, from my personal experience, for men to understand the nuance behind it. It's a lot of work to understand that there's one thing we all go through, but everybody goes through it differently'. Non-menstruators were thought to perceive menstruation as 'dirty' or 'gross' (Samira), highlighting a prevalent narrative of menstruation as 'unclean' (Briggs, 2021; Gottlieb, 2020; Plan International UK, 2018; Roberts, 2020) and reinforcing the idea that 'believing that menstruation is gross and should be kept hidden is a normal and acceptable male response' (Allen *et al.*, 2011: 152). Participants agreed that poor menstrual education has perpetuated this lack of understanding, with sex education in schools seen as 'unsatisfactory' and a reason that non-menstruators did not have 'the right tools' to support others (Samira). Here, some participants referenced how they had educated themselves, and while this mostly occurred before university, they were still in the process of learning about their own cycles. Allen *et al.* (2011) found that the segregation of menstrual education to women and private conversations was significant in many men believing menstruation was not something they needed to understand. Their findings about the importance of intimate relationships in educating non-menstruators chimes with Samira's experiences: 'unless they've had a long-term relationship with somebody who menstruates or has difficulty menstruating, so many boys or men don't understand what that process is'.

An important result of this poor understanding was the assumptions participants felt were made of them because of having periods, including that they were hormonal, emotional or irrational, which made them feel invalidated, ignored and frustrated. As found in previous research, this resulted in hyper-consciousness and individuals altering their behaviour (Roberts, 2020), highlighting the stigmatisation of the psychological symptoms of menstruation (Sang *et al.*, 2021). Pip also emphasised the gendering effect of menstruation, and how this felt like it was sometimes weaponised to attack their identity: 'it has a weird gender invalidating sense because people equate periods with womanhood'. Menstruation is indeed 'deeply gendered and coded as women's experience' (Bobel and Fahs, 2020: 1009), intensifying menstruators' gendered experiences and linking strongly to discourses of femininity (Briggs, 2021; Gottlieb, 2020; Johnston-Robledo and Chrisler, 2013; Roberts, 2020).

Sometimes, participants' own lack of understanding was seen as a barrier to discussing menstruation with people from other cultural backgrounds or gender identities as they did not want to 'offend anyone' or 'make

a mistake' (Samira). This reflects the challenge to university students 'when navigating their cultural expectations of menstruation', which has important implications for supporting culturally diverse and trans students (Munro *et al.*, 2021: 21).

Dealing with the difficulties of menstruation

Participants felt that a lack of understanding regarding menstruation has led to a mainstream perception of 'normality' as an 'emotionless, mood-less ideal where you're just kind of neutral' (Phoebe), which is unachievable and used to dismiss the impacts of menstruation. Participants described the pressure to work 'as normal' during their period, despite fearing that this could negatively affect their academic or sporting performances. For Sabine, this means 'a lot of the time, I'm just really stressed and scared that my period is gonna end up falling at a time where I really need to be fully concentrated and fully there', which Phoebe linked to university sports, saying 'we're not thinking about playing the game. We're not thinking about anything else [other than managing our periods].' The discussion emphasised previous findings into the burden of calculation and anticipation around menstrual management (Briggs, 2021; Jackson and Falmagne, 2013; Sang *et al.*, 2021), including worrying about taking time out during sport matches and choosing certain study spaces for their toilet facilities. As Claire said, 'people who don't have periods don't think it's that bad because it looks like we're operating as normal, but we're only operating as normal because we're having to think so much about it.' Thus, participants demonstrated an understanding of the risk that menstruation could pose to their attendance, concentration and performance, and were frustrated that this was not being addressed at the University (Munro *et al.*, 2021; Sang *et al.*, 2021).

With pain brought up repeatedly and often described as 'debilitating' (Nicole, Sabine, Samira), participants discussed how the failure of universities and workplaces to consider 'the potential suffering that menstruators can go through' (Nicole) is frustrating and illustrates the injustice of current systems. Samira linked this to sexist attitudes that endure in the workplace, asking 'why would they still be making women or menstruators who really struggle work through such immense pain? Like, if someone got smacked in the head with a baseball bat, you wouldn't tell them to work through it'. Evidently, the gendered expectations for menstruators experiencing painful periods to keep working without rest or supportive structures, such as appropriate sports facilities or flexible deadlines, negatively impacts their confidence, wellbeing, and agency (Johnston-Robledo and Chrisler, 2013, Munro *et al.*, 2021; Plan International UK, 2018; Sang *et al.*, 2021).

Participants also highlighted cost as an aspect of menstrual inequality, seen as an aggravating factor to previously discussed difficulties. Phoebe encapsulated this frustration, stating 'access to period products should be a basic right, and it's disgusting it isn't'. This highlights the importance of a sexual-reproductive-health approach to menstruation that recognises supportive menstrual policies as a human right (Hennegan, 2017; McLaren and Padhee, 2021).

Expressing anger at perceived injustices

Relating discussion of wider menstrual stigma back to their immediate environment, participants expressed disappointment and frustration towards the perceived lack of support from the University of Warwick. This was linked to other perceived failures on gendered issues such as sexual assault, which Samira described as 'worrying', 'disappointing' and something that means 'you just feel really let down when this is supposed to be a hub of fantastic people and fantastic ideas'.

Here, participants connected their own experiences to wider systems of inequality that ignore, invalidate and inconvenience menstruators. Claims that menstruation 'doesn't get taken seriously' (Sabine) and 'isn't really taken into account' (Nicole) resonate with continued dismissal of menstrual activism, research, and experiences in academia and the workplace (Bobel, 2020; Bobel and Fahs, 2020). Referencing patriarchy and capitalism, participants felt that they were being made to pay to manage and experience a normal bodily function, which Levitt and Barnack-Tavlaris (2020: 569) describe as 'the medicalisation of menstruation [that] objectifies the female body through commodifying it through capitalist maintenance and care'. Samira described how mainstream discourse around menstrual management 'feels like it enforces such a patriarchal narrative, of, you've got to prepare yourself, and if you're not prepared, it's your fault things have gone wrong' – a responsibility she called 'oppressive'. This reflects the individualisation of menstrual management and how 'menstruation has been used to marginalize and oppress women and other menstruators through the process of objectification and the ideology of sexism' (Levitt and Barnack-Tavlaris, 2020: 565).

Responding to ongoing stigma

As found in recent studies (Jackson and Falmagne, 2013; Sang *et al.*, 2021), a few participants referenced actively trying to challenge menstrual stigma through being open and 'unapologetic' (Claire). Phoebe referred to the role of privilege in this, stating 'I shouldn't feel any shame or embarrassment asking [for products], so I'm just gonna do it, because why not? I'm in a position where I'm comfortable enough to do that'. This suggests that some menstruators are indeed subverting cultural discourses about invisibility or secrecy (Bobel, 2020; Levitt and Barnack-Tavlaris, 2020). Stigma is therefore being challenged in certain circles, with some menstruators no longer 'going to a great deal of effort to conceal [menstruation]' (Johnston-Robledo and Chrisler, 2013: 184), instead emphasising the role of wider society in addressing stigma and inequalities.

Nonetheless, although discretion and silence were being challenged by some participants, sometimes it was seen as necessary, such as for trans students' comfort and safety, with disclosure of menstruation potentially having harmful social consequences (Sang *et al.,* 2021). Here, participants expressed an awareness of other people's boundaries when discussing menstruation, with Claire recognising that 'even if I don't find this taboo, someone else might and that might make them feel uncomfortable'.

Participants agreed that the University should be taking the initiative to educate students and support the diverse experiences of menstruators. Suggestions included academic interventions such as introducing extensions on deadlines or alternative exam arrangements for menstruating students, and practical arrangements such as widespread product provision, awareness training for sports clubs, and more accessible facilities across campus. Free product provision was seen as a 'really basic thing' that the University could do to tackle current inaccessibility (Phoebe), with participants frustrated that this currently relies on individual student activism – seen as filling an important gap in provision, but short-term and burdensome for students. However, Phoebe acknowledged that products alone may be inadequate to tackle stigma, 'because it would just be menstruators accessing and seeing and using those products, so in the broader consciousness of society it wouldn't change much'.

Instead, education was emphasised, including the University leading or funding creative and informative events with expert advice on menstrual health topics. While participants emphasised the need for better education at a younger age, the University was still seen as an important site of learning. This supports

previous findings into the importance of targeted education to challenge assumptions, myths and stigma around menstruation (Allen *et al.*, 2011; McLaren and Padhee, 2021; Medina-Perucha *et al.*, 2020; Plan International UK, 2018).

Discussion and implications

Throughout this focus group, participants' discussion of perceived injustices – including poor menstrual education, stigmatising assumptions and difficulties with pain and accessibility – reveals the ongoing burden of menstruation at the University of Warwick. However, it also highlights how students are responding to and challenging these difficulties.

Silence and shame were less prominent discourses than found in previous research; for example, participants placed less emphasis on the pressure to 'discursively and practically render menstruation invisible' or fear of shame (Sang *et al.*, 2021: 4), instead emphasising frustration at the lack of accommodation to their needs (Gottlieb, 2020; Sommer *et al.*, 2021). Although non-menstruators were frequently cited as a barrier to open discussion about menstrual taboo, there were few references to policing, objectification or shaming behaviour, except in isolated incidents before university (Roberts, 2020). This suggests that it is the labour of managing the painful body, workload and access to facilities that are the most important aspects of these participants' 'blood work', rather than managing stigma and remaining silent (Sang *et al.*, 2021). Confidence and wellbeing appeared more affected by a lack of supportive structures than shameful experiences, embarrassment, or pressure to maintain a strict 'menstrual etiquette' (Briggs, 2021; Roberts, 2020).

Sang *et al.* (2021: 9) have suggested that the fear of stigma is a 'by-product of the male-dominated nature of universities' – however, this dynamic is not reflected in these participants' female-dominated social circles, which may have allowed these individuals greater freedom in discussing menstruation than academics working in male-dominated spaces. Such gendered dynamics require further investigation, as informal circles represent an important source of learning about menstruation, with the resulting discussions forming a basis from which stigma may be challenged (Levitt and Barnack-Tavlaris, 2020; Plan International UK, 2018). Here, scholars have emphasised the importance of normalising menstruation through conversation to create more positive attitudes and challenge misconceptions (Bobel and Fahs, 2020; Gottlieb, 2020; Johnston-Robledo and Chrisler, 2013). While Johnston-Robledo and Chrisler (2013) suggest that menstruators themselves have the responsibility to challenge negative attitudes, the way that these participants used their informal circles for knowledge-sharing and resistance implies that the challenge is to widen the conversation beyond menstruators to truly challenge menstrual stigma (Bobel and Fahs, 2020; Levitt and Barnack-Tavlaris, 2020; McLaren and Padhee, 2021). In our conversation, many participants expressed the desire to share their experiences and for non-menstruators to actively find out how to support them. The role of non-menstruators in challenging menstrual stigma is therefore important, suggesting that future research could build upon existing work into non-menstruators' knowledge gaps and willingness to know more (Medina-Perucha *et al.*, 2020). For example, Plan International UK (2018: 41) found that 'boys were accepting of the fact that their knowledge was flawed in regard to menstruation, but were willing to learn more to become more supportive of their female peers'.

As well as facilitating greater discussion through educational events, participants called for the University to take initiative to address the needs of menstruating students through academic and practical interventions. Free period product provision, although seen as inadequate alone, was still acknowledged as an essential part of a wider approach to challenge stigma (Bobel and Fahs, 2020; McLaren and Padhee, 2021). Implementing

further measures to support students requires looking into current provision and the potential feasibility of suggested interventions, accounting for participants' anxieties – which included the fear of disclosing menstruation or of having to 'prove' levels of pain – and ensuring these do not inadvertently exacerbate existing inequalities (Levitt and Barnack-Tavlaris, 2020; Munro *et al.*, 2021; Plan International UK, 2018). Tackling stigma requires disseminating accurate, accessible information that encourages discussion to counter the feminisation, privatisation and individualisation of menstruation (Allen *et al.*, 2011; Plan International UK, 2018; Sang *et al.*, 2021).

Essentially, this research highlighted how the different experiences of shame and stigma between transgender and cisgender participants must be considered (Munro *et al.*, 2021). Future research should look specifically at the feelings and experiences of marginalised students, accounting for the intersections of culture, language, disability, class, and so on, and how their needs and coping strategies may differ to the unapologetic empowerment discourses circulating among some cisgender students (Bobel and Fahs, 2020, Munro *et al.*, 2021; Phillips-Howard, 2021).

In this way, this paper does have its limitations; the small and self-selected sample cannot reflect the diverse menstrual experiences of the whole student body, affected by a wider range of intersecting factors than could be included within this research (Gottlieb, 2020). The participants were also part of a similar feminist social circle, potentially over-emphasising the themes of activism and frustration over silence and stigma. Furthermore, the group reflects interacting forms of privilege – primarily, white, educated and engaged students who did not have first-hand experience of period poverty. Such dynamics may have limited the disclosure of more intimate details such as feelings of shame. This emphasises the need for larger and deliberately diverse samples in future research, centring marginalised voices and considering how qualitative and quantitative data, or individual and group discussions, can be combined to enhance our understanding of menstrual stigma and potential institutional interventions.

Conclusion

Overall, this paper contributes to the growing field of literature regarding menstrual health, addressing an important gap in understanding the experiences of menstrual stigma among university students, especially in my immediate context of the University of Warwick. The research has found that students are increasingly expressing frustration towards an ongoing lack of understanding or support for the difficulties of menstruation, demanding greater support from the University itself. This suggests that discourses are moving beyond shame and stigma to highlight current institutional failures – although the ability to challenge negative assumptions and take an unapologetic attitude remains somewhat limited to privileged groups, such as cisgender students – a dynamic that requires further research.

Educational institutions must implement proactive measures to improve menstrual education, counter stigmatising assumptions and help menstruators mitigate the impact of menstruation on their wellbeing and academic performance. This research has highlighted how inclusive and considerate university policy is important for student wellbeing, performance and equality, and can help act against patriarchal gender norms and generations of silence and shame surrounding menstruation (Bobel and Fahs, 2020; Johnston-Robledo and Chrisler, 2013). Menstrual activism should constantly expand upon its rich and radical history, which means 'thinking deeply about the root structures of menstrual negativity and taboo, and working to link the inequalities that surround menstruation to deeper stories about power and identity' (Bobel and Fahs, 2020: 1014).

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Appendix A – Focus group discussion guide

Goals

- Understand students' experiences of menstruation and their perception of the taboo surrounding it.
- Discuss ideas of how to tackle this stigma.
- See what students perceive the role of the institution in tackling this.
- Consider what actions do they believe will be the most effective? Is period product provision enough?

Introductions

- Firstly I would just like to confirm that you are all happy with me recording this session? Your data will be kept confidential.
- My name is Naomi, I am a second year GSD student conducting this research as part of a module I study about inequalities.
- The objective of this project is to investigate how students who menstruate at the University of Warwick perceive the role of the University and Student Union in responding to the ongoing stigma surrounding menstruation.
- Please reflect on the questions asked and the contributions of other members of the discussion, and feel free to ask your own questions as and when you think of them. You are not obliged to answer any questions, and if you feel the need to leave at any point you are welcome to do so with no adverse effect. You may also withdraw your data from this study for up to 1 week after this discussion, and if you wish to do so please contact me via my email or phone number.
- I would like to make this environment as safe as possible, so please be mindful of what you say, especially any sensitive topics such as stories of shame or stigma.
- Before we begin any questions, feel free to introduce yourselves to each other to facilitate the discussion.

Questions

- Firstly, can you give me three words that come to mind when you think about periods.

<u>Existence of stigma</u>

- Do you think there is still a stigma surrounding periods and period products?

- Can you see any links to broader systems of oppression or inequality? For example, how do you think attitudes to periods are linked to patriarchy (inc. the male gaze), gender norms (such as standards of femininity), racism, transphobia, classism, etc.
- What sort of positive attitudes to periods have you seen/heard? [in the media, amongst your peers, with your family, at university]
- What sort of negative attitudes to periods have you seen/heard? [in the media, amongst your peers, with your family, at university]

The university environment

- What do you find challenging or difficult about having your period? Do you avoid anything when you're on your period and why?
- What do you do about these issues? What systems do you have to support you?
- Do you find the university to be a supportive environment?
- Do you have any thoughts or experiences regarding the shame and stigma that surrounds periods or period products, especially from your time at university?

Products

- What products do you feel comfortable using?
- Are there any that you feel uncomfortable using?
- Are there any that you would like to use but don't currently?
- Has there ever been a time when you didn't have a period product? What did you use? What happened? Why didn't you have one?
- Where would you get a period product from if you needed? Who would you ask?

Response to stigma

- What would you like to see in terms of the culture and attitudes around periods?
- Do you know of anything the university is doing to address the stigma?
- Do you think the university is doing enough to address this?
- Do you think the provision of free period products is useful in tackling the stigma of periods? Does action need to go further?
- What do you think would be useful action from the university?

Conclusion

Thank you very much for participating in this discussion, I really appreciate it.

If any of the topics brought up have been sensitive or cause any distress, I would urge you to reach out to the University Wellbeing Services or your personal tutor.

I would like to remind you that you can still withdraw your data for up to one week after this discussion.

Appendix B – Framework for analysis derived from thematic coding of focus group transcript

Experience of stigma	Discussion groups and information sharing	Empowerment and support
		Comfort and boundaries
	Lack of understanding	Poor education
		Negative assumptions
Experience of periods	Pain	'Normal'
	Anticipation and management	
Frustration	Lack of action from uni	Other gendered issues, inc. sexual assault
	Perceived inequalities in uni and workplaces	
	Access to products	Marketing
Suggestions	Education / activities / events	
	Academic intervention	
	Product provision	

Table 1: Thematic framework for analysis

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Towards a European Framework for Fiscal Standards: Data Collection, Description and Institutional Analysis

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Abstract

The fiscal rules of the Stability and Growth Pact have consistently failed to enforce good fiscal governance and contain rising debt ratios across euro area economies. This article illustrates the unsustainable nature of Greek fiscal policy prior to the global financial crisis and argues for the adoption of fiscal standards to improve fiscal policy. This will require a common and transparent framework for debt sustainability analysis. An evaluation of the euro area's newest member along the lines of sustainable fiscal governance shows that Croatia is in a stronger fiscal position than Greece was after adopting the euro. Moreover, the resilience and crisis management methods of the Eurozone as a whole have improved significantly. To safeguard against future crises and prepare euro area economies for the fiscal strain of ageing populations and climate change, however, the Eurozone needs to transition from fiscal rules to fiscal standards.

Keywords: Debt dynamics, debt sustainability analysis, fiscal standards, fiscal rules, sustainable fiscal governance, Greek debt crisis

Introduction

Government debt ratios across OECD economies have been on the rise since the 1970s. Although there are large cross-country differences in past debt accumulation among this club of mostly high-income economies, fiscal balances have had the largest impact on rising government debt (Rawdanowicz *et al.*, 2021). The creation of the modern welfare state has vastly expanded government budgets. Fundamental challenges such as the ageing of populations and the effects of climate change are straining public finances. Fiscal policymakers are increasingly constrained by their governments' high levels of debt and struggle to finance the long-term investments required to stop climate change. There is a need for a paradigm change in the way bond markets price rising government debt levels. This article promotes the idea that high-debt ratios on their own should not immediately be of concern as long as there is a high probability that these ratios are sustainable. Understanding what makes a debt path sustainable – or, in the case of Greece, unsustainable – is vital to assess whether a country has the capacity to take on more debt to finance the green transition. In the Eurozone, this will require moving from ineffective fiscal rules towards fiscal standards. This has the potential to improve fiscal governance across euro area economies and make the whole Eurozone more resilient against future symmetric and asymmetric shocks. Finally, using fiscal standards to analyse the debt dynamics of the euro area's newest member helps to understand why Croatia is unlikely to go down the same path as Greece did after joining the European monetary union.

Sustainable debt dynamics

Sustainable government debt is often defined as a state where a government is able to service all of its financial obligations, and the probability of the debt ratio exploding is very low. How to assess whether a country's debt obligations are sustainable or not is central to the field of debt sustainability analysis. The following equations are used in the traditional discussion and provide valuable insights into the

fundamentals of debt dynamics (Carlin and Soskice, 2015: 518). A government budget constraint for the period t is given by:

$$G_t + i_t B_{t-1} = T_t + \Delta B_t + \Delta M_t$$

The government budget identity requires that expenditure and revenue are equal. On the expenditure side, we have government expenditure G_t and the cost of servicing debt as the interest rate i_t times the amount of debt in the previous period B_{t-1}. Expenditure is financed by tax revenue T_t, new debt ΔB_t and new money ΔM_t. Printing new money is a desperate measure that governments may resort to when they are unable to issue new debt or raise tax revenues. Debt monetisation can lead to hyperinflation – something that most central banks today avoid at all costs as part of their inflation-targeting regime (Carlin and Soskice, 2015: 517). In this case, we therefore exclude debt monetisation and assume that ΔM_t is zero. All variables in the budget identity are in nominal terms.

$$G_t + i_t B_{t-1} = T_t + \Delta B_t$$

Government deficits are central to the debt sustainability discussion. The primary government deficit is the difference between government spending and taxes excluding transfers. It serves as a first indicator of a government's short-term fiscal sustainability. The actual deficit adds the interest on existing debt to the primary deficit. By rearranging the budget identity, we determine that the actual deficit is equal to the change in debtΔB_t:

$$\Delta B_t = i_t B_{t-1} + G_t - T_t$$

The total debt stock for a period t is consequently given by B_t:

$$B_t = (1 + i_t) i_t B_{t-1} + G_t - T_t$$

Debt in absolute terms does not account for the size of the economy. Dividing by nominal GDP $P_t Y_t$ gives the debt ratio b_t:

$$b_t = (1 + i_t) \frac{B_{t-1}}{P_t Y_t} + \frac{G_t - T_t}{P_t Y_t}$$

Similarly, we divide the previously determined actual government deficit to obtain the budget deficit to GDP ratio Δb_t. To simplify the formula, we introduce d_t as a notation for the primary deficit to nominal GDP ratio $\frac{G_t - T_t}{P_t Y_t}$.

$$\Delta b_t = \frac{i_t B_{t-1}}{P_t Y_t} + d_t$$

$$\equiv d_t + i_t b_{t-1}$$

We continue without using the time notation t. The aim is to identify the determinants that move Δb. While the debt stock is $B \equiv bPY$, we approximate the change in the debt stock as a function of the changes in the debt ratio Δb, prices ΔP and real GDP ΔY.

$$\Delta B \approx PY \Delta b + bY \Delta P + bP \Delta Y$$

The next step is to divide by nominal GDP and identify the inflation rate π and GDP growth γ as $\frac{\Delta P}{P}$ and $\frac{\Delta Y}{Y}$ respectively.

$$\Delta b_t = \frac{bY \Delta P}{PY} + \frac{bP \Delta Y}{PY} \frac{PY \Delta b}{PY}$$

$$\Delta b = b\pi + b\gamma + \Delta b$$

Using our previous equation for Δb, we can rewrite the change in the debt-to-GDP ratio as:

$$\Delta b = d + (i - \pi - \gamma)b$$

and apply the Fisher rule to arrive at the central equation to this debt dynamics discussion:

$$\Delta b = d + (r - \gamma)b$$

This formula is an obvious abstraction, and economists usually use stochastic techniques to model debt dynamics. Nevertheless, we now have a simple equation that defines the nett debt ratio change Δb as a function of the real interest rate r, the economic growth rate γ, the previous period's debt ratio b and the primary deficit ratio d. There are two situations in this formula: either real interest exceeds growth or vice versa. If the government were to run a stable primary balance, this would lead to a gradual increase or decrease in the debt ratio. Although primary deficits have a negative impact on the debt ratio, governments can still pursue a stable debt ratio if economic growth exceeds the real interest paid on the debt $(r < \gamma)$. Observers might point out that inflation reduces the real value of debt and could therefore facilitate debt reduction. This works for old debt but would also increase the yields investors demand on new debt. Inflation is therefore not a simple solution to high government debt, as it complicates the debt rollover process.

The sign of $(r - \gamma)$ can be subject to abrupt changes and can only be determined with probabilities. Furthermore, Carlin and Soskice (2015) suggest that since the global financial crisis, sovereign default risk has played an increasingly important role in this equation. Investors no longer assume that governments will always be able to service their debts, and therefore demand a risk premium when a country's debt stock begins to look unsustainable. Decomposing the real interest rate into the real risk-free interest rate and a risk premium ρ better illustrates how expectations influence debt dynamics.

$$\Delta b = d + \left(r^{\text{risk}-\text{free}} + p - \gamma\right)b$$

Greek debt dynamics

Greece joined the EMU on 1 January 2001. The following calculations analyse AMECO (2023) data for the years 2002–2008. During this period, the Greek economy grew at an average annual rate of 6.9 per cent, while long-term nominal interest rates averaged only 4.4 per cent. The interest rate-growth differential $(r - \gamma)$ is therefore -2.5 per cent. A negative interest rate-growth differential is favourable for public finances as it favours debt reduction, provided the government does not run substantial primary deficits. Figure 1 plots the debt dynamics equation for Greece in the period 2002 to 2008. The slope is negative because growth exceeded interest rates and is equal to the interest rate-growth differential for the period. Moreover, the government ran an average primary deficit of -2.6 per cent. There are three different conditions on this curve: At point A, the change in the debt ratio is negative and will result in the overall debt ratio falling towards point B. This reduction in the debt ratio is being achieved in spite of a primary deficit. In this situation, the economy outgrows the government's debt. At point B, the debt ratio is stable. The debt ratio will remain constant as long as the differential and deficit remain unchanged. Finally, at point C, the debt ratio will rise towards the stable point B. Here the negative effect of the primary deficit on the debt ratio dominates.

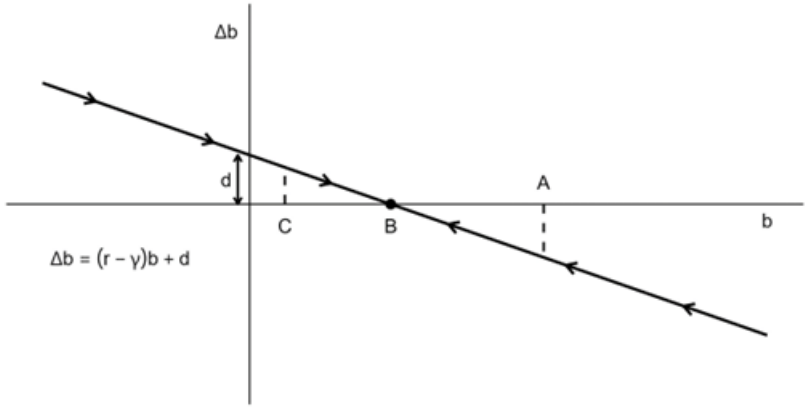

Figure 1: Greek debt dynamics from 2002 to 2008, under a negative interest rate growth differential and primary deficit.

We can rewrite the debt dynamics equation as $b = \frac{-d}{(r-\gamma)}$ to find the debt stabilising ratio for Greece over our seven-year period. The calculated ratio amounts to 104 per cent. The actual debt ratio averaged 105.6 per cent. Furthermore, Figure 2 shows that Greek debt as share of nominal GDP remained more or less stable around this average. The minor difference between the calculated and the observed ratio may be the product of the actual interest rate on government debt differing from the long-term nominal interest rate.

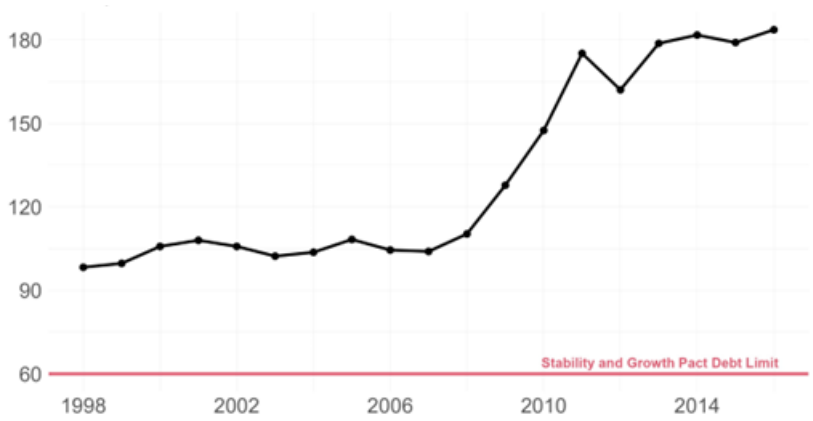

Figure 2: Greek general government gross debt in per cent of GDP from 1998 to 2016. IMF (2023)

The numbers suggest that during this period of exceptional economic growth, the Greek government used the favourable interest rate-growth differential to run higher primary deficits. Closely coordinated deficits with the stable debt ratio slightly above 100 per cent imply that Greece did not design fiscal policy to facilitate debt reduction.

Greece's fiscal stance in years of economic growth shows clear signs of deficit bias. A prudent fiscal policy stance would entail fiscal contraction during economic upswings to finance fiscal expansion in times of recession. Conversely, Greece continued its expansionary fiscal policy as long as the debt ratio remained constant (Figure 3).

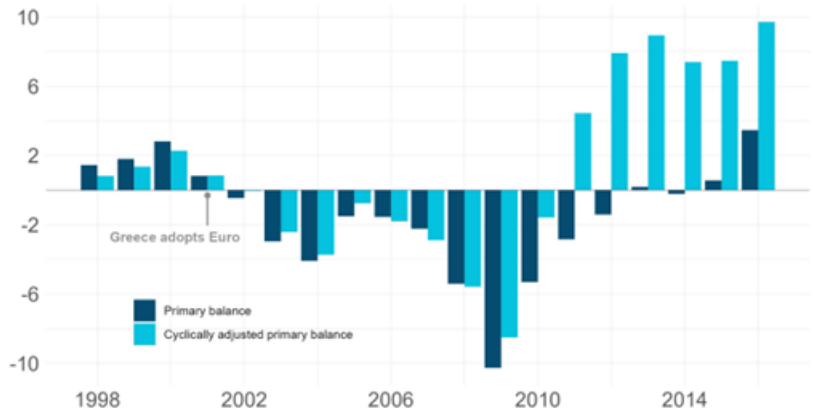

Figure 3: Greek government primary balance as per cent of GDP from 1998 to 2015. IMF (2023)

Carlin and Soskice (2015) identify a preference for borrowing over taxation as a symptom of debt bias. According to World Bank (2023), Greece's tax revenue as a percentage of GDP was only 19.1 per cent in 2003, while Denmark's was 31.3 per cent. Song *et al.* (2012, cited in Carlin and Soskice, 2015) suggest that different preferences for public goods may be central to understanding the motivation behind deficit bias. Governments that provide high-value public goods have a more prudent fiscal policy stance. The Scandinavian countries are a good example in Europe. Conversely, countries such as Greece and Italy provide fewer public goods and borrow more. The theory is that there is less intergenerational altruism in the latter countries, and voters therefore prefer to pass on the debt burden on to the next generation. The key is for voters to believe sufficiently in the future provision of public goods to vote for fiscal consolidation in the short run. Greece arguably lacked this level of intergenerational altruism and foresight during the period of high economic growth and low interest rates.

Favourable interest rate-growth differentials do not last forever, so debt is not a free lunch. Economic growth and interest rates can fluctuate arbitrarily due to external factors, as shown by Figure 4 for the euro area. While the debt ratio may appear stable in one period, a change in the interest rate-growth differential could turn the same ratio into a highly unsustainable position. Figure 5 shows how interest rate-growth differentials have varied within Germany and Greece.

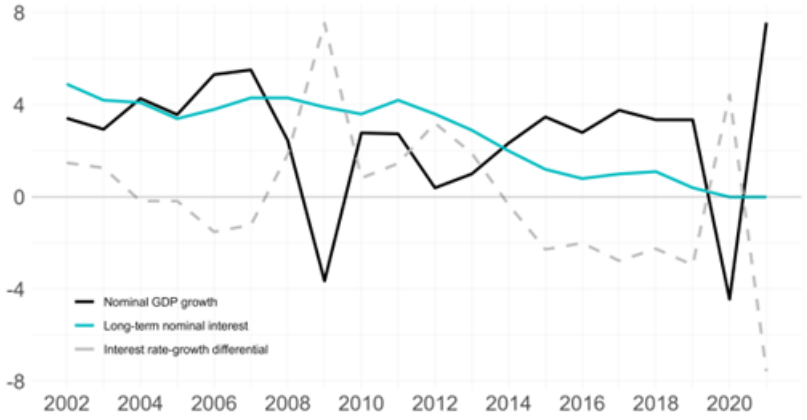

Figure 4: Euro area interest rate-growth differential from 2002 to 2021. Difference between nominal long term interest rate and nominal GDP growth rate in per cent. Author's calculations; AMECO (2023)

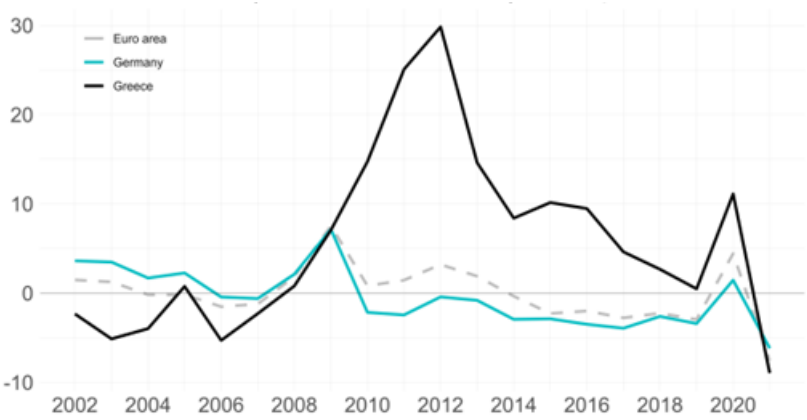

Figure 5: Selected countries interest rate-growth differential from 2002 to 2021. Difference between nominal long term interest rate and nominal GDP growth rate in per cent. Author's calculations; AMECO (2023)

After the onset of the global financial crisis, Greece's previously stable debt ratio was at risk. The differential climbed from 0.8 per cent in 2008 to 7.1 per cent in 2009, 14.7 per cent in 2010 and peaked at a staggering 29.8 per cent in 2012 (AMECO, 2023). Figure 6 shows how a stable ratio can become unsustainable from one period to the next. Initially, the differential is negative and the government runs a primary deficit. The debt ratio remains stable at point A. In the next period, nominal long-term interest rates exceed the nominal growth rate. The debt dynamics function now slopes upwards and point A is no longer a stable debt ratio. As indicated by the arrows, in this scenario every debt ratio will eventually explode unless some of the other parameters change. Point A is now at risk of becoming unsustainable. If the government has the fiscal capacity to reduce its deficit, or even run a primary surplus, the debt ratio at point A can become constant again. Graphically this is illustrated by the third line, which has been downwards shifted by the improved primary balance. In the third scenario, the debt ratio at point A is constant but no longer stable. Improving the primary balance can be difficult for the government, as it must either reduce government spending or increase taxes.

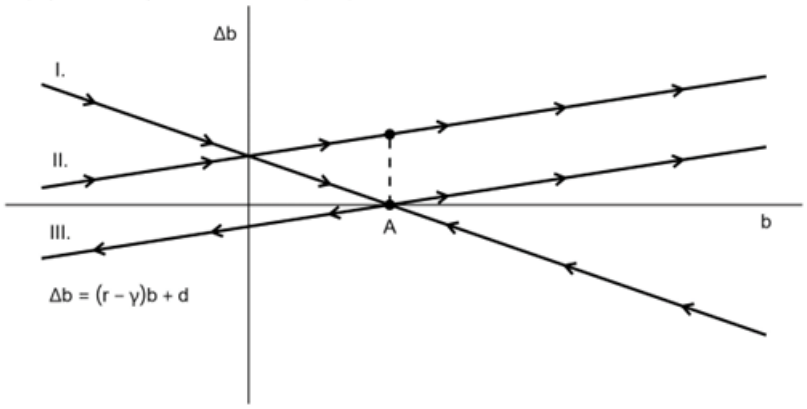

Figure 6: Multiple scenarios with varying interest rate-growth differentials and primary deficits.

The Greek government was not able to improve its primary balance and therefore the debt ratio deteriorated as shown by the arrows in the second line of the graph. Rising debt ratios raise concerns about a country's ability to service its debt. The rising risk premium demanded by investors above the risk-free real interest rate will increase the cost of new debt. Figure 7 shows the weighted average maturity and cost of new annual funding. During the financial crisis, Greece not only had to pay more interest on newly issued debt, but also found it difficult to issue long-term debt. A global credit crunch and concerns about Greece's solvency drastically reduced the average maturity of newly issued bonds. The weighted average maturity of new annual funding dropped to a low of 3.8 years in 2010 with the average maturity of total debt decreasing from 8.5 years in 2008 to 6.3 years in 2011 (Figure 8).

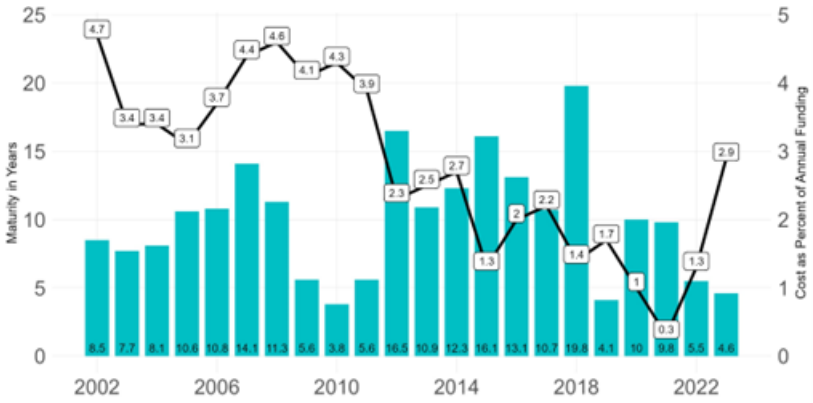

Figure 7: Greek central government annual funding maturity/cost weighted average from 2002 to 2023. PDMA (2023)

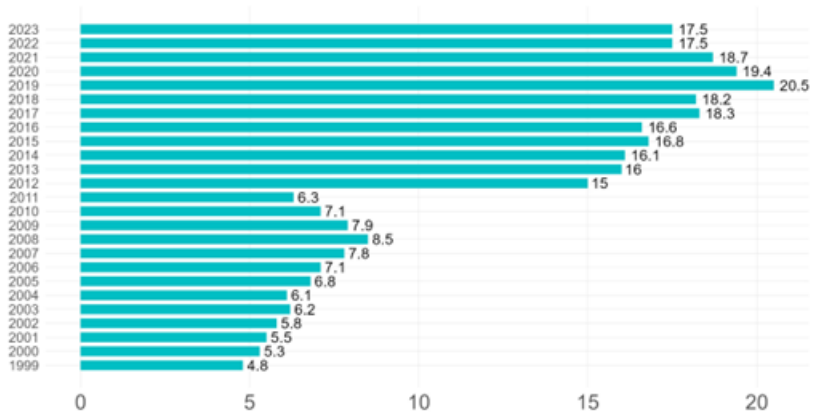

Figure 8: Greek central government debt weighted average maturity from 1999 to 2023 in years. PDMA (2023)

The global financial crisis and the ensuing Eurozone debt crisis hit peripheral European economies such as Spain, Greece and Ireland hard. First the primary balance deteriorated amid the global economic crisis, state interventions in the economy and the need to bail out financial institutions. Credit ratings for more indebted and vulnerable European economies deteriorated, as can be seen by Standard & Poor's credit rating of Greece in Figure 9. Risk premiums climbed in response and credit began to dry up. Finally, economic growth collapsed during the recession, reducing government revenues and further worsening the primary balance. By 2012, Greece had defaulted on its debt. The ensuing debt restructuring became the largest of its kind.

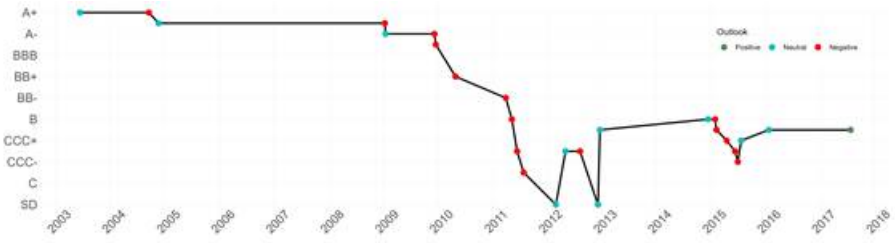

Figure 9: Greek credit rating from 2003 to 2018. Standard & Poor's global ratings. World Government Bonds

Instruments that facilitated Greek debt accumulation

Greece's fiscal position was on a good trajectory when it joined the EMU in 2001. The primary balance had been positive for the previous seven years, averaging at 1.8 per cent of nominal GDP (IMF, 2023). Ever since the European exchange rate mechanism crisis in 1992, which caused the debt ratio to rise from 80.6 per cent in 1992 to 101.1 per cent in 1993, Greece's debt had remained stable and stood at 108 per cent in 2001 (IMF, 2023). Joining the euro area meant that Greece could benefit from euro area monetary policy. As determined previously, Greece did not consolidate fiscal policy in the years of economic growth following its adoption of the euro. The Greek government expanded its fiscal position under the improved financing conditions in the EMU. There are multiple channels through which EMU participation manifested itself in better credit conditions for the Greek state. This article aims to highlight the role of the European collateral system in potentially distorting Greek sovereign bond yields. How the European Central Banks's (ECB) operational framework is equipped to provide effective money market management helps to understand the important role of collateral in the Eurosystem.

Open market operations are the ECB's main mechanism to conduct monetary policy. These operations manage liquidity in the Eurosystem and consist of the main refinancing operations, longer-term refinancing operations, fine-tuning operations and structural operations. To support overnight liquidity within the Eurosystem, the ECB has the standing facilities at its disposal. Standing facilities contain the marginal lending facility and the deposit facility. The most frequently used tools to manage money supply and interest rates are the one-week main refinancing operations, three months longer-term refinancing operations, and the overnight marginal lending facility. Counterparties' access to these tools are conditional on collateral. The Eurosystem Collateral Framework enables a large number of solvent and supervised counterparties to use these instruments to match their respective liquidity needs. Central banks such as the ECB do not face the same liquidity constraints that other financial institutions might encounter in crisis. The ECB has therefore the capacity to provide solvent but temporary illiquid financial institutions with credit, while taking over fewer liquid assets as collateral (Bindseil *et al.*, 2017). Saving healthy institutions with temporary liquidity constraints is vital for the economy. According to Bindseil *et al.* (2017) credit in the Eurosystem is conditional on collateral as the risk management associated with unsecured lending is infeasible. To provide credit without collateral would require the central bank to thoroughly analyse counterparties and operate

with different interest rates. One unique feature of the Eurosystem is that one set of collateral applies to all instruments. Other central banks such as the Bank of England or Federal Reserve distinguish between different operations. To avoid moral hazard and over-reliance on central bank credit, strict rules for haircuts apply. The objective of this framework is to enable financially sound institutions to access funds during periods of financial difficulty in a universal and transparent manner.

Greek government bonds were first upgraded to the status of eligible assets when Greece formally joined the Eurosystem. From that moment on, the euro area's financial institutions could use Greek bonds as collateral to access ECB credit and satisfy their liquidity needs. As a consequence, Greek debt became more attractive as an investment. Whereas previously German bonds were deemed safer and could be used to access credit at the ECB, Greek bonds became a cheaper alternative method to access the same credit. The inclusion of Greek bonds on the ECB's list of eligible assets may have played a significant role in the decrease of Greek bond yields, driven by heightened demand and a resulting increase in their price. Financial institutions may have ignored underlying structural differences and considered the risk to Greek bonds to be more or less equal to other Eurozone bonds since these economies shared the same currency (Figure 10).

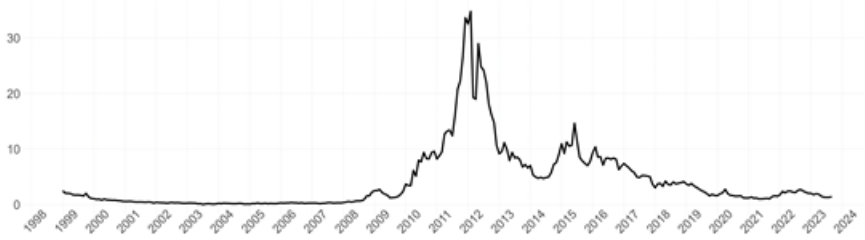

Figure 10: Greek-German 10-year bond yield spread from 1999 to 2023 in per cent. Investing.com

Therefore, one could argue that the European collateral framework had distortionary effects on financial markets. In hindsight, the market pricing of Greek bonds did not reflect the underlying risks of debt-biased fiscal policy pursued by the Greek government. Further analysis of the ECB eligible assets database could provide interesting insights into what kind of maturities were indirectly promoted by the European collateral framework. This selection could have impacted the demand for specific Greek bonds and therefore affected Greece's overall weighted average maturity.

Fiscal reform

The EMU is a unique economic and political experiment and successor to the European monetary system (EMS). In the EMS, countries engaged in a fixed exchange rate agreement, which proved vulnerable to second-generation speculative attacks. High capital mobility in Europe and monetary tightening in post-reunification Germany made exchange rate commitments incredible. According to De Grauwe (2023), many EU countries hoped to eliminate the threat of speculative attacks on their currencies by joining the euro. The removal of fixed exchange rates through the creation of a monetary union or adoption of floating exchange rates as part of an inflation-targeting regime reduced the threat of speculative attacks in the twenty-first century (Rose, 2023). Along with the creation of the monetary union in Europe, new problems emerged. Since countries in the EMU do not control their currency, their credibility to service their debt suffers (De Grauwe, 2023). The EMU therefore replaced the risk of devaluation with the risk of default in the bond markets. Serious concerns over the integrity of southern European bonds started to pick up in 2010 and marked the beginning of the sovereign debt crisis. By 2012, Greece had defaulted, and its debt had to be restructured. In contrast to the euro's first decade in existence, the second one proved to be more

tumultuous. The fiscal framework had not adequately prepared Eurozone economies for economic shocks, such as the global financial crisis and the ensuing credit crunch.

Past legislation, such as the Maastricht Treaty and the Stability and Growth Pact (SGP), centred around fiscal rules to enforce prudent fiscal governance. Blanchard *et al.* (2021) suggest that during the early days of the EMU simple fiscal rules – namely, the 60 per cent debt to GDP and 3 per cent deficit limits – might have been essential to establish credibility. Shortcomings of these simple rules became apparent when they prevented adequate counter-cyclical fiscal responses during severe economic downturns, with the effect of unnecessarily prolonging recessions. In addition to forced fiscal consolidation during recessions, fiscal rules also failed to curb excessive spending during economic expansions, such as the one preceding the global financial crisis. The authors suggest that EU fiscal rules or standards should only serve the original purpose of preventing negative debt externalities from spilling over between member states and threatening the financial stability of the Eurosystem. The structural differences between the economies covered by the current framework of fiscal rules remain too large to be effectively managed by the original 60 per cent debt to GDP and 3 per cent deficit limits. Frequent violations and a lack of enforcement have led to many ad hoc amendments, turning the previously simple targets into a complex framework of fiscal rules. Fiscal rules have ultimately failed to contain the rise of debt levels all over the Eurozone.

Blanchard *et al.* (2021) identify two approaches to overhauling the European Union's fiscal framework. The first more ambitious, albeit politically less feasible, is the creation of a European fiscal union capable of dealing with asymmetric economic shocks. This would involve expanding the EU budget, increasing risk sharing and issuing common debt. The second approach aims to transform EU-level fiscal rules to resemble fiscal standards that can be applied more idiosyncratically. The advantage of fiscal standards would be that they could focus solely on safeguarding the stability of the monetary union while allowing countries to develop their own preferred fiscal rules or standards adapted to their individual needs. These preferences may include financing climate investments, policies to smooth the business cycle and individual targets for debt levels. EU-level fiscal standards could ensure that, in addition to debt levels and deficits, other relevant factors are taken into account. Blanchard *et al.* (2021) suggest these standards should be enshrined in EU primary legislation and have the aim of keeping debt levels sustainable at a high probability. The European Fiscal Board would then assess whether a member state's debt level is sustainable using a stochastic debt sustainability analysis model. Stochastic debt sustainability analysis is a powerful tool for modelling future paths of economic growth and interest rates under uncertainty and determining the probability of unsustainable dynamics in the debt ratio. Inputs and assumptions in this model have to be transparent. One reason why the SGP lacked credibility was its weak enforcement. Member states do not wish to give up sovereignty over fiscal policy decisions, and citizens are not sufficiently aware of debt externalities across the Eurozone. Blanchard *et al.* (2021) propose changes to national laws to give either national independent fiscal institutions (IFIs) or the European Commission some say in the national budgetary approval process. Alternatively, EU treaties could be changed to establish the European Court of Justice as a supranational and independent adjudicator. Beetsma (2023) points out that IFIs monitor their own governments fiscal policies, criticise budgetary processes and identify shortcomings in government publications and projections. While countries benefit from positive spillover effects of neighbouring IFIs, they see their own IFI as a liability. According to Beetsma (2023), the European Commission and European Parliament would therefore have to enforce the elevated role of IFIs to solve this prisoner's dilemma. Expanding the role of IFIs to conduct debt sustainability analyses and force corrective action in case of unsustainable fiscal practices would be met with resistance from national governments. If the public can be convinced of the positive effects on economic outcomes, introducing fiscal standards via IFIs would be more politically feasible than through a

supranational institution. In contrast to fiscal rules, this framework of fiscal standards should allow countries to implement their preferred fiscal strategies as long as their debt remains sustainable and avoids debt externalities across the Eurozone.

Emerging from the twin crisis

The twin crises was the first major challenge to the EMU and brought it to the brink of collapse. The crises can be traced back to a lack of collective crisis management tools that was a significant factor in pushing the euro area from the global financial crisis into the euro area sovereign debt crisis (Lane, 2021). In accordance with the saying that Europe is forged in crisis, lessons have been learnt and reforms have been taken ever since the euro area experienced its first major crisis.

Analysing various macro-economic variables across the euro area, Lane (2021) finds that the resilience of the monetary union has grown significantly since the twin crisis. By looking at the inter-quartile range of GDP growth, inflation, current account balance and budget balance, he finds that overall dispersion is lower than in the pre-crisis period. Most notably, current account deficits and fiscal deficits, which combined are a risk to macro-prudential outcomes, have largely been absent. Although the debt levels have climbed to new heights after the sovereign debt crisis, Lane (2021) suggests that some vulnerabilities have been eliminated by increased capital-asset ratios in the banking sector that benefit loss-absorbing capacity. The solvency ratio of significant financial institutions has grown from 15.84 per cent in the second quarter of 2015 to 19.60 per cent in the first quarter of 2023 (ECB, 2023). As of recently, OECD economies' interest rates have been on a downwards trend that started in the 1980s. Excess saving in the economy, excess demand for safe assets and a loosening of monetary policy in response to recessions without subsequent tightening affected this fall (Rawdanowicz *et al.*, 2021). Lane (2021) identifies the period succeeding the twin crisis of 2014–2019 as a period of relative calm. EU–IMF adjustment programmes in Greece, Ireland, Portugal and Cyprus assured investors that euro area resilience was a political priority. The European Stability Mechanism (ESM), established in 2012, provided financial assistance programmes to member states in financial distress. ESM loans are financed through common ESM bonds. The sale of ESM bonds provides funds at a cheaper rate than sovereign bonds from countries seeking ESM assistance. In addition to the ESM, the Outright Monetary Transactions (OMT) programme was also launched in 2012 to calm financial markets and eliminate the very acute risk of large divergences in short-term bond yields. According to Lane (2021), the ESM and OMT programmes were crucial in alleviating pressure from the more intense phase of the euro area sovereign debt crisis.

Along with crisis management tools, the euro area has also made progress in preventing future crises. The creation of the banking union with its two major instruments, the Single Supervision Mechanism (SSM) in 2013 and Single Resolution Mechanism (SRM) in 2014, have been central to boosting the resilience of the financial sector by allowing for increased coordination and supervision of national macro-prudential policy measures.

The COVID 19 crisis was the first large scale test of the euro area's new crisis management methods. In addition to already existing facilities, a new macro-economic stabilisation instrument was created with the €750 billion Next Generation EU programme (NGEU). Checherita-Westphal *et al.* (2022) attribute NGEU together with an adequate monetary and fiscal response to aiding the economy surpass its pre-crisis real GDP level in the fourth quarter of 2021. Notably, countries with the largest NGEU allocations are also more

prone to have less sustainable debt (EC, 2022b, cited in Checherita-Westphal *et al.*, 2022). Therefore, NGEU is a small step towards European fiscal union.

Croatia

On 1 January 2023 Croatia became the twentieth member of the Eurozone and the twenty-seventh member of the Schengen area. Preparations for this transition had been long in the making. After joining the EU in 2013, Croatia became subject to the preventive arm of the SGP in 2017 and entered the European Exchange Rate Mechanism II in 2020. This latest development pegged the kuna to the euro at a rate of 7.53450. To consolidate this fixed exchange rate system, the ECB agreed on a €2 billion swap agreement with the Croatian national bank (HNR). Integration into the SSM and SRM followed. The ECB now directly supervises significant institutions and indirectly supervises less significant institutions through national supervisors. Croatian debt had already entirely been denominated in euros prior to adoption of the single currency (ECB, 2022). The convergence reports of the European Commission (EC, 2022a) and ECB (ECB, 2022) both concluded that the Croatian economy had significantly converged to the euro area in fields ranging from price stability and long-term interest rates to supervision and structural reforms. Investors and rating agencies have taken note of these developments as can be seen by the declining trend in Croatian-German bond spreads (Figure 11) and a decade high credit rating (Figure 12).

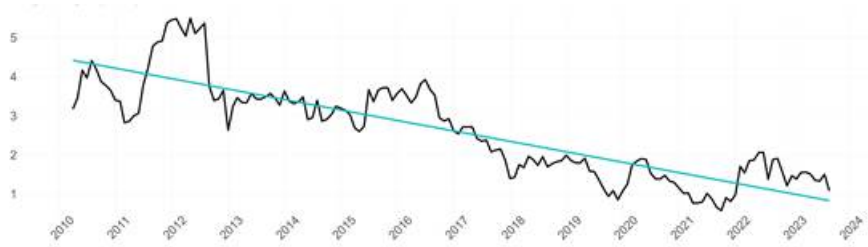

Figure 11: Croatian-German 10-year bond yield spread in per cent from 2010 to 2023. Investing.com

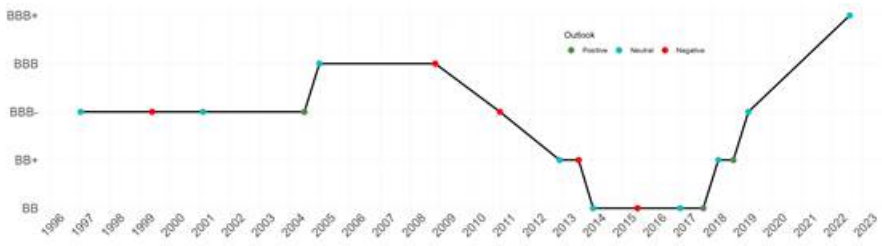

Figure 12: Croatian credit rating from 1996 to 2023. Standard & Poor's global rating. World Government Bonds

Reforms carried out during the accession period to the Euro boosted Croatia's resilience and crisis management capabilities. Real GDP growth of 6.2 per cent in 2022, representing the fourth highest rate in the EU, is a clear testament to these reforms (EC, 2023). In the last quarter of 2022, real GDP was 10.3 per cent higher than its pre-pandemic level. The European Commission's '2023 Country Report – Croatia' (EC, 2023) finds that Croatia had fully recovered from the pandemic, strengthened its resilience and competitiveness and is making good progress in accelerating the digital and green transition with the help of the EU's resilience and recovery plan. This plan supports investments by providing €5.51 billion in grants, equivalent of 9.5 per cent of Croatia's 2021 GDP. These grants are tied to economic reforms that should significantly boost potential GDP and put the country on a path to a green future.

Fiscal governance is another area where Croatia has improved in recent years. Not accounting for the pandemic-induced exogenous shock to the economy, Croatia's primary balance has been positive since 2016 and is projected to turn positive

again in 2024 (Figure 13). The debt ratio has also been on a declining trend since 2014, only spiking back up in 2020. The debt ratio is projected to reach the 60 per cent SGP limit by 2028 (Figure 14).

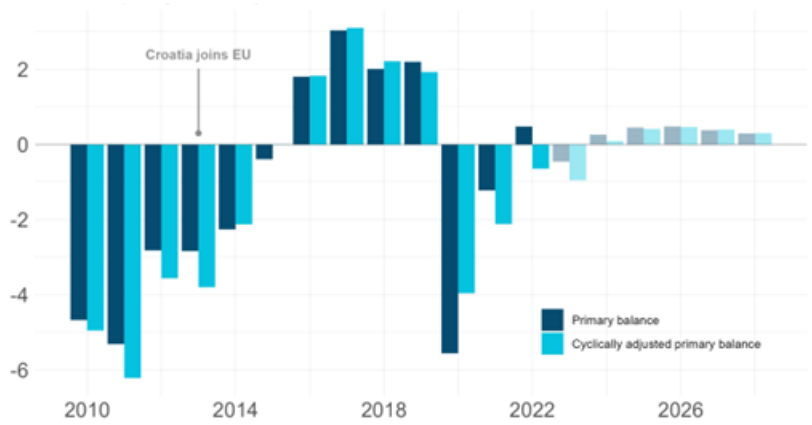

Figure 13: Croatian government primary balance from 2010 to 2028 as per cent of GDP. IMF (2023)

Figure 14: Croatian general government gross debt from 2010 to 2028 as per cent of GDP. IMF (2023)

Although many inefficiencies and structural problems remain in the Croatian economy, good fiscal governance, structural reforms and better crisis management methods in the EU make it highly unlikely that Croatia will go down the same path as Greece did.

Conclusion

Reforms to the monetary framework have made the euro area more resilient, boosted its crisis management methods and have been vital to prevent macro-economic imbalances from forming in the first place. However, debt levels remain dangerously high, and the ECB has tightened monetary policy to bring down inflation in accordance with its price stability mandate. This high-interest, high-debt environment constrains fiscal policy to make long-term climate investments. This article has analysed Greek debt dynamics to showcase the consequences of ineffective fiscal rules that are too constraining in times of economic downturns and fail to enforce prudent fiscal policy during economic upturns. Although the euro area has become progressively more resilient, and Croatia – as the newest member to the EMU – is very unlikely to go down the path of Greece, high-debt ratios remain a potent threat to stability. Adoption of fiscal standards and strengthening the role of IFIs in the monetary union would improve fiscal governance and reduce the risk of a future debt crisis.

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Glossary

Bond market: Financial market tapped by governments to issue debt

Credit crunch: Sudden decline in credit availability

Deficit bias: Preference towards running fiscal deficits

Eurosystem: The monetary authority of the euro area

Eurozone: The economic region of those EU countries that adopted the euro

Fiscal balance: Difference between government revenue and expenditure

Fisher rule: Formula expressing the relationship between nominal interest rates, real interest rates and inflation

Haircut: Reduction to the value of an asset used as collateral to reflect the underlying risk of that asset

OECD: Forum of mostly high-income developed economies

Prisoner's dilemma: A situation in game theory where the actions of two agents result in a sub-optimal outcome for both

Schengen area: EU countries that have committed to the free movement of people across borders

Stochastic techniques: Modelling techniques that account for random elements to account for the inherent uncertainty in future developments

Asymmetric shocks: Economic shocks that affect different regions or industries in an irregular way

Twin crises: The simultaneous occurrence of banking crises and currency crises

Weighted average maturity: The average maturity of a portfolio weighted by the composition of that portfolio

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